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Chapter 5

Existing Conditions, Impacts, and Mitigation – Certificate of Need

5.1 INTRODUCTION

This chapter assesses potential construction and operations impacts of Enbridge Energy, Limited Partnership's (Enbridge's, or the Applicant's) proposed Project and each of the Certificate of Need (CN) Alternatives discussed in Chapter 4. As discussed in Section 4.2, the Minnesota Public Utilities Commission (Commission) must determine whether the benefits to society of granting a CN for Enbridge's proposed Project outweigh the consequences, or whether a more reasonable and prudent alternative is available. This review of Enbridge's proposed Project and the range of CN Alternatives identified in Chapter 4 will help to inform the Commission's decision on need.

The impact assessment in this chapter is organized by three sub-sections:

- Natural environment,
- Socioeconomic environment, and
- Cultural resources.

The Commission is required to consider environmental and socioeconomic impacts in determining whether to issue a CN.[1] While the Commission does not typically evaluate impacts on cultural resources as part of a CN determination, the evaluation of historical and archaeological resources provides context relevant to the socioeconomic and natural environments. The impact assessment focuses on issues of concern for each resource that were identified based on:

- Relevant regulatory requirements;
- Input during scoping from the public, agencies, non-governmental organizations, and tribal representatives;
- Consultation with knowledgeable resource management agencies and tribal resource representatives; and
- Professional judgment, in part based on other impact assessments in recent energy infrastructure environmental impact statements (EISs) and agency guidance including U.S. Department of State (DOS) 2009; Federal Energy Regulatory Commission (FERC) 2013a, 2013b; U.S. Department of Energy (DOE) 2015; Wisconsin DNR 2016.

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1 According to Minnesota Administrative Rules § 7853.0130 B(3), the Commission must consider "the effect of the proposed facility upon the natural and socioeconomic environments compared to the effects of reasonable alternatives." According to Minnesota Administrative Rules § 7853.0130 C(2), the Commission must consider the effect of the proposed facility, or a suitable modification of it, upon the natural and socioeconomic environments compared to the effect of not building the facility.

The following sub-sections are presented in this chapter for each resource:

- Regulatory context and methodology,
- Existing conditions,
- Impact assessment, and
- Summary and mitigation.

The general contents of each of the sub-sections in this chapter are described below. The route permit analysis of route alternatives is described in Chapter 6, and the analysis of route segment alternatives is described in Chapter 7. The analysis of potential impacts associated with crude oil releases is presented in Chapter 10. Cumulative potential effects are discussed in Chapter 12.

5.1.1 Regulatory Context and Methodology

The regulatory context describes the framework of laws, regulations, ordinances, and policies intended to protect and manage an affected resource with regard to impacts associated with the proposed Project and CN Alternatives. As described in Chapter 3, these regulations are implemented under a variety of federal, state, and local jurisdictions.

For each affected resource, the impact assessment methodology is described. This includes identifying the region of interest (ROI) for the resource (the geographic scope), the specific data sets acquired and analyzed, the analytical methods and assumptions used, and the quantitative or qualitative metrics for assessing impacts relative to each issue of concern. The ROI incorporates the geographic extent of each CN Alternative, as described in Chapter 4. The extent of the ROI beyond the physical footprint of each CN Alternative varies among resources according to the characteristics of the resource and the Project-related effects that could occur (e.g., potential effects on vegetation would be localized while effects on air quality may be localized and regional).

5.1.2 Existing Conditions

The existing conditions within the ROI for each affected resource are described for the Applicant's proposed project and each CN Alternative. Sources of data used to characterize existing conditions were identified based on a review of publically available geospatial datasets; federal, state, and local government reports, assessments, and planning documents; and input during the scoping process, including input from the public, tribes, agencies, and non-governmental organizations. In addition, data available as part of Enbridge's application, Enbridge's November 2016 Environmental Assessment Worksheet (EAW), and responses to data requests from the Minnesota Department of Commerce Energy, Environmental Review and Analysis (DOC-EERA) were considered. **Descriptions of existing conditions reflect the current state of the environment. Where past projects have impacted or altered the environment, these impacts or alterations are captured in the description of the existing environment. For example, where forest has been cleared, or habitat has been fragmented by the existing mainline, this is part of the discussion in the relevant "existing conditions" section.**

Literature addressing the potential impacts of Project construction and operations was reviewed. Information was evaluated for its relevancy in assessing Project-related impacts based on the data collection methods used and the geographic extent, study duration and age, detail, and usefulness of the data in characterizing existing conditions. Project-specific mileposts included in Chapter 5 resource sections and figures are based on the Applicant's proposed project and system alternative SA-04 starting at milepost (MP) 0.0 from Neche, North Dakota, and extending to Superior, Wisconsin, or Joliet, Illinois, respectively. Maps depicting a range of existing resource conditions and data associated with land ownership and physical features are provided in Appendix A.

5.1.3 Impact Assessment

Resource-specific impact assessment methods are described in each resource section of this chapter. The impact assessments focus on direct impacts from construction and operation of the Project, describe the nature of the impacts, and provide quantifiable estimates of those direct impacts where feasible and meaningful. **The impact assessment describes the incremental impact that construction and operation of the Project (or alternatives to the project) will have on the existing environment (as described in the "Existing Conditions" portion of each section). Even in areas where existing conditions reflect impacts from previous projects, the proposed project (and alternatives) will still have incremental impacts on the environment, and these are the impacts represented in this EIS. The discussion in the impacts section identifies that there are some resources for which the incremental impacts of constructing and operating a pipeline in a new corridor are greater than the incremental impacts of constructing and operating a pipeline in an existing corridor. Habitat fragmentation, land use, and aesthetics are all good examples of cases where the incremental impact in a new corridor is greater than the incremental impact in an existing corridor.**

Examples of direct impacts include habitat fragmentation due to permanent loss of woody vegetation within the permanent right-of-way and contributions to climate change from greenhouse gas (GHG) emitted as a result of fossil fuel combustion in construction equipment. Indirect impacts, which may result from or be influenced by the Project later in time or further removed from direct Project activities, are described where appropriate. Examples of indirect impacts include economic growth, reduced productivity in wildlife due to stress, and direct impacts on aesthetics from vegetation removal indirectly affecting recreational use.

Within each resource section, the nature of impacts are discussed and the impacts are characterized in terms of their duration and magnitude or severity. Impacts are discussed for resources located within the ROI, specified for each resource. Impact duration was characterized as *temporary, short term, long term,* or *permanent*. Impact duration was considered temporary if the impact would occur only during and immediately following construction activity (e.g., turbidity due to instream construction). Impacts were considered short term if the resource recovery would last up to 3 years following construction (e.g., vegetation clearing in pastures). Impacts were considered long term if resource recovery would require more than 3 years but would occur during the life of the Project (e.g., clearing of trees in temporary construction work areas). Impacts were considered permanent if they would last for the life of the Project (e.g., clearing of trees within the permanent right-of-way). See Table 5.1-1.

Table 5.1-1. Definitions of Impact Duration

Term	Definition
Temporary	Impacts that would occur during and immediately following construction
Short term	Impacts that would continue for up to 3 years after construction
Long term	Impacts that would last more than 3 years but would recover during the life of the proposed Project or alternative[a]
Permanent	Impacts that would last for at least the duration of the proposed Project or alternative

Notes:

a. The life of the project is assumed to be 30 years for the purposes of this EIS.

Categories of impact magnitude or severity for the purposes of this EIS include *negligible*, *minor*, and *major*. Impacts were considered negligible if they have the potential to occur but generally would not be measurable or noticeable. Impacts were considered minor if they were expected to be evident but below resource-specific standards or metrics, such as those used in other recent linear infrastructure EISs in the region (e.g., Great Northern Transmission Line, Alberta Clipper, Wisconsin Sandpiper/Line 3 Replacement) and requirements by FERC for interstate natural gas pipelines crossing wetlands, waterbodies, or uplands (DOS 2009; FERC 2013a, 2013b; DOE 2015; Wisconsin DNR 2016). Impacts were considered major if they were expected to potentially exceed the resource-specific standards or metrics. See Table 5.1-2.

Table 5.1-2. Definitions of Impact Magnitude

Term	Definition
Negligible	Impacts could potentially occur, but not expected to be measureable or noticeable
Minor	Impacts are evident, but expected to be below resource-specific standards or metrics
Major	Impacts are evident and expected to exceed resource-specific standards or metrics

In each resource area, available datasets and metrics were reviewed to identify "factors" that provide an indication of how a given resource could be affected. For example, the presence of different vegetation types, noxious weeds, native plants, and old-growth forest were identified as factors that could be examined to understand how vegetation resources as a whole could be affected.

In most cases, no single "factor" provides a perfect indication of impacts to a resource. Therefore, for each resource, a collection of factors was analyzed that together provide a reasonably comprehensive indication of the potential impacts. For example, impacts to wetlands are a function of the number and acreage of wetlands crossed, wetland type and quality, and a number of other factors. There is no readily available composite dataset that effectively combines all of these individual factors, so the "wetlands" section of the EIS instead evaluates a suite of factors, including acreage of forested and scrub/shrub wetlands, acres of emergent wetlands, acres of Public Waters Inventory wetlands, acres of calcareous fen, acres of wetland reserve program wetland, and acreage of wetland mitigation bank easement within the Project footprint. Taken together, all of these factors provide a fairly complete picture of wetland impacts for a given alternative and provide the information necessary for a valid comparison of impacts across alternatives.

In most cases, impacts were assessed by mapping available data for each of the relevant factors and overlaying information on the construction and operations footprint for the Applicant's proposed project and CN Alternative. These overlays were reviewed in order to identify the location, type, and condition of resources within and adjacent to the construction and operations features. In addition, methods of construction and operations, including Applicant-proposed measures to minimize impacts, and other potential mitigation approaches were reviewed. Together, the spatial analysis and review of construction and operation methods were used to determine the nature, duration, and magnitude of impacts on a given resource. In addition to the impact assessment for the Applicant's proposed project, the CN Alternatives analyzed in this chapter include:

- Continued use of existing Line 3
- System alternative SA-04
- Transportation by rail
- Transportation by truck
- Existing Line 3 supplemented by rail
- Existing Line 3 supplemented by truck

The footprint of the Applicant's proposed project was defined based on the Project applications and additional information provided by Enbridge. This information is summarized in Chapter 2, which includes the Applicant-proposed measures to limit or avoid impacts during construction and operations. It was assumed that the Applicant-proposed measures would be applied to other pipeline alternatives, as appropriate. In addition, it was assumed that the rail and truck alternatives would be constructed and operated in accordance with standard best management practices (BMPs), and that all alternatives would incorporate regulatory and permit requirements.

As described in Chapter 2, Enbridge provided the location and land requirements of the proposed Project during construction and operation, including the construction work area along the pipeline route, additional temporary workspaces (ATWS), temporary and permanent access roads, temporary contractor and material/pipe storage yards (yards), and aboveground facilities. Enbridge provided DOC-EERA with geo-referenced geographic information system (GIS) shapefiles of these features. Over 80 percent of the 5,604 acres that would be disturbed during construction of the Project would be associated with the construction work area along the pipeline (typically 120 feet wide). The remaining land disturbance primarily would be associated with temporary construction, including ATWS (9 percent), access roads (5 percent), and yards (4 percent). During operation, 62 percent (3,480 acres) of the land disturbed during construction would return to preconstruction uses, and the majority of the permanent operations-related land disturbance would be associated with maintenance of the permanent right-of-way (97 percent, or 2,057 acres). The remaining 3 percent of permanently disturbed land would be associated with aboveground facilities, including access roads (67 acres). Each resource section in this chapter discusses the impacts of construction and operations for the Applicant's proposed project based on this detailed geo-referenced information.

In contrast, the available data for the CN Alternatives are not as extensive or complete as those for the Applicant's proposed project—in part, because no one has designed or engineered those alternatives as stand-alone projects. For continued use of the existing Line 3, data are available on pipeline location, some existing resources along the Enbridge Mainline system corridor, and Enbridge's ongoing integrity digs (as discussed in Section 4.2.3). In addition, approximately 42 percent of the Applicant's proposed project would be located in the same Enbridge corridor as the existing Line 3; consequently, much of the data for the Applicant's proposed project can be used to describe existing conditions for Line 3. However, no information is available on the precise location of future integrity digs if existing Line 3 operations continued, and the extent of disturbance at a dig site would be based in part on initial findings in the field. As a result, the environmental analysis for continued use of the existing Line 3 identifies the types of resources that may be affected and qualitatively assesses the nature, magnitude, and duration of those impacts.

For system alternative SA-04, quantitative analysis was conducted using the digital centerline identified during scoping; no corresponding geo-referenced information is available on aboveground facilities, ATWS, access roads, or yards. Along SA-04, a standard 120-foot-wide construction work area, 60 feet either side of the centerline, was applied to assess the impacts associated with pipeline construction. This allowed quantification of construction and operations impacts on land cover, habitat, and resources along SA-04 based on publically available information on existing conditions. Applying the relative proportion of land requirements for the Applicant's proposed project to the AS-04 alternative, the 120-foot-wide construction footprint equates to approximately 80 percent of the overall construction acreage that would be required to construct the system alternative (the other 20 percent being associated with unidentified ATWS, access roads, yards, and aboveground facilities). The 50-foot-wide permanent right-of-way along the SA-04 centerline would account for 97 percent of the operations footprint of the system alternative (based on the relative proportion of the land requirements for the Applicant's proposed project). Without knowing precise locations of aboveground facilities and secondary construction features (e.g., ATWS, yards, and temporary access roads), potential impacts were qualitatively assessed by applying assumptions used in the evaluation of the Applicant's proposed project. For example, although the exact locations for pump stations are not known, they average about 8 acres each for the proposed Project and would be expected to be located in open upland areas—especially with all the available agricultural land along SA-04. If the proposed Project is not constructed, field surveys, landowner and agency coordination, and site-specific engineering would be conducted to develop routing; develop specialized construction methods; and locate aboveground facilities, access roads, and yards along any other pipeline route.

It was assumed that transportation by rail and transportation by truck would require a new oil loading facility at the closest Enbridge pump station to Neche, North Dakota (Gretna, Canada); a new offloading facility at Clearbrook, Minnesota; an expansion of the offloading facility in Superior, Wisconsin; and associated upgrades to access those facilities. In addition, the rail and truck alternatives would entail rail/truck traffic to deliver oil from Gretna to Clearbrook and Superior. Although the exact facility locations and designs and the transit routes are not known, the environmental analysis was predicated on the general size of the facilities; an assumption that the facilities would be located within 1 mile of the Gretna pump station, Clearbrook terminal, and Superior terminal; and the likely train and truck transit routes described in Sections 4.2.6 and 4.2.7.

The environmental analysis of supplementing existing Line 3 with rail or truck transport assumed that (1) operation and maintenance of the existing Line 3 would continue as described for the existing Line 3; and (2) the same rail and truck facilities and access upgrades would be needed as described for transportation by rail and transportation by truck. Thus, the only difference in combining the impacts for the continued use of existing Line 3 with those for the rail or truck alternative would be associated with a decrease in the number of required train and truck transits during operations because of the reduced volume of oil that would be transported via train or truck with continued use of existing Line 3 (see Section 4.2.6-4.2.7).

5.1.4 Summary and Mitigation

Each resource discussion in this chapter concludes with a general summary of the anticipated impacts on the resource for the Applicant's proposed project and each CN Alternative based on the nature, extent, duration, and magnitude of potential impacts.

As discussed in Section 5.1.3, because of the lack of locational data for secondary facilities (aboveground facilities, access roads, ATWS, and yards) for the CN Alternatives, the impacts are more quantifiable for the Applicant's proposed project than for the CN Alternatives.

To allow for a more direct comparison between the Applicant's proposed project and the CN Alternatives, the impacts for both the Applicant's proposed project and SA-04 in the summary sub-section are calculated based on Enbridge's refined construction work area (typically 120 feet wide) and 50-foot-wide permanent right-of way. This approach results in underestimating impacts for both alternatives by approximately 3 percent (operations) to 20 percent (construction). As discussed in Section 5.1.3, it is expected that the majority of the acreage of aboveground facilities, access roads, ATWS, and yards for the SA-04 alternative would be located in upland open lands. From an overall acreage perspective, the 3- to 20-percent underestimate does not substantially alter the general relationship between the Applicant's proposed project and CN Alternatives, as the land requirements for construction and operation along the SA-04 alternative are over twice the amount for the Applicant's proposed project; both the Applicant's proposed project and SA-04 would require acreage for construction an order of magnitude greater than for construction of the rail or truck facilities (see Sections 2.4 and 4.2).

In addition to incomplete information on the extent of upland impacts for SA-04, the primary shortcoming of the above approach for the environmental analysis is associated with Enbridge's proposal to reduce the width of the construction work area for the Applicant's proposed project in some wetlands and waterbodies (from 120 feet to 95 feet) based on site-specific field investigations and engineering. These refinements have not been incorporated into the general approach for the SA-04 footprint. For wetlands, this discrepancy is addressed in the wetlands resource section. For the analysis of surface water, the issue is recognized but is less integral, as the impact assessment for surface waters is not driven by the acreage of waterbody crossings as much as the resulting impact on water quality, aquatic habitat, and fisheries, and the measures to minimize those impacts. As noted above, if SA-04 is approved, it is expected that field surveys and engineering would result in refinements to the route, the width of the construction footprint, and construction methods to further avoid and minimize impacts to wetlands and waterbodies.

Comprehensive quantitative data were not available for all resource-specific factors associated with existing Line 3 operations, or with construction and operation of the rail or truck alternative. As a result, some of the summary sub-sections present quantitative information for these factors where available and qualitative results for those alternatives where quantitative information is not available.

The summary sub-section for each resource includes a summary table to highlight impacts on the resources among need alternatives. **The individual rows of these tables summarize information for the various factors evaluated in the impact assessment. As discussed above, no single factor provides a comprehensive picture of impacts; instead, the whole suite of factors for each resource are meant to be considered all together. For the summary tables, this means that the individual rows are not meant to stand alone, but together all the rows provide a reasonably comprehensive summary of the potential impacts. Additionally, the quantitative information in the tables should be coupled with an**

understanding of the qualitative descriptions of impacts that are contained in the text in each section. Tables provide quantitative information and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts is contained in the text of each section.

The summary sub-section also identifies mitigation, as appropriate, to further avoid and minimize impacts. Mitigation may include expanding BMPs, initiating agency/landowner coordination, and identifying potential permit conditions (Section 3.6 summarizes the permits and approval processes for the Project).

5.1.5 References

Federal Energy Regulatory Commission (FERC). 2013a. Upland erosion control, revegetation, and maintenance plan. May. Washington, DC.

_____. 2013b. Wetland and Waterbody Construction and Mitigation Procedures. May. Washington, DC.

U.S. Department of Energy (DOE). 2015. Great Northern Transmission Line Final Environmental Impact Statement. (DOE/EIS0499.) Prepared by the U.S. Department of Energy, Office of Electricity Delivery and Energy Reliability and the Minnesota Department of Commerce, Energy Environmental Review and Analysis. October. Washington, DC.

U.S. Department of State (DOS). 2009. Final Environmental Impact Statement for the Alberta Clipper Pipeline Project. U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs. June. Washington, DC.

Wisconsin Department of Natural Resources (Wisconsin DNR). 2016. Final Environmental Impact Statement Enbridge Sandpiper and Line 3 Replacement Projects. August.

5.2 NATURAL ENVIRONMENT

Project actions have the potential to affect the natural environment. This section describes the existing conditions and assesses potential impacts on water resources, geology and soils, flora and fauna, public lands, and air quality associated with the Applicant's proposed project and CN Alternatives.

5.2.1 Water Resources

This section describes water resources, including groundwater, surface water, wetlands, and floodplains, located along the Applicant's proposed project and the existing Line 3 pipeline in North Dakota, Minnesota, and Wisconsin and along system alternative system alternative SA-04 in North Dakota, Minnesota, Iowa, and Illinois. The analysis focuses on major groundwater aquifers and wells; surface waterbodies, including streams, rivers, and lakes, and their designations; Public Waters Wetlands, calcareous fens, and wetland reserve programs; and floodplains designated by the Federal Emergency Management Agency (FEMA). The potential impacts of pipeline construction and operation on water resources are described for and compared between the Applicant's proposed project and the CN Alternatives (continued use of the existing Line 3, system alternative SA-04, transportation by rail or truck, and supplementing continued use of the existing Line 3 with rail or truck transportation).

5.2.1.1 Groundwater

Groundwater is water that collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. Groundwater originates from rain and from melting snow and ice that infiltrate into the ground; it is the source of water for springs and wells. Groundwater is relied on as a source for drinking water, irrigation, and industrial use (USGS 1992). Groundwater can be sourced from shallow surficial aquifers or from deeper confined aquifers. Activities that reduce the quantity of available water or introduce contaminants into these aquifers can affect groundwater resources and the people and industries that rely on them.

This section assesses the potential for construction and operation of the Project to affect the quantity of available water or to introduce pollutants that would degrade the quality of groundwater resources. Groundwater impacts that could occur during construction and operation are evaluated and compared for the Applicant's proposed project and the CN Alternatives.

The potential construction-related groundwater impacts to be addressed include the following:

- Changes in groundwater availability (from withdrawals for hydrostatic testing and other construction activities including the "French drain" effects of a pipeline);
- Increases in total suspended solid (TSS) concentrations during trenching/excavation activities in shallow aquifers;
- Degradation of shallow groundwater quality from blasting, spills, or existing contamination;
- Degradation of groundwater quality in potable supply wells, sole source aquifers,[2] or other designated groundwater protection areas; and

[2] EPA defines a "sole source aquifer" as one that supplies at least 50 percent of the drinking water for its service area and there are no reasonably available alternative drinking water sources should the aquifer become contaminated.

- Degradation of water quality from drilling mud releases during horizontal directional drilling (HDD) crossings.

Potential operations-related groundwater issues addressed in this section include:

- The potential for ongoing groundwater availability changes due to repair and maintenance activities and the risk of French drain effects, and
- Contamination resulting from small fuel and lubricant leaks and spills from maintenance and inspection vehicles.

This section first describes the existing groundwater resource conditions within an area along the Applicant's proposed project and each of the CN Alternatives where groundwater could be affected by construction or operation activities. The potential impacts on groundwater resources from construction and operation of the Applicant's proposed project and CN Alternatives are considered next. A summary and comparison of the impacts of the Applicant's proposed project and CN Alternatives are included at the end of the section. Potential impacts on groundwater resources due to a release of crude oil from the pipeline are discussed in Chapter 10.

5.2.1.1.1 Regulatory Context and Methodology

Regulatory Context

A number of water management and groundwater regulations control activities that have the potential to affect the quantity or quality of groundwater resources. These programs and their relevance to the construction and operation of pipelines are summarized by state in Table 5.2.1.1-1.

Continued use of existing Line 3 and transport by rail or truck require no, or minimal, construction of above ground facilities; they do not require appropriation of large quantities of water that would trigger regulatory approval. The minimal construction activities related to these alternatives (see Chapter 4) would be subject to general stormwater management practices and associated BMPs.

Methodology

The ROI for the analysis of potential impacts on groundwater during construction generally consists of the pipeline, rail, or truck corridor and a 1,000-foot buffer on either side of the centerline of the Applicant's proposed project and the CN Alternatives. Although the precise location of rail and truck offloading facilities are not known, they would be located in proximity to the Clearbrook and Superior terminals, where existing conditions would be the same as those described for the Applicant's proposed project. Routes for rail and truck transportation have been assumed for this impact analysis but could vary in actual operation.

Table 5.2.1.1-1. Regulatory Requirements for Protection of Groundwater during Pipeline Construction

Unit of Government	Type of Application	Reason Required
North Dakota		
North Dakota State Water Commission[a]	Water Appropriation Permit	Chapter 61-04 North Dakota Century Code and Article 89-03 of the State Administrative Code authorizes withdrawal and use of groundwater for hydrostatic testing, dust control, HDD installation, and trench dewatering.
North Dakota Department of Health[b]	North Dakota Source Water Protection Program – Wellhead Protection Area consultation	1999 Safe Drinking Water Act requires applicant to determine whether pipeline construction would affect existing wellhead protection areas.
Minnesota		
Minnesota Department of Natural Resources[c]	Water Appropriation Permit for withdrawals exceeding 10,000 gallons per day or 1 million gallons per year	Minnesota Statute 103G.265 authorizes withdrawal and use of water from groundwater from private or municipal wells for hydrostatic testing, dust control, HDD installation, and trench dewatering.
	Calcareous Fen Management Plans	The Minnesota Wetlands Conservation Act requires approved management plans for impacts on calcareous fens.[d]
Minnesota Department of Health[e]	Drinking Water Supply Management Area – Wellhead Protection Area consultation	Minnesota Administrative Rules Chapter 4720 ensures that pipeline construction and operation are compatible with goals of relevant Drinking Water Supply Management Area and Wellhead Protection Area plans.
Minnesota Pollution Control Agency[f]	Permitting of actions that may result in discharges to surface water or groundwater	Clean Water Act Section 401 requires certification that the Project would not result in violation of state water quality standards.
		Minnesota Groundwater Protection Act requires prevention/remediation of groundwater contamination.
Iowa		
Iowa State Department of Natural Resources[h]	Water Use Permit	Iowa Administrative Code 567, Chapter 52 directs that registration of a minor, non-recurring use of water is required for a project where at least 25,000 gallons of water would be used in a 24-hour period and the project does not exceed a 1-year duration (e.g., well drilling and highway construction activities).
Illinois		
Illinois Environmental Protection Agency[i]	Consultation	Illinois Groundwater Protection Act – Wellhead Protection Area ensures that pipeline construction and operation are compatible with goals of relevant plans.
Wisconsin		
Wisconsin Department of Natural Resources[g]	Water Use Permit	Great Lakes Compact Law (2007 Wisconsin Act 227) and Groundwater Quantity Law (2003 Wisconsin Act 310) require users in Great Lakes Basin withdrawing quantities averaging 100,000 gallons per day or more in a 30-day period to secure a Water Use Permit to ensure that withdrawals do not harm rivers, streams, lakes, wetlands, springs, groundwater, or plants and animals that depend on them.

[a] Source: North Dakota State Water Commission 2015.

[b] Source: North Dakota DH 2016.

Table 5.2.1.1-1. Regulatory Requirements for Protection of Groundwater during Pipeline Construction

Unit of Government	Type of Application	Reason Required

[c] Source: *Minnesota DNR 2017a.*
[d] Calcareous fens are discussed in Wetlands, Section 5.2.1.3.
[e] Source: *Minnesota DH 2014.*
[f] Source: *Minnesota PCA* n.d.[a].
[g] Source: Wisconsin DNR n.d.
[h] Source: *Iowa State DNR n.d.*
[i] Source: Illinois EPA 2015.
HDD = horizontal directional drilling

The ROI for assessment of operations impacts varied according to the configuration of the alternative. Operations impacts for the Applicant's proposed project were estimated based on the footprints for the permanent right-of-way provided by the Applicant. Operations impacts for the existing Line 3 were evaluated based on the existing permanent right-of-way for that pipeline. Operations impacts for system alternative SA-04 were estimated by overlaying a standardized 50-foot-wide permanent right-of-way centered on the route. As noted above, specific routes for rail and truck transportation were assumed for the impact analysis, although other routes also may be used. Potential impacts on groundwater associated with transportation by rail and truck operations were assessed qualitatively.

Impacts on groundwater resources were identified based on common construction methods; peer-reviewed literature; agency documents, including permit requirements and guidance manuals; Applicant-submitted documents, including the November 2016 EAW and associated construction BMP plans (Enbridge 2016a); and the experience and professional judgment of the hydrogeologists involved in developing this analysis.

Identification of groundwater resources potentially affected by the Project was completed by reviewing reports and data from the U.S. Geological Survey (USGS); the State Geological Surveys of Minnesota, Iowa, and Illinois; the North Dakota State Water Commission and North Dakota Source Water Protection Program; the Minnesota Department of Natural Resources (Minnesota DNR), Minnesota Pollution Control Agency (Minnesota PCA), Minnesota Department of Agriculture (Minnesota DA), and Minnesota Department of Health (Minnesota DH); Iowa Department of Natural Resources (Iowa DNR); and the U.S. Environmental Protection Agency (EPA).

Impacts related to groundwater resources were evaluated by overlaying the Applicant's proposed project and CN Alternative footprints with the following data sources:

- Aquifer locations and type, including EPA-designated sole source aquifers;
- Wellhead protection areas[3] in North Dakota; Minnesota, Iowa, and Illinois;
- Domestic and public water supply wells in North Dakota, Minnesota, Iowa, and Illinois. A Public Water Supply (PWS) in Minnesota by definition must serve 25 or more people for at

[3] A wellhead protection area is the surface and subsurface area surrounding a public water supply well or well-field that is regulated to prevent contamination; any potential contaminants would be likely to move toward this area and reach the well or well-field capture zone.

least 60 days of the year as defined by the Federal Safe Drinking Water Act. PWSs are broken down into community and non-community:

- Community PWS (Municipal and Non-municipal) – provides water to the public in their primary living space—where people live and sleep—(i.e., homes, apartments, nursing homes, prisons, mobile home parks, etc.)
- Non-community PWS – provides water to the public in places other than their homes—where people work, gather and play. Two types are:
  - Transient Noncomm PWS – facilities that serve at least 25 people at least 60 days of the year, but do not serve the same 25 people over 6 months of the year (i.e., restaurants, campgrounds, hotels, churches)
  - Nontransient Noncomm PWS – facilities that serve at least 25 of the same people over 6 months of the year (i.e., schools, offices, factories, daycare centers);

- Minnesota water table aquifer vulnerability; Iowa groundwater vulnerability; and Illinois aquifer sensitivity maps;
- Minnesota DNR's Watershed Health Assessment Framework (WHAF) groundwater contamination susceptibility index;
- Minnesota PCA's "What's in My Neighborhood?" (WIMN) database and EPA's Facility Registry Service (EPA-listed contaminated sites);
- Minnesota drinking water supply management areas (DWSMAs);[4] and
- Minnesota pollution sensitivity of near-surface materials.

No single one of the datasets listed above provides a complete indication of all relevant impacts to groundwater. Together, though, these datasets provide a reasonably comprehensive indication of the potential impacts. For example, public water supply well counts do not consider the influence that overlying geology may have on the susceptibility of public water supply wells to impacts. However, data from the aquifer vulnerability dataset can aid the reader in understanding the influence that overlying geology may have on the susceptibility of groundwater along the route to impacts.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with the qualitative descriptions of impacts that are contained in the text. The summary table at the end of the groundwater section provides counts, for example, of DWSMAs and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to DWSMAs is contained in the text of this section.

The impact analysis for the Applicant's proposed project and CN Alternatives was made using available comparable data. Individual states monitor and categorize groundwater quantity and quality in different manners; thus, the same or even similar data are not available across all states. Minnesota DH, Minnesota DNR, and Minnesota PCA provided data and guidance for these analyses.

[4] A drinking water supply management area is the surface and subsurface area surrounding a public water supply well that is approved by Minnesota DH and completely contains the scientifically calculated wellhead protection area; these are managed by the entity identified in a Wellhead Protection Plan.

5.2.1.1.2 Existing Conditions

Groundwater can accumulate in underground layers of permeable rock, sediment, or soil and when these layers yield usable amounts of water, they are known as "aquifers." Aquifers can be classified as unconfined or confined. When the top of the aquifer is not overlain by impermeable layers that restrict the vertical movement of water, the aquifer is unconfined. The upper surface of groundwater in this type of aquifer is referred to as the "water table." When there is a layer of low-permeability material between the top of the aquifer and overlying sediments that restricts the vertical movement of water, the aquifer is confined. The low-permeability layers are called "confining units," or aquitards, which are mainly composed of silt and clay. Both of these aquifer types occur beneath the Applicant's proposed project and the CN Alternatives.

Confined and unconfined aquifers occur in both glacial and bedrock materials. Glacial aquifers consist of unconsolidated sediments deposited and reworked by glaciers that range in depth from just below to several hundred feet below the land surface. Bedrock aquifers underlie the glacial materials and consist of deeper consolidated bedrock layers, such as limestone or sandstone.

The following discussion details the existing groundwater conditions in the vicinity of the Applicant's proposed project and CN Alternatives, including aquifer types, characteristics of the materials that make up the aquifers, water yield, and water quality.

Applicant's Proposed Project

<u>Glacial Aquifers</u>

Groundwater in permeable glacial sediments and recent stream-derived (alluvial) sediments is an important source of water in the vicinity of the Applicant's proposed project in North Dakota and Minnesota. These sediments comprise glacial till, outwash, glacial lake sediments, or sand and gravel that have been deposited along streams.

The thickness of glacial aquifers is highly variable, ranging from a few feet to greater than 150 feet. The highly variable composition of these aquifers, both vertically and horizontally, results in widely varying yields at different depths and locations. Well yields in glacial aquifers range from approximately 10 to 1,000 gallons per minute (gpm) (Adolphson et al. 1981), which makes them important sources of drinking water for domestic and municipal use (Minnesota PCA 1999).

The quality of water in glacial aquifers is generally good, but minerals such as iron and manganese may be present in a dissolved state in concentrations that exceed secondary drinking water standards (levels at which human health is not affected, but at which the taste, odor, and color of water may be negatively affected).

Water Table Glacial Aquifers

Most glacial aquifers that contain sands and gravels near the land surface contain surficial or water table aquifers because they receive direct recharge from infiltrating precipitation, melting snow, and overlying wetlands. Groundwater in surficial aquifers generally moves downhill or down-gradient from upland areas, recharges deeper aquifers, and discharges at lakes and streams. Water table aquifers are inherently more vulnerable to construction and spill impacts because they are in direct contact with the land surface. The depth to the water table along with the soil types indicates the degree of vulnerability to impacts.

Confined Glacial Aquifers

Glacial aquifers also exist as confined aquifers near the Applicant's proposed project. Confined glacial aquifers consist of permeable sand and gravel sediments at variable depths from the land surface, overlain by confining units. The confining units restrict the movement of water between the aquifers and the land surface; therefore, these aquifers are generally better protected from human activity on the land surface and thus not generally affected by pipeline activities. Confined glacial aquifers are recharged primarily by downward leakage from overlying surficial aquifers or upward leakage from deeper confined aquifers. No available datasets show the exact location of confined glacial aquifers in the ROI, but their locations can be inferred from nearby well and boring records.

Bedrock Aquifers

In areas with greater thicknesses of glacial material overlying bedrock aquifers, there is a higher likelihood that low-permeability confining layers are present in the overlying glacial sediments, and the potential for groundwater within the aquifers to be affected by construction or operation of a pipeline is low. Where the depth to bedrock is shallow, there is a lower likelihood that low-permeability confining layers are present in the overlying glacial sediments, and there is a higher potential for groundwater within these bedrock aquifers to be affected by construction or operation of the pipeline.

Generally, two types of bedrock aquifers occur beneath the glacial aquifers along the Applicant's proposed project. The first type consists of hard and very old igneous and metamorphic rocks where groundwater occurs mostly in fractures. In most instances, this type of material does not yield usable quantities of water. The exception is where this bedrock is shallow and more highly fractured.

The second type of bedrock aquifer consists of thick, laterally extensive sequences of sandstone, limestone, and dolostone of sedimentary origin. This type of bedrock aquifer tends to be more productive than the first type. Similar to confined glacial aquifers discussed above, the majority of this type of bedrock aquifer often is isolated from overlying surficial aquifers by confining units, which decreases their vulnerability to contamination from land surface activities. The exception to this is karst aquifers, which are vulnerable to contamination.

A karst aquifer is a type of bedrock aquifer that usually consists of limestone but also can consist of dolostone or sandstone. Aquifers composed of these pH basic rock types are prone to chemical weathering and dissolution from the slight acidity of precipitation and groundwater, which can result in the formation of fractures, joints, sinkholes, cavities, caves, and void spaces that allow the movement of large volumes of surface water into and through the aquifer. These aquifers are often the source of abundant springs and seeps. These characteristics also allow contamination to spread rapidly within the aquifer. Karst aquifers are susceptible to collapse of the aquifer matrix, which can be triggered by construction activities on the land surface. This can lead to the formation of sinkholes in unconsolidated sediments that overlie the bedrock. Paleozoic limestones and some Precambrian sandstones found in southeastern and eastern Minnesota and in northeast Iowa are susceptible to dissolution and result in karst topography. Bedrock in these areas often is less than 50 feet below land surface and is considered vulnerable to contamination (Minnesota DNR 2016; Iowa DNR 2010). Karst conditions are not believed to be present along the Applicant's proposed project.

With the exception of shallow bedrock (either igneous/metamorphic or sedimentary, which is not common along the Applicant's proposed project), bedrock aquifers are not expected to be affected by pipeline construction and operation because they exist at depths averaging from 300 to 400 feet, which is well below pipeline construction depths. These deeper bedrock aquifers often are overlain by thick confining layers, which protect them from disturbance by human activities on the land surface. These aquifers are listed below in Table 5.2.1.1-2 but generally are not discussed further.

Beneath the Applicant's proposed project in Minnesota, bedrock aquifers consist of hard and very old igneous and metamorphic rocks. Groundwater in these rocks occurs mostly in fractures that may not yield usable quantities of water.

Table 5.2.1.1-2. Bedrock Aquifers Crossed by the Applicant's Proposed Project

State	Bedrock Aquifer	Description
North Dakota	Unit D	• Primarily consists of limestone. • Includes some sandstone and shale. • The top of this unit is a few hundred feet below land surface in the area. • Very little is known about the water-bearing properties of the rocks in this unit.
North Dakota and Minnesota	Red River-Winnipeg	• Occupies a depression in the crystalline bedrock of northwestern Minnesota and is overlain by several hundred feet of glacial till and lake sediments. • A porous zone at the top of the upper limestone yields most of the water to wells in the aquifer. Groundwater generally flows eastward through the aquifer from North Dakota and discharges upward to wells and to overlying deposits. • Yields of wells open to the full thickness of the aquifer range from 100 to 250 gpm. • Water is unsuitable for most uses because of the high mineral content; concentrations of dissolved solids range from about 3,000 mg/L in the eastern part of the aquifer to about 60,000 mg/L in the northwestern corner of Minnesota.
Minnesota	Proterozoic	• Underlies glacial drift and rocks in much of the north-central part of Minnesota. • Yields to wells are generally less than 20 gpm, but yields of 30 gpm can be obtained locally from wells completed in the fractured zone near the upper surface of the aquifer. • Water is used for numerous domestic and some municipal supplies, and is of the calcium-magnesium-bicarbonate type. It contains much less iron, manganese, dissolved solids, and hardness than most water from glacial drift aquifers in the area.
Minnesota	Cretaceous	• Present in Kittson and Itasca counties in the Applicant's proposed project. • Aquifer is not widely used except where glacial drift aquifers are absent or where well yields are poor. • Most water is used to supply farms, and wells typically yield from 10 to 25 gpm. • Major source of water locally, southwest of the Minnesota River. • Water quality is typically poor compared to glacial aquifers, and it has naturally elevated levels of arsenic in many parts of the state.

Table 5.2.1.1-2. Bedrock Aquifers Crossed by the Applicant's Proposed Project

State	Bedrock Aquifer	Description
Minnesota and Wisconsin	Precambrian Undifferentiated	• Underlies the entire state. • Source of minor water supplies in the central portion of the region of interest and along the Applicant's proposed project in Carlton County. • Yields generally range from 1 to 25 gpm. • Quality of water often is similar to that contained in overlying glacial drift aquifers. Concentrations of dissolved solids are generally less than 300 mg/l. Calcium-magnesium-bicarbonate type water is the most common water type, and concentrations of total dissolved solids are typically less than 300 mg/l.

Sources: Paulsen 1983; Adolphson et al. 1981; Wisconsin GNHS 2013.

gpm = gallons per minute, mg/L = milligrams per liter

Sole Source Aquifers

A sole source aquifer is an underground water supply designated by the EPA as the "sole or principal source" of drinking water for an area. The Applicant's proposed project would not cross any aquifers designated by EPA as sole source aquifers.

Domestic Wells, Public Wells, and Wellhead Protection Areas

There are 304 domestic wells within the ROI for the Applicant's proposed project (98 unverified and 205 verified location domestic wells in Minnesota and 1 in North Dakota). Well data were requested for the Wisconsin portions of the Applicant's proposed project and alternatives but were not made available. There are two unverified and four verified locations of public wells within Minnesota in the ROI. Private well databases often only include a portion of existing wells, as many older wells were installed prior to current record-keeping efforts; therefore it is likely that more wells are present in the vicinity of the proposed project, as well as in the vicinity of alternatives.

The Applicant's proposed project would not cross any wellhead protection areas in North Dakota, and it would cross 87 acres in Minnesota. Wellhead protection area data were requested for the Wisconsin portions of the Applicant's proposed projects and CN Alternatives but were not made available.

Aquifer Vulnerability Areas

Minnesota provides rankings of water table aquifer vulnerability based on the water time of travel to the aquifer. The vulnerability ranking is inversely proportional to the time of travel: in areas of higher sensitivity, contaminants may reach the groundwater within hours to months; and in areas of lower sensitivity, surface contamination may take months to years to travel into groundwater. The Applicant's proposed project would cross 25,765 acres of high vulnerability water table aquifers in Minnesota. Comparable data are not available for North Dakota or Wisconsin.

Contaminated Sites

There are 19 EPA-designated contaminated sites within the ROI for the Applicant's proposed project (13 in Minnesota and 6 in Wisconsin). There are 104 WIMN sites (three Minnesota DA and 101 Minnesota PCA) within the ROI for the Applicant's proposed project in Minnesota (these data are not available in other states).

Minnesota Groundwater Contamination Susceptibility and Pollution Sensitivity of Near-Surface Materials

Minnesota also evaluates the vulnerability of groundwater to contamination based on the shape, type, and relative position of surface and subsurface geology (e.g., the geomorphic setting), which controls the flow paths of water and dissolved elements above and below the surface. Sandiness, permeability, depth to rock outcrops, fracturing and permeability of bedrock, flow-restricting layers, and surface and subsurface connections all affect how vulnerable groundwater is to contamination. Areas of highest groundwater contamination susceptibility are in central, north-central, and east-central Minnesota and in the southeastern corner of the state in areas dominated by sand and gravel aquifers or in areas with karst bedrock. The Applicant's proposed project would cross 26,382 acres of high groundwater contamination susceptibility in Minnesota. Comparable data are not available for North Dakota or Wisconsin.

Additionally, Minnesota DNR classifies the sensitivity to pollution of near-surface materials, which is an estimate of the time it takes for water to travel through the unsaturated zone to reach the water table, which is assumed to be 10 feet below land surface. Generally, areas of coarse-grained material are modeled as higher sensitivity to pollution compared to areas of fine-grained material. Based on these data, the Applicant's proposed project would cross 16,299 acres of high pollution sensitivity in Minnesota. The DNR also classifies bedrock (aquifer) surface sensitivity to pollution and there are 1700 acres of very high to high sensitivity Precambrian shallow fractured bedrock aquifers within the Applicant's proposed project ROI. There is no karst at or near the land surface within the ROI.

DWSMAs

The Applicant's proposed project ROI would cross 538 acres of DWSMAs in Minnesota. DWSMA data do not exist for other states.

Continued Use of Existing Line 3

Glacial Aquifers

The confined and unconfined glacial aquifers below the existing Line 3 pipeline are similar to those described above for the Applicant's proposed project.

Bedrock Aquifers

The existing Line 3 crosses the same bedrock aquifers as those crossed by the Applicant's proposed project (see Table 5.2.1.1-2). In addition, the primary fractured bedrock aquifer beneath existing Line 3 is the Biwabik Iron-formation aquifer. This Precambrian age aquifer is composed of chert and iron materials. It generally underlies glacial materials; however, it outcrops[5] above the land surface in north-central Minnesota. The yields of this aquifer range from 250 to 1,000 gpm. It is one of the most productive aquifers for the Mesabi Iron Range and is a primary source of drinking water for many municipalities. Dissolved solids range from 100 to 300 milligrams per liter (mg/L); and the water can contain high concentrations of iron, manganese and silica. This aquifer is susceptible to contamination where surficial materials are thin, at outcrops, and in mine pits. Groundwater flow in this aquifer occurs as regional flow along bedding planes and large fracture networks, as localized flow in discrete fractures near wells, or as a combination of both.

[5] An outcrop is a visible exposure of bedrock on the land surface.

Sole Source Aquifers

The existing Line 3 route does not cross any aquifers designated by EPA as sole source aquifers.

Domestic Wells, Public Wells, and Wellhead Protection Areas

There are 589 domestic wells within the ROI for the existing Line 3 (366 unverified location and 222 verified location domestic wells in Minnesota and 1 in North Dakota). There are four unverified and 44 verified location public wells within the ROI for the existing Line 3, and all are located in Minnesota. The existing Line 3 crosses 624 wellhead protection area acres in Minnesota. It does not cross any wellhead protection areas in North Dakota. Well and wellhead protection data were requested for the Wisconsin portions of the route but were not made available.

Aquifer Vulnerability Areas

The existing Line 3 crosses 69,614 acres of high vulnerability water table aquifers in Minnesota. Comparable data are not available for North Dakota and Wisconsin.

Contaminated Sites

There are 107 EPA-designated contaminated sites within the ROI for the existing Line 3 (101 in Minnesota and 6 in Wisconsin). There are 159 WIMN sites (one Minnesota DA and 158 Minnesota PCA) within the ROI for the existing Line 3 in Minnesota (these data are not available in other states).

Minnesota Groundwater Contamination Susceptibility and Pollution Sensitivity of Near-Surface Materials

The existing Line 3 would cross 19,833 acres of high groundwater contamination susceptibility, 16,179 acres of high pollution sensitivity of near-surface materials, and 1700 acres of very high to high sensitivity Precambrian shallow fractured bedrock aquifers in Minnesota. Comparable data are not available for North Dakota or Wisconsin. No other karst aquifers or bedrock at or near the land surface are within the ROI.

DWSMAs

The ROI for the existing Line 3 crosses 1,120 acres of DWSMAs in Minnesota. DWSMA data do not exist for the other states.

System Alternative SA-04

Glacial Aquifers

Groundwater in permeable glacial sediments and recent stream-derived (alluvial) sediments is an important source of water in the vicinity of system alternative SA-04 in North Dakota, Minnesota, Iowa, and Illinois (Kay and Bailey 2016; Prior et al. 2003; Sadorf and Linhart 2000; Visocky et al. 1985; Voelker 1986).

Bedrock Aquifers

North Dakota

System alternative SA-04 also would cross the Unit D bedrock aquifer described for the Applicant's proposed project (see Table 5.2.1.1-2).

Minnesota

Beneath system alternative SA-04 in southwest Minnesota and above the hard, fractured bedrock, bedrock aquifers consist of Cretaceous sandstones that are interbedded with thick shale. These sandstone aquifers are relatively thin and only locally useful. Cretaceous bedrock aquifers are present in Traverse, Stevens, Swift, Chippewa, Renville, Sibley, Nicollet counties although not everywhere that SA-04 crosses in these counties. Similar to the Applicant's proposed project, shallow bedrock is not common along system alternative SA-04, with depths to bedrock along both alignments averaging from 300 to 400 feet. System alternative SA-04 in Minnesota crosses the same bedrock aquifers as the Applicant's proposed project listed above, with the exception of the Proterozoic Aquifer.

In the southeastern third of Minnesota, beneath system alternative SA-04, the bedrock aquifers consist of thick, laterally extensive sequences of sandstone, limestone, and dolostone of sedimentary origin. In these bedrock aquifers, groundwater occurs in granular pore spaces, partings, joints, fractures, and dissolution features. Karst features are common in bedrock in the extreme southeast of Minnesota. Conditions vary locally, but generally these aquifers are capable of yielding quantities of groundwater that are sufficient for most purposes. However, these aquifers are highly vulnerable to contamination and structural changes with ground disturbance; including induced sinkhole formation and alteration of groundwater flow.

Karst topography is found in southeastern and eastern Minnesota, where Paleozoic limestones and some Precambrian sandstones are susceptible to dissolution. Along system alternative SA-04, relatively shallow carbonate bedrock with potential for karst intersects the route across Minnesota, Iowa, and Illinois (none is present in North Dakota). Karst features are present in Minnesota along 8 miles of system alternative SA-04 in Mower County and 3 miles in Le Seur and Blue Earth counties (Minnesota DNR 2016; USGS 2016). Known and potential karst conditions also are present along approximately 63 miles of the route in Iowa and 5 miles in Illinois.

Iowa

The Silurian-Devonian and Upper Carbonate aquifers are present near the land surface and supply approximately 37 percent of groundwater used in northeastern and southeastern Iowa. The Silurian-Devonian aquifer would be crossed by the central and southern portion of system alternative SA-04 in Iowa, and the Upper Carbonate aquifer would be crossed in the north (Savoca et al. 1998).

The Silurian-Devonian aquifer consists of shallow marine limestones, shales, evaporites, dolostone, and sandstone. Shale underlies quaternary alluvial deposits and acts as a confining unit to the dolomite, limestone, gypsum, and sandstone units below (Savoca et al. 1998). The Silurian-Devonian aquifer only reaches the surface in outcrops along the major river valleys (Prior et al. 2003).

The Upper Carbonate aquifer underlies unconsolidated Quaternary and Cretaceous sand, gravel, and clay deposits. The aquifer consists of shallow marine limestone, dolostone, and shale from the Ordovician and Devonian. The Upper Carbonate aquifer is unconfined in the ROI and is underlain by confining units of shale (Savoca et al. 1998).

Illinois

Below the surficial aquifer, Pennsylvanian and Devonian limestones, shales, and some sandstones act as confining/semi-confining layers to the bedrock aquifers. Water supply wells typically are cased through these confining units, but no water supplies are obtained from bedrock aquifers that outcrop at the land surface (Kay and Bailey 2016).

Sole Source Aquifers

System alternative SA-04 would not cross any aquifers designated by EPA as sole source aquifers (EPA 2016).

Domestic Wells, Public Wells, and Wellhead Protection Areas

The ROI for system alternative SA-04 would encompass domestic and public wells in the states through which it would be built. Data provided by the states differ in terms of clarity and classification of wells; therefore, direct comparison between states is difficult. The SA-04 ROI would encompass 17 domestic wells in North Dakota, 36 unverified location and 134 verified location domestic wells in Minnesota, 46 permitted private wells and 190 wells included in the private well tracking system in Iowa, and 205 domestic wells in Illinois. Public wells encompassed by the SA-04 ROI are as follows: one in North Dakota; nine verified location public wells in Minnesota; four in Iowa; and one in Illinois.

System alternative SA-04 would cross 1,203 acres of wellhead protection areas: 538 acres in North Dakota, 138 acres in Minnesota, 36 acres in Iowa, and 491 acres in Illinois.

Aquifer Vulnerability Areas

Minnesota, Iowa, and Illinois rank groundwater and aquifer vulnerability in different ways (Table 5.2.1.1-3). Iowa data represent areas with similar hydrogeologic characteristics thought to represent similar potentials for contamination of groundwater and/or water wells. Illinois data presented below are based on the vulnerability of aquifers to pesticide leaching. No aquifer or groundwater vulnerability data exist for North Dakota. In total, SA-04 would cross 30,201 acres of high vulnerability aquifers (5,687 acres in Minnesota; 12,280 acres of sinkholes and alluvial aquifers in Iowa; and 12,233 acres of high or excessive risk aquifers in Illinois).

Table 5.2.1.1-3. Acres of Aquifer or Groundwater Vulnerability Crossed by System Alternative SA-04

State Vulnerability Ranking	Acres Crossed
Minnesota Total	**60,781.7**
Low	3,821.7
Medium	50,225.2
High	5,686.8
Unrated	1,047.9
Iowa Total	**45,493.7**
Good bedrock aquifers; thin drift confinement	16,994.0
Sinkholes (400-meter radius around each is shown)	1,475.5
Good bedrock aquifers; moderate drift confinement	16,219.3
Alluvial aquifers (southeast Iowa)	2,984.2
Alluvial aquifers (northeast Iowa)	7,820.7
Illinois Total	**29,456.4**
Very limited	15,629.3
Somewhat limited	804.3
Limited	255.0

Table 5.2.1.1-3. Acres of Aquifer or Groundwater Vulnerability Crossed by System Alternative SA-04

State Vulnerability Ranking	Acres Crossed
Moderate	569.6
High	11,705.1
Excessive	528.3

Sources: Illinois State Geological Survey 1995; Iowa DNR 2013; Minnesota DA 2015.

Contaminated Sites

There are 212 EPA-listed contaminated sites within the ROI for system alternative SA-04 (44 in North Dakota, 34 in Minnesota, 55 in Iowa, and 79 in Illinois). There are 80 Minnesota PCA and 3 Minnesota DA WIMN sites within the ROI for system alternative SA-04 in Minnesota (these data are not available in other states).

Minnesota Groundwater Contamination Susceptibility and Pollution Sensitivity of Near-Surface materials

Within the ROI in Minnesota, system alternative SA-04 would cross 4,674 acres of high groundwater contamination susceptibility, 1,493 acres of high pollution sensitivity, 2,053 acres of karst topography and very limited amounts of bedrock at or near the land surface.

Minnesota DWSMAs

System alternative SA-04 would cross 224 acres of DWSMAs within the ROI in Minnesota. DWSMA data do not exist for the other states crossed by system alternative SA-04.

Transportation by Rail

Glacial Aquifers

The glacial aquifers below the assumed rail routes are similar to those described above for the Applicant’s proposed project.

Bedrock Aquifers

Beneath the assumed rail routes in Minnesota, bedrock aquifers consist of hard and very old igneous and metamorphic rocks. Groundwater in these rocks occurs mostly in fractures that may not yield usable quantities of water. The rail routes would cross the same general bedrock aquifers as those described for the Applicant’s proposed project.

Sole Source Aquifers

The assumed rail routes do not cross any aquifers designated by EPA as sole source aquifers.

Domestic Wells, Public Wells, and Wellhead Protection Areas

The ROI for the assumed rail routes would encompass 584 domestic wells and no public wells in Minnesota. The assumed rail routes would cross 3,059 acres of wellhead protection areas in Minnesota. The ROI for the rail routes does not encompass any public or private wells or wellhead protection areas in North Dakota. Well and wellhead protection area data were requested for the Wisconsin portions of the route but were not made available.

Aquifer Sensitivity Areas

The assumed rail routes would cross 78,190 acres of high vulnerability aquifers in Minnesota. Comparable data are not available for North Dakota and Wisconsin.

Contaminated Sites

Within the ROI for the assumed rail routes, there are 2,251 EPA-listed contaminated sites (2,215 in Minnesota, 36 in Wisconsin, and none in North Dakota) and 2,108 Minnesota PCA WIMN sites.

Minnesota Groundwater Contamination Susceptibility and Pollution Sensitivity of Near-Surface Materials

Within the ROI in Minnesota, the assumed rail routes also would cross 41,707 acres of high groundwater contamination susceptibility, 43,189 acres of high pollution sensitivity of near-surface materials, no areas of karst topography, and very limited bedrock at or near the land surface.

Minnesota DWSMAs

The assumed rail routes would cross 3,678 acres of DWSMAs in Minnesota.

Transportation by Truck

Glacial Aquifers

The glacial aquifers below the assumed truck routes are similar to those described for the Applicant's proposed project.

Bedrock Aquifers

Beneath the assumed truck routes in Minnesota, bedrock aquifers consist of hard and very old igneous and metamorphic rocks. Groundwater in these rocks occurs mostly in fractures that may not yield usable quantities of water. The assumed truck routes would cross the same general bedrock aquifers as those described for the Applicant's proposed project.

Sole Source Aquifers

The assumed truck routes would not cross any aquifers designated by EPA as sole source aquifers.

Domestic Wells, Public Wells, and Wellhead Protection Areas

The ROI for the assumed truck routes would encompass 301 domestic wells in Minnesota and none in North Dakota. No Minnesota or North Dakota public wells are located within the ROI for the assumed truck routes. The potential truck routes would cross 2,197 acres of wellhead protection area acres (1,303 acres in Minnesota and 894 in North Dakota). Well and wellhead protection area data were requested for the Wisconsin portions of the route but were not made available.

Aquifer Sensitivity Areas

The assumed truck routes would cross 40,573 acres of high vulnerability aquifers in Minnesota. Comparable data are not available for North Dakota and Wisconsin.

Contaminated Sites

A total of 1,318 EPA-listed contaminated sites (1,023 in Minnesota, 270 in North Dakota, and 25 in Wisconsin) and 2,108 Minnesota PCA WIMN sites are within the ROI for the assumed truck routes.

Minnesota Groundwater Contamination Susceptibility and Pollution Sensitivity of Near-Surface Materials

The assumed truck routes also would cross 21,412 acres of high groundwater contamination susceptibility, 16,699 acres of high pollution sensitivity of near-surface materials, and no karst topography within the ROI in Minnesota.

Minnesota DWSMAs

The assumed truck routes would cross 1,567 acres of DWSMAs in Minnesota.

Existing Line 3 Supplemented by Rail

Existing conditions for the existing Line 3 supplemented by rail transport are similar to those described above for continued use of the existing Line 3 pipeline and the assumed rail routes.

Existing Line 3 Supplemented by Truck

Existing conditions for the existing Line 3 supplemented by truck transport are similar to those described above for continued use of the existing Line 3 pipeline and the assumed truck routes.

5.2.1.1.3 Impact Assessment

The Applicant's proposed project and each of the CN Alternatives were assessed separately for the construction and operations phases.

For construction, the following potential impacts were assessed:

- Changes in groundwater availability from withdrawals;
- Increases in TSS concentrations during excavation, trenching, and backfilling;
- Degradation of shallow groundwater quality from blasting, spills, or contamination;
- Degradation of groundwater quality in potable supply wells, sole source aquifers, or designated protection areas; and
- Degradation of water quality from drilling mud releases during HDD crossings.

Continuing potential impacts that could occur during operation include:

- Changes in groundwater availability; and
- Changes in groundwater quality.

Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

Construction activities that could affect groundwater include groundwater withdrawals and discharges, dewatering and trenching, blasting, access road construction, waterbody crossings, and fueling and use of hazardous materials. These activities may affect groundwater quantity and quality; the extent and magnitude of the impacts would be influenced by the proximity and sensitivity of groundwater resources to construction work areas.

Changes in Groundwater Availability from Withdrawals

Impacts on groundwater availability could occur in two ways: (1) water withdrawals for hydrostatic testing; and (2) groundwater inflows to the pipe trench during construction and subsequent drawdown of the aquifer, if dewatering is required. The Applicant would withdraw water for construction activities such as dust control, HDD installation, and hydrostatic testing of the pipeline. Approximately 120 million gallons of water would be requested through water appropriation permits for hydrostatic testing for the 340 miles of the Applicant's proposed project in Minnesota. The total amounts of water needed for these activities for the Applicant's proposed project have not been determined for North Dakota and Wisconsin. The Applicant would source water from surface water and private and public wells; the proportion of water that would be obtained from groundwater versus surface water has not been determined. Prior to construction, the Applicant would obtain water appropriation permits from the appropriate state agencies (listed in Table 5.2.1.1-1). The rate and total volumes of water withdrawn would be measured with a flow meter and would not exceed the rate and amount specified in the permits (Appendix E).

Dewatering of the pipeline trench may be required before the pipe is lowered into it. It also may be necessary at road boring sites adjacent to wetlands, areas where excessive volumes of groundwater flow into the trench either as a result of seepage or artesian flow, or locations where increased visibility or physical access is necessary. Depending on the state, trench dewatering is considered a water appropriation or water use permit activity that is regulated based on withdrawal volumes. In areas where an aquifer that is under artesian conditions is exposed by the trench, the volume of inflowing water could cause rapid flooding of the trench and the bottom or sides to become unstable. In these areas, the pipeline trench may have a French drain effect, allowing water to migrate down the trench. Soil borings would be advanced to the design depth of the pipeline in areas where artesian conditions are possible to determine whether a confining layer may be breached (Enbridge 2016a). To protect against subsurface water flow along the pipe after the trench is backfilled, the Applicant would install trench breakers from the bottom of the trench to near the top of the trench, completely surrounding the pipe. The trench breakers would be constructed of bags filled with rock-free subsoil or sand, and their locations would be based on field conditions—including the degree and length of slope, presence of down-slope sensitive resource areas, such as wetland and waterbodies, and proximity to other features such as roads and railroads (Appendix E). Once construction in the area is completed and the trench was backfilled, groundwater levels likely would return to preconstruction levels because shallow aquifers readily recharge due to precipitation and surface water inflow.

With adherence to Water Appropriation Permit conditions and implementation of Applicant-proposed measures, impacts on groundwater availability from water withdrawals would be temporary and minor.

Increases in Total Suspended Solid Concentrations in Groundwater

During trenching, excavation, and backfilling, the water table in surficial aquifers could be exposed, which could increase TSS concentrations in water in the trench or excavated area. The Applicant would use temporary erosion and sediment controls, including slope breakers, sediment barriers, stormwater diversions, trench breakers, and mulch, to minimize sedimentation in water resources during construction. The Applicant also would limit the amount of excavated open trench to a maximum of 3 days of anticipated welding production per spread, per pipe to minimize the potential for erosion and sedimentation (Appendix E). In addition, the relatively slow groundwater flow rate and fine-grained nature of the glacial sediments likely would filter out TSS from infiltrating groundwater. Thus, increases in TSS concentrations in groundwater, in aquifers near trenched and excavated areas would be temporary and minor.

Degradation of Shallow Groundwater Quality from Blasting, Spills, or Contamination

The quality of shallow groundwater may be degraded from blasting; small spills and leaks of lubricants, oil, or other hazardous chemicals used during construction; or disturbance of existing contamination. Blasting is likely to be necessary only in Carlton County, Minnesota, near the Wisconsin border where surface bedrock composed of slate and graywacke material of the Thomson Formation is present. The Applicant has identified one location at MP D1128.4 is required. The blasting area is expected to be approximately 0.25 mile in length (Enbridge 2016a).

Where blasting would occur, rock would be removed to a depth of 7 feet, which could be above the elevation of the water table in the area. If the water table is exposed by blasting, the turbidity, sedimentation, or chemical contamination that could result would be localized and likely confined to the immediate area of the activity. Prior to construction, the Applicant would develop a site-specific Blasting Plan, which would include measures for transporting, storing, handling, detonating, and disposing of blasting materials to protect groundwater resources.

Groundwater may become contaminated from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities such as fuel storage, equipment refueling, and equipment maintenance. Water table aquifers are most vulnerable to contamination because they lack confining layers and directly interact with the land surface (certain states identify areas of high aquifer and groundwater vulnerability or susceptibility to contamination; see Section 5.2.1.1.2 above). The Applicant would follow Spill Prevention, Containment, and Control (SPCC) measures outlined in Appendix E to minimize the likelihood of spills and of contamination entering groundwater. The Applicant would store petroleum products, hazardous chemicals, and lubricating oils; conduct refueling, maintenance, and lubricating operations; and perform concrete coating activities in upland areas at least 100 feet away from wells and use secondary containment (Appendix E). Concrete wash water, grindings, and slurry disposal would be limited to a designated area, away from wetlands and other sensitive areas. Rinse water, used in conjunction with a cleaning pig to remove any accumulated construction debris, dirt, and dust prior to hydrostatic testing, would be treated and disposed of or discharged in accordance with applicable National Pollutant Discharge Elimination System (NPDES) permit conditions. Excess HDD drilling mud would be disposed of offsite at an approved disposal facility. In addition to these prevention measures, the Applicant would be responsible for cleaning up spills through procedures outlined in the Environmental Protection Plan (Appendix E), including notifying proper personnel (e.g., the onsite spill coordinator) and agencies, stopping work activity that caused the spill, using absorbent booms and pads to contain and recover released materials in water, and disposing of contaminated response materials at approved facilities. Prevention and response procedures for an unanticipated release of crude oil are discussed in Chapter 10.

If contaminated soils or groundwater are encountered during construction, they would be handled and disposed of in accordance with applicable regulations; the Environmental Protection Plan; and a Contaminated Soils Management Plan, which the Applicant would develop prior to construction. The plan would describe site assessment and response actions that would be implemented to manage contaminated soils and groundwater (Enbridge 2016a). With implementation of Applicant-proposed measures and adherence to the Blasting and Contaminated Soils Management plans, impacts on groundwater quality from blasting, small leaks and spills, and existing contamination would be temporary and minor.

Degradation of Groundwater Quality in Potable Supply Wells, Sole Source Aquifers, or Designated Protection Areas

Potable water supply wells and wellhead protection areas could be affected by construction activities that include groundwater withdrawals, minor spills of industrial chemicals and hazardous materials, and drilling mud releases during HDD installation, depending on how close the wells are to construction areas. The Applicant's proposed project crosses the City of Oklee, Sundruds Court, and the City of Wrenshall's Wellhead Protection areas. The City of Plummer's Wellhead Protection Area lies within the ROI for the Applicant's proposed project. With adherence to the Applicant-proposed measures discussed above and below (e.g., water appropriation BMPs, erosion/sedimentation controls, SPCC measures, and HDD monitoring and clean-up procedures) construction impacts on groundwater in these sensitive areas and wells would be temporary and minor.

The Applicant's proposed project would not cross any aquifers designated by EPA as sole source aquifers. Therefore, there would be no construction impacts on any sole source aquifer.

Degradation of Water Quality from Drilling Mud Releases during HDD Crossings

HDD installation involves drilling under a waterbody and installing the pipeline without physical disturbance of the waterbody feature. This method would be used to cross environmentally sensitive areas such as certain wetlands, sensitive fishery resources, and impaired waters (Appendix G). Geotechnical surveys are conducted to determine which waterbodies exist in areas that are geologically suitable for HDD based on properties such as depth to aquifer, aquifer flow properties, aquifer material type, strength, and deformational properties. Areas not conducive to HDD include soils containing cobbles, boulders, layers of gravel, or non-cohesive sands. During drilling, fluid (water, bentonite clay, and possible Minnesota PCA-approved additives) is circulated through the drilling pipe to lubricate the drill bit, remove drill cuttings, and stabilize the open hole.

The potential exists for an inadvertent rupture of the bore hole or "frac-out" and release of the drilling fluid. Such events can occur when pressurization of the drill hole increases beyond the containment capability of the overburden soil material, which allows the drilling fluid to flow to the ground surface. The general risks to groundwater associated with HDD construction methods include loss of drilling mud into surficial aquifers, which could lead to turbidity in nearby aquifers and wells. Partial or full loss of drilling mud may occur as a result of encountering loose, unstable zones of soil, particularly in areas of karst. A large subsurface drilling fluid escape that does not reach the surface may fill subsurface voids and potentially cause the upward displacement of water and materials, creating a "doming" effect until the water in the dome reaches equilibrium with the surrounding hydrology. No known areas of karst topography occur along the Applicant's proposed project.

Additives may be mixed with the drilling fluids/mud for viscosity or lubricating reasons. Only non-hazardous additives approved by the MPCA's 401 Water Quality Certification letter would be used, and a Material Safety Data Sheet for the drilling fluid would be maintained onsite. Construction personnel would monitor the crossing to detect releases of drilling mud and would implement containment, response, and clean-up procedures outlined in the Applicant's Environmental Protection Plan (Appendix E) to minimize the potential for drilling mud to reach groundwater resources. If a frac-out occurred and went undetected or was not quickly contained, impacts on groundwater quality could be long term and major. With implementation of the Applicant-proposed measures for drilling mud releases during HDD construction, impacts on groundwater quality would be temporary and minor.

Operations Impacts

Changes in Groundwater Availability

Ongoing French drain effects could occur during pipeline operations in areas of groundwater upwelling. With proper installation of trench breakers and soil compaction during backfilling during construction as described above, impacts on groundwater availability during pipeline operations would be temporary and negligible.

Normal operation of the Applicant's proposed project would not require withdrawal or discharge of water. During maintenance and repair of the pipe, it may be necessary to withdraw and discharge water to hydrostatically test sections of pipe and for dust control during integrity digs and backfilling activities. The frequency with which hydrostatic testing would occur, locations of testing, and amount of water needed for testing and dust control are not defined. As described for pipeline construction, the Applicant would be required to obtain water appropriation permits for testing procedures, and the volume of water would be substantially less than for construction. With adherence to permit conditions and implementation of Applicant-proposed measures as described above for construction, impacts on groundwater from withdrawals would be temporary and negligible.

Degradation of Groundwater Quality

Small fuel and lubricant leaks and spills could occur from maintenance and inspection vehicles. Any refueling, fuel storage, or vehicle maintenance would follow the Applicant-proposed measures set forth in the Environmental Protection Plan (Appendix E). Further, the volume of such spills and leaks would be small and would largely remain on the land surface, and only very low concentrations likely would infiltrate into groundwater supplies. Therefore, impacts related to groundwater contamination from small leaks and spills during operation would be temporary and negligible to minor. Potential impacts on groundwater resources from a crude oil release are discussed in Chapter 10.

Continued Use of Existing Line 3

Construction Impacts

There would be no construction impacts on groundwater from continued use of the existing Line 3 pipeline because it is already built.

Operations Impacts

Operations impacts for continued use of the existing Line 3 pipeline would be similar to those discussed above for the Applicant's proposed project. In addition, continued use of Line 3 at its present capacity would require high levels of maintenance, with an estimated 267 repair procedures per year in the form of integrity digs (see Section 4.2.3 for more detail). Integrity digs require opening the pipeline trench with excavation equipment and making any necessary repairs. The impacts associated with integrity digs and subsequent pipeline repairs would be comparable to those associated with construction of new pipeline as described above, but on a much smaller scale. It was assumed that the Applicant would adhere to the same measures as proposed for new pipeline construction to protect groundwater resources during repair and maintenance procedures. As such, impacts associated with potential French drain effects, increased TSS concentrations, and degradation of water quality resulting from integrity digs would be expected to be temporary and negligible to minor when they occur; but they would occur as long as Line 3 was operational. Impacts on public or private wells from integrity digs are not anticipated.

Changes in Groundwater Availability

Continued use of the existing Line 3 also may require withdrawal and discharge of hydrostatic testing water. The frequency with which hydrostatic testing would occur, locations of testing, and amounts of water needed for testing are not defined. As described for new pipeline construction, the Applicant would be required to obtain water appropriation permits for testing procedures. With adherence to permit conditions and implementation of Applicant-proposed measures, impacts on groundwater from water appropriation would be temporary and negligible.

Degradation of Groundwater Quality

Small fuel and lubricant leaks and spills could occur from maintenance and inspection vehicles. Refueling, fuel storage, and vehicle maintenance were assumed to follow measures similar to the Applicant-proposed measures described above for maintenance activities and therefore would be minor. Further, the volume of such spills and leaks would be small and would largely remain on the land surface, and only very low concentrations likely would infiltrate into groundwater supplies. Therefore, impacts associated with groundwater contamination from small leaks and spills during operation likely would be temporary and negligible to minor. The potential impacts on groundwater resources from a crude oil release are discussed in Chapter 10.

System Alternative SA-04

Construction Impacts

Construction for system alternative SA-04 would result in impacts of the same type, magnitude, and duration as discussed above for the Applicant's proposed project. If SA-04 is constructed, it was assumed that the Applicant would implement the same Applicant-proposed measures identified for the Applicant's proposed project (Appendix E) and would implement all necessary requirements mandated by North Dakota, Minnesota, Iowa, and Illinois permits to reduce impacts on groundwater resources for the route.

Changes in Groundwater Availability from Withdrawals

With adherence to Water Appropriation Permit conditions and implementation of Applicant-proposed BMPs (Appendix E), temporary and minor alterations in groundwater quantity would occur from water withdrawn from groundwater wells during construction. The correct use of trench breakers during construction would result in temporary and minor impacts on groundwater migration (i.e., the French drain effect).

Increases in Total Suspended Solid Concentrations in Groundwater

Increases in TSS concentrations and sedimentation could occur in areas of construction with shallow aquifers. However, the relatively slow groundwater flow rate and fine-grained nature of glacial sediments likely would filter out TSS from infiltrating groundwater. With implementation of the Applicant-proposed measures discussed above for the Applicant's proposed project, increases in TSS concentrations during construction of system alternative SA-04 would be temporary and minor.

Degradation of Shallow Groundwater Quality from Blasting, Spills, or Contamination

The quality of shallow groundwater may be degraded from blasting; small spills and leaks of lubricants, oil, or other hazardous chemicals used during construction; or disturbance of existing contamination. The need for blasting along SA-04 is not known but may be required in areas where bedrock is at or near the land surface. Except for within karst topography that occurs along 70 miles of the SA-04 alternative, if the water table is exposed by blasting this could result turbidity, sedimentation, or chemical contamination, but impacts would be localized and likely diluted or attenuated before it could travel very far into the aquifer. For all blasting, the Applicant would develop a site-specific Blasting Plan, which would include measures to protect groundwater resources.

Temporary and minor impacts on groundwater quality could occur from small leaks and spills, as discussed above for the Applicant's proposed project. If any contaminated soils or groundwater are encountered during construction they would be handled and disposed of in accordance with applicable regulations; the Environmental Protection Plan; and a Contaminated Soils Management Plan, which the Applicant would develop prior to construction. The plan would describe site assessment and response actions that would be implemented to manage contaminated soils and groundwater (Enbridge 2016a).

With implementation of the Applicant-proposed measures and adherence to the Contaminated Soils Management Plan discussed for the Applicant's proposed project, impacts on groundwater quality from small leaks and spills, blasting activities, and existing contamination would be temporary and minor.

Degradation of Groundwater Quality in Potable Supply Wells, Sole Source Aquifers, or Other Designated Groundwater Protection Areas

Construction activities, including groundwater withdrawals, minor spills of industrial chemicals and hazardous materials, and drilling mud releases during HDD installation, could affect domestic and PWS wells and wellhead protection area groundwater quality. With implementation of the Applicant-proposed measures described for the Applicant's proposed project, construction impacts on groundwater in these sensitive areas would be temporary and minor.

System alternative SA-04 would not cross any aquifers designated by EPA as sole source aquifers. Therefore, there would be no construction impacts on any sole source aquifer.

Degradation of Water Quality from Drilling Mud Releases during HDD Crossings

The number of HDDs to be constructed along SA-04 is not known at this time. Loss of drilling fluid into loose unstable zones of soil could temporarily restrict water movement in shallow aquifers. A loss of drilling fluid in areas prone to karst formation, of which SA-04 crosses over 2,000 acres in Minnesota, could affect local karst aquifers. Construction through karst areas would require a site-specific plan, which would include preconstruction assessment and surveys, construction monitoring, and karst mitigation and conservation procedures. A large subsurface drilling fluid escape that does not reach the surface may fill subsurface voids and potentially cause the upward displacement of water and materials, creating a doming effect until the water in the dome reaches equilibrium with the surrounding hydrology. Long-term major impacts on surface water quality could result if a frac-out occurred and went undetected or was not quickly contained. These impacts would be temporary and minor with implementation of Applicant-proposed measures for drilling mud releases during HDD construction (Appendix E).

<u>Operations Impacts</u>

Changes in Groundwater Availability

Ongoing French drain effects could occur during pipeline operations in areas of groundwater upwelling. With proper installation of trench breakers and soil compaction during backfilling during construction, as described for the Applicant's proposed project, impacts on groundwater availability during pipeline operations would be temporary and negligible.

Normal operation of SA-04 would not require withdrawal or discharge of water. During maintenance and repair activities over the duration of the pipeline's operation, it may be necessary to withdraw and discharge water to hydrostatically test sections of pipe and for dust control during integrity digs and backfilling activities. The frequency with which hydrostatic testing would occur, locations of testing, and amount of water needed for testing and dust control are not defined. As described for pipeline construction, the Applicant would be required to obtain water appropriation permits for testing procedures, and the volume of water would be substantially less than for construction. With adherence to permit conditions and implementation of Applicant-proposed measures, impacts on groundwater from withdrawals would be temporary and negligible.

Degradation of Groundwater Quality

Small fuel and lubricant leaks and spills could occur from maintenance and inspection vehicles. Any refueling, fuel storage, or vehicle maintenance would follow the Applicant-proposed measures set forth in the Environmental Protection Plan (Appendix E). Further, the volume of such spills and leaks would be small and would largely remain on the land surface, and only very low concentrations likely would infiltrate into groundwater supplies. Therefore, any groundwater contamination from small leaks and spills during operation would be temporary and negligible to minor. Potential impacts on groundwater resources from a crude oil release are discussed in Chapter 10.

Transportation by Rail

<u>Construction Impacts</u>

Transportation of crude oil by rail would require construction of temporary storage and offloading facilities, and upgrade or replacement of existing rail lines. The exact locations and footprints for these facilities have not been identified. In general, clearing and grading would be required for these activities, which would not affect groundwater.

Changes in Groundwater Availability from Withdrawals

Water likely would be used for common construction purposes, such as dust control, but it would not be needed for hydrostatic testing. Therefore, impacts on groundwater availability from well withdrawals likely would not occur.

Increases in Total Suspended Solid Concentrations in Groundwater

The rail alternative does not appear to require trenching and excavation activities; therefore, no impacts on TSS concentrations in groundwater are expected to occur.

Degradation of Shallow Groundwater Quality from Blasting, Spills, or Contamination

Degradation of groundwater quality could occur from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals that could infiltrate into surficial aquifers during construction activities. These spills would be managed according to SPCC plans that would be developed for each facility.

Because potential rail lines already exist, construction would occur only at localized facility sites, not along the entire rail routes. With implementation of measures similar to those described above for the Applicant's proposed project and adherence to SPCC and Contaminated Soils Management plans, impacts on groundwater quality from small leaks and spills, blasting activities, and existing contamination likely would be temporary and minor.

Degradation of Groundwater Quality in Potable Supply Wells, Sole Source Aquifers, or Other Designated Groundwater Protection Areas

Minor spills of industrial chemicals and hazardous materials during construction could affect groundwater quality in domestic and PWS wells and wellhead protection areas. Because potential rail lines already exist, construction would occur only at localized facility sites, not along the entire rail routes. Small spills would be managed according to SPCC plans that would be developed for each facility. Therefore, construction impacts on groundwater quality in wells and wellhead protection areas would be temporary and negligible.

The rail alternative would not cross any aquifers designated by EPA as sole source aquifers. Therefore, there would be no construction impacts on any sole source aquifer.

Degradation of Water Quality from Drilling Mud Releases during HDD Crossings

The rail alternative does not appear to require construction through waterbodies; therefore, no impacts on water quality from HDD crossings are expected to occur.

<u>Operations Impacts</u>

Changes in Groundwater Availability

Transportation by rail operations would not require groundwater appropriation: therefore, no impacts on groundwater availability are expected to occur.

Degradation of Groundwater Quality

Impacts of rail transportation on groundwater quality could result from brakepad consumption, locomotive lubrication, and small cargo (i.e., crude oil) and fuel (i.e., diesel) drips and leaks that could infiltrate into surficial aquifers. The volume of such drips and leaks would be small and would largely remain on the rail bed, and only very low concentrations likely would infiltrate into groundwater supplies. These are existing impacts from trains currently transporting crude oil along existing rail lines. Impacts on groundwater quality would be temporary and negligible. Potential impacts of a crude oil release on groundwater resources are discussed in Chapter 10.

Transportation by Truck

<u>Construction Impacts</u>

Transportation of crude oil by truck would require construction of offloading facilities and new road access. The exact locations and footprints for storage and offloading facilities and new roads have not been identified. In general, clearing and grading would be required for these activities, which would not affect groundwater.

Changes in Groundwater Availability from Withdrawals

Water likely would be used for common construction purposes, such as dust control, but would not be needed for hydrostatic testing. Therefore, no impacts on groundwater availability from well withdrawals are expected to occur.

Increases in Total Suspended Solid Concentrations in Groundwater

The truck alternative does not appear to require trenching and excavation activities; therefore, no impacts on TSS concentrations in groundwater are expected to occur.

Degradation of Shallow Groundwater Quality from Blasting, Spills, or Contamination

Degradation of groundwater quality could occur from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals that could infiltrate into surficial aquifers during construction activities. These spills would be managed according to SPCC plans that would be developed for each facility.

Because potential roadways already exist, construction would occur only at localized facility sites, not along the entire truck routes. With implementation of Applicant-proposed measures and adherence to the SPCC and Contaminated Soils Management plans described for the Applicant's proposed project, impacts on groundwater quality from small leaks and spills, blasting activities, and existing contamination would be temporary and minor.

Degradation of Groundwater Quality in Potable Supply Wells, Sole Source Aquifers, or Other Designated Groundwater Protection Areas

Minor spills of industrial chemicals and hazardous materials during construction activities could affect groundwater quality in domestic and PWS wells and wellhead protection areas. Because potential roadways already exist, construction would occur only at localized facility sites, not along the entire truck routes. Small spills would be managed according to SPCC plans that would be developed for each facility. Therefore, construction impacts on groundwater quality would be temporary and negligible.

The truck alternative would not cross any aquifers designated by EPA as sole source aquifers. Therefore, there would be no construction impacts on any sole source aquifer.

Degradation of Water Quality from Drilling Mud Releases during HDD Crossings

The truck alternative does not appear to require construction through waterbodies; therefore, no impacts on water quality from HDD crossings are expected to occur.

<u>Operations Impacts</u>

Changes in Groundwater Availability

The truck alternative would not require groundwater appropriation: therefore, no impacts on groundwater availability are expected to occur.

Changes in Groundwater Quality

Impacts of additional truck traffic on groundwater quality could result from small cargo (i.e., crude oil) and fuel (i.e., diesel) drips and leaks that could infiltrate into surficial aquifers. These are existing impacts from trucks currently transporting crude oil along highways. The volume of such drips and leaks would be small and would largely remain on the road surface, and only very low concentrations likely would infiltrate into groundwater supplies. Impacts on groundwater quality would be temporary and negligible. Potential impacts of a crude oil release on groundwater resources are discussed in Chapter 10.

Existing Line 3 Supplemented By Rail

<u>Construction Impacts</u>

There would be no construction impacts from the continued use of the existing Line 3 because it is already built.

Impacts on groundwater during construction of the temporary storage and offloading facilities and upgrade or replacement of rail lines would be the same as those described above for the rail alternative, including potential degradation of groundwater quality from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals that could infiltrate into surficial aquifers during construction activities. Impacts on groundwater during construction would be temporary and negligible to minor with implementation of appropriate BMPs and adherence to permit requirements.

Operations Impacts

Operations impacts on groundwater during integrity digs and subsequent excavation and repair work for continued use of the existing Line 3 would be the same as those described above for the existing Line 3 alternative, including temporary and negligible impacts from hydrostatic test water withdrawal and discharge, and temporary and negligible or minor impacts on groundwater contamination from minor leaks and spills during operation. Impacts of excavation activities from integrity digs associated with continued use of the existing Line 3 would be comparable to impacts described for construction of new pipeline. These impacts are expected to be temporary and minor.

Impacts of rail transportation on groundwater resources could result from brakepad consumption, locomotive lubrication, and small cargo (i.e., crude oil) and fuel (i.e., diesel) drips and leaks, although these are existing conditions for crude oil trains traveling on existing rail lines. The associated impacts on groundwater quality likely would be temporary and negligible to minor. Groundwater impacts for the existing Line 3 supplemented by train alternative would be less than for the rail alternative as fewer trains would be used to transport crude oil under this alternative.

Existing Line 3 Supplemented By Truck

Construction Impacts

There would be no construction impacts from continued use of the existing Line 3 because it is already built.

Impacts on groundwater during construction of the truck storage and offloading facilities and new road access would be the same as those described above for the truck alternative, including degradation of groundwater quality from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals that could infiltrate into surficial aquifers during construction activities. The impacts on groundwater during construction would be temporary and negligible to minor with implementation of appropriate BMPs and adherence to permit requirements.

Operations Impacts

Operations impacts on groundwater during integrity digs and subsequent excavation and repair work for continued use of the existing Line 3 would be the same as those described above for the existing Line 3 alternative, including temporary and negligible impacts from hydrostatic test water withdrawal and discharge, and temporary and negligible or minor impacts on groundwater contamination from minor leaks and spills during operation. Impacts of excavation activities for integrity digs associated with continued use of the existing Line 3 would be comparable to the impacts of new pipeline construction. These impacts are expected to be temporary and negligible to minor.

Impacts of truck transportation on groundwater resources could result from small cargo (i.e., crude oil) and fuel (i.e., diesel) drips and leaks, although these are existing conditions for trucks traveling on existing roads, and associated impacts on groundwater quality likely would be temporary and negligible to minor. Impacts on groundwater from trucks for the existing Line 3 supplemented by truck alternative would be less than under the truck alternative as fewer trucks would be used to transport crude oil.

5.2.1.1.4 Summary and Mitigation

Summary

Overall, based on industry-standard construction techniques and compliance with regulatory guidelines, impacts on groundwater for the Applicant's proposed project and the CN Alternatives would be temporary and negligible to minor, or no impact would occur. Potential construction impacts due to karst aquifers' sensitivity would be the highest for SA-04. Potential construction and operation impacts due to vulnerable groundwater would be the somewhat higher for the Applicant's proposed project due to the susceptibility of contamination to groundwater. Table 5.2.1.1-4 provides a summary and comparison of potential construction and operations impacts for the Applicant's proposed project and CN Alternatives. These impacts are listed below.

<u>Construction Impacts</u>

- Potential impacts on groundwater availability from groundwater withdrawals, hydrostatic testing, trench dewatering, and other construction activities, as a result of the Applicant's proposed project and SA-04, would be temporary and minor.
- Impacts on groundwater quality from construction-related increases in TSS for the Applicant's proposed project and SA-04 would be temporary and minor, wherever trenching, excavation, and backfilling occurred.
- The potential for degradation of water quality in shallow groundwater aquifers from blasting is known for only one location along the Applicant's proposed project, and impacts are expected to temporary and minor. It is not known whether blasting would be necessary for SA-04; and it is unlikely that it would be necessary for the rail, truck, and combination alternatives.
- Impacts from small spills of chemicals and fuels and lubricants are expected to be temporary and negligible to minor for the Applicant's proposed project and all of the CN Alternatives.
- Degradation of groundwater quality from drilling mud releases during HDD crossings for the Applicant's proposed project and SA-04 is expected to be temporary and minor with adherence to Applicant-proposed detection, response, and clean-up measures. Impacts could be long term and major if an inadvertent release of drilling mud went undetected.

<u>Operations Impacts</u>

- Operational impacts of the Applicant's proposed project and CN Alternatives on groundwater quality from small fuel, lubricant, and hazardous material leaks and drips would be temporary and negligible to minor because the volume of such drips and leaks would be relatively small, likely would remain on the land surface, and only very low concentrations would likely infiltrate into groundwater supplies.
- Operational impacts on groundwater from continued use of the existing Line 3 would primarily be associated with ongoing integrity digs. As no specific locations for integrity digs have been identified, there is no specific information on the exact extent to which the integrity digs may occur proximal to sensitive groundwater resources. However, it is

expected that continued use would entail the same types of activities and impacts associated with new pipeline construction (e.g., trenching, hydrostatic testing, and potential for minor leaks). As a result, impacts on groundwater would be expected to be temporary and minor when they would occur at an integrity dig, but would occur over the life of the pipeline.

- The potential impacts on groundwater resources from a crude oil release are discussed in Chapter 10.

Table 5.2.1.1-4. Summary of Potential Impacts on Groundwater for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's ProposedProject[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Changes in groundwater availability from withdrawals	Temporary/minor impacts	No impact	Temporary/minor impacts	No impact	No impact	No impact	No impact
Increases in TSS concentrations	Temporary/minor impacts	No impact	Temporary/minor impacts	No impact	No impact	No impact	No impact
Degradation of shallow groundwater quality from blasting, spills, or contamination	Temporary/minor impacts • 25,765 acres of high vulnerability water table aquifers (in MN) • 26,382 acres of high groundwater contamination susceptibility (in MN) • 16,299 acres of high pollution sensitivity (in MN) • 19 EPA-listed contaminated sites (13 in MN; 6 in WI) • 104 WIMN sites (in MN)	No impact • 69,614 acres of high vulnerability water table aquifers (in MN) • 19,833 acres of high groundwater contamination susceptibility (in MN) • 16,179 acres of high pollution sensitivity (in MN) • 107 EPA-listed contaminated sites (101 in MN; 6 in WI) • 159 WIMN sites (in MN)	Temporary/minor impacts • 30,201 acres of high water table vulnerability aquifers (5,687 in MN; 12,280 in IA; 12,233 in IL) • 4,674 acres of high groundwater contamination susceptibility (in MN) • 1,493 acres of high pollution sensitivity (in MN) • 212 EPA-listed contaminated sites (55 in IA;	Temporary/minor impacts • 78,190 acres of high water table vulnerability aquifers (in MN) • 41,707 acres of high groundwater contamination susceptibility (in MN) • 43,189 acres of high pollution sensitivity (in MN) • 2,251 EPA-listed contaminated sites (2,215 in MN; 36 in WI; 0 in ND)	Temporary/minor impacts • 40,573 acres of high water table vulnerability aquifers (in MN) • 21,412 acres of high groundwater contamination susceptibility (in MN) • 16,699 acres of high pollution sensitivity (in MN) • 1,318 EPA-listed contaminated sites (1,023 in MN; 270 in ND; 25 in WI)	Temporary/minor impacts	Temporary/ minor impacts

Table 5.2.1.1-4. Summary of Potential Impacts on Groundwater for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's ProposedProject[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
	• No karst topography • 1700 acres of high and very high bedrock sensitivity	• No karst topography • 1700 acres of very high to high sensitivity Precambrian shallow fractured bedrock aquifers	79 in IL; 34 in MN; 44 in ND) • 83 WIMN sites (in MN) • 2,053 acres of karst topography in MN • Known or potential karst topography along 11 miles in MN; 63 miles in IA; 5 miles in IL	• 2,108 WIMN site (in MN) • No karst topography	• 2,108 WIMN sites (in MN) • No karst topography		
Degradation of groundwater quality in potable supply wells, sole source aquifers, or other designated groundwater protection areas	Temporary/minor impacts • 87 acres of wellhead protection areas (all in MN, 0 in ND) • 304 domestic wells (303 in MN; 1 in ND) • 6 public wells (in MN) • 0 sole source aquifers	No impact • 624 acres of wellhead protection areas (all in MN; 0 in ND) • 589 domestic wells (588 in MN; 1 in ND) • 48 public wells (all in MN) • 0 sole source aquifers • 1,120 acres of DWSMAs (in MN)	Temporary/minor impacts • 1,203 acres of wellhead protection areas (538 in ND; 138 in MN; 36 in IA; 491 in IL) • 628 domestic wells (17 in ND; 170 in MN; 46 permitted and 190 private in IA; and 205 in IL)	Temporary/ negligible impacts • 3,059 acres of wellhead protection areas (all in MN; 0 in ND) • 584 domestic wells (all in MN; 0 in ND) • 0 public wells • 0 sole source aquifers • 3,678 acres of DWSMAs (in MN)	Temporary/ negligible impacts • 2,197 acres of wellhead protection areas (1,303 in MN; 894 in ND) • 301 domestic wells (all in MN; 0 in ND) • 0 public wells • 0 sole source aquifers • 1,567 acres of DWSMAs (in MN)	Temporary/ negligible impacts	Temporary/ negligible impacts

Table 5.2.1.1-4. Summary of Potential Impacts on Groundwater for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's ProposedProject[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
	• 538 acres of DWSMAs (in MN)		• 15 public wells (1 in ND; 9 in MN; 4 in IA; and 1 in IL) • 0 sole source aquifers • 224 acres of DWSMAs (in MN)				
Degradation of water quality from release of drilling mud during HDD crossings	Temporary/minor impacts (*if quickly contained*) to long-term/major impacts (*if undetected or uncontained*)	No impact	Temporary/minor impacts (*if quickly contained*) to long-term/major impacts (*if undetected or uncontained*)	No impact	No impact	No impact	No impact
Operations Impacts							
Changes in groundwater availability	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	No impact	No impact	Temporary/ negligible impacts	Temporary/ negligible impacts
Changes in groundwater quality	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts

WIMN = "What's in My Neighborhood?" [database]

[a] **No single dataset in this summary table provides a complete indication of all relevant impacts to groundwater. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, public water supply well counts do not consider the influence that overlying geology may have on the susceptibility of public water supply wells to impacts. However, data from the aquifer vulnerability dataset can aid the reader in understanding the influence that overlying geology may have on the susceptibility of groundwater along the route to impacts. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.**

[b] **Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-24 through 5-35. This table, for example, provides the acreage of DWSMAs and a general**

Table 5.2.1.1-4. Summary of Potential Impacts on Groundwater for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's ProposedProject[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]

assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to DWSMAs is contained in the impacts discussion in the text.

[c] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-24 to 5-28. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridor. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on page 5-28 to 5-29. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-29 to 5-31. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-31 to 5-31. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on page 5-32 to 5-33. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

Mitigation

Beyond the Applicant-proposed measures described for the Applicant's proposed project listed in Chapter 2, Section 2.7, potential mitigation measures to minimize impacts on groundwater could include:

- If the owner of a potable supply well believed that the quality or yield of their water was negatively affected as a result of a pipeline construction-related activity, the Applicant could engage a third party to determine the nature and severity of the impact. If it was determined that impacts were related to construction, the Applicant could provide an alternate source of water to the well owner until the well water returned to preconstruction conditions. If the well water did not return to preconstruction conditions within a reasonable time period, the Applicant could compensate the landowner for the installation of a new well or otherwise arrange for provision of a suitable water supply.
- To prevent the loss of drilling fluid from the borehole during HDD installation, the properties of drilling fluid may be augmented to aid in stabilizing the soils and in maintaining drilling fluid returns to the entry and exit pits. If circulation is lost, lost circulation materials can be used to seal around the borehole and prevent drilling fluid from escaping into the formation, and allow for reestablishment of drilling fluid returns to the entry and exit pits. Many types of lost circulation materials that are inert and environmentally benign are available for use during HDD installation. These can include wood fibers, cotton seed husks, ground walnut shells, and other natural materials. Special polymers that swell to several times their original size when introduced to water also can be used. These polymers are industrial-grade equivalents of food-grade polymers that are used to swell and absorb fluids in the food industry.

The potential impacts on groundwater resources from a crude oil release are discussed in Chapter 10.

5.2.1.1.5 References

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5.2.1.2 Surface Water

Surface water in the vicinity of the Applicant's proposed project and CN Alternatives consists of streams, rivers, lakes, wild rice waterbodies, and wetlands. Streams, rivers, lakes, and wild rice waterbodies are discussed in this section; wetlands are discussed in Section 5.2.1.3. This section assesses the potential for construction and operation of the proposed Project to affect surface water resources. Surface water impacts that could occur during construction and operation are evaluated and compared for the Applicant's proposed project and the CN Alternatives. The impact analysis focuses on potential impacts on surface waters associated with the following concerns:

- Runoff and flows – increases in stormwater runoff and erosion, increases in TSS concentrations and increased sedimentation, changes in stream flows from water withdrawals and discharges, and disruption of flow paths or local hydrologic connectivity;
- Surface water and aquatic habitat quality – degradation of surface water quality, degradation of aquatic habitat from instream and other construction activities, degradation of water quality and habitat from releases of drilling mud during HDD crossings;
- Channel morphology and stability – changes in channel morphology and stability caused by channel and streambank modifications; and
- Disturbance of wild rice waterbodies.

This section first describes the regulations relevant to assessing surface water impacts, the methods used to conduct the impact assessment, and the existing surface water conditions within the defined ROIs for the Applicant's proposed project and CN Alternatives. The potential impacts of construction and operation of the Applicant's proposed project and CN Alternatives on surface waters are considered next. A summary and comparison of the impacts for the Applicant's proposed project and CN Alternatives are presented at the end of the section along with potential mitigation measures that could be used to minimize impacts.

Surface water quality impacts that affect fish and wildlife and their habitats, including fisheries, Aquatic Management Areas (AMAs), waterbodies assigned an Index of Biotic Integrity, Lakes of Biological Significance (LBS), designated wildlife lakes, trout streams, and invasive species, are discussed in Section 5.2.4. This section and Section 5.2.4 should be considered together to provide an overall picture of the potential impacts of the Project on surface water.

Potential impacts on surface water due to unanticipated crude oil releases are discussed in Chapter 10.

5.2.1.2.1 Regulatory Context and Methodology

Regulatory Context

Federal, state, and local agencies have oversight and permitting authority for activities that may affect surface water use, flow, current, or quality. These permits include required actions and BMPs that would reduce potential impacts on surface water resources. EPA delegates authority to the states to regulate water quality and implement permitting (including the NPDES program) required by the Clean Water Act (CWA). The Applicant would be required to obtain NPDES permits from the North Dakota Department of Health's (North Dakota DH's) Division of Water Quality, Minnesota PCA, Iowa DNR, Wisconsin DNR, and Illinois EPA prior to construction in each respective state. Permits for withdrawal and use of water from surface water or groundwater sources also would be required from the North Dakota State Water

Commission, Minnesota DNR, Iowa DNR, Wisconsin DNR, and Illinois DNR. Any pipeline crossings of public water within Minnesota would require a license to cross from the Minnesota DNR.

Federal water permitting compliance associated with the sections 404 and 10 of the CWA would be required from the U.S. Army Corps of Engineers (USACE). State and federal rules as they pertain to surface water resources that could be affected by the Project are described below.

State-Designated/Sensitive Surface Waters

Each state designates certain surface waters as sensitive based on the beneficial use and water quality of the waterbody in order to maintain and protect the present and future beneficial uses of the designated waters. Each state designates the beneficial uses of its waters independently and with slight variations, including state-specific criteria such as whether the waterbody supports warmwater or coldwater aquatic life; is suitable for human contact and recreation; is suitable for drinking or for agricultural or industrial purposes; and is a lake, reservoir, or wetland. Each state also sets water quality standards (allowable concentrations of nutrients and pollutants) for each waterbody to protect the beneficial use(s). In Minnesota, some surface waters bodies are designated as outstanding resource value waters (ORVWs) when that waterbody has either wilderness, scientific, educational, ecological, recreational, cultural, or aesthetic resource characteristics, or other special qualities, that warrant stringent protection from degradation. Stringent water quality standards and fishing restrictions are implemented in Minnesota streams and lakes that have been designated as trout streams in order to maintain and propagate healthy communities of trout.[6] In Minnesota, surface waters used as a drinking water source are regulated by the Minnesota Department of Health.

Nationwide Rivers Inventory

Rivers or segments of rivers listed on the National Park Service's (NPS's) Nationwide Rivers Inventory (NRI) are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance (NPS 2011). All federal agencies must seek to avoid or mitigate actions that would adversely affect (e.g., decrease water quality or alter the free-flowing nature of the river) any NRI-listed river segments. Some NRI-listed rivers also are designated as Wild and Scenic Rivers, which are rivers or river segments with outstanding natural, cultural, and recreational values that are to be voluntarily protected in a free-flowing condition for the characteristics for which they were first designated.

Impaired Surface Waters

Section 303(d) of the CWA requires that states review, establish, and revise water quality standards for all surface waters within the state. Every 2 years, each state, territory, and authorized tribe must submit to the EPA a list of surface waters that do not meet EPA-approved water quality standards. These waters are considered impaired and do not meet their designated beneficial use from such causes as elevated contaminant levels, low dissolved oxygen, turbidity, high temperature, or bacterial contamination. The law also requires that the states establish priority rankings for waters on the Section 303(d) lists and develop total maximum daily loads (TMDLs) for these waters. North Dakota DH, Minnesota PCA, Iowa DNR, and Illinois EPA implement federal water quality regulations and identify and manage the list of impaired surface waters in their respective states. These agencies seek to avoid further impairment to these waterbodies by setting water quality standards and TMDLs (which are included in permit

6 Minn. R. 7050.0222 and 6264.0050

conditions and not to be exceeded by construction and operations activities), conducting water quality assessments, and developing plans to restore waterbodies to meet their designated use(s).

Navigable Waterways

USACE has jurisdiction over navigable waterways in accordance with Section 10 of the Rivers and Harbors Act of 1899. Navigable waters of the United States include those that are subject to the ebb and flow of the tide or are presently used, have been used in the past, may be susceptible for use to transport interstate or foreign commerce, or have a defined streambed and streambanks and an ordinary high water mark. Surface water crossings of navigable waters would require authorization from USACE under the CWA Section 404 and Rivers and Harbors Act Section 10. Issuance of a CWA Section 401 Individual Water Quality Certification for the Project in Minnesota falls under the jurisdiction of Minnesota PCA. CWA Section 401 certification in Wisconsin is issued by Wisconsin DNR, and in North Dakota by North Dakota DH's Division of Water Quality. Permitting for system alternative SA-04 would require obtaining a CWA Section 401 certifications from both Iowa DNR and Illinois DNR.

Wild Rice Waterbodies

Wild rice waterbodies are shallow bodies of water where rice, a persistent annual grass, reproduces each year from seed stock deposited in previous fall seasons. Wild rice beds are very attractive to migrating waterfowl, and many rice areas are traditional waterfowl staging and hunting areas. Because they are an important component of Minnesota's agricultural economy, wild rice waterbodies are specifically protected from destruction and disturbance. Wild rice is grown in Minnesota and Wisconsin but does not occur in North Dakota, Iowa, or Illinois. Various tribal, federal, state, and local laws and regulations are designed to manage and protect wild rice. These are associated with formal recognition of the significance of natural wild rice and its protection, management, and harvest. The Wisconsin DNR and Chippewa Tribes work together to determine the season, number of permits, and prescribed method in which Wisconsin residents are allowed to harvest wild rice. No other formal wild rice protection regulations, beyond federal and state wetland and waterbody permitting, exist in Wisconsin.

In Minnesota, wild rice and other aquatic vegetation growing in public waters is owned by the state, and a person may not acquire a property interest in or destroy wild rice except as allowed by law. Outside of tribal jurisdictions, Minnesota statutes and agency rules regulate the harvest of natural wild rice, including methods and timing of harvest. The Minnesota DNR Aquatic Plant Management Program prohibits removal of wild rice without an approved permit. Wild rice also is protected through shoreland protection laws and regulations, which are based on a system of classification for lakes and rivers that applies different zoning regulations depending on their classification. Minnesota PCA is proposing amendments to Minnesota Administrative Rules, Chapters 7001, 7050, 7052, and 7053. These amendments would refine how a wild rice waterbody is defined as well as acceptable sulfate levels for wild rice waterbodies (Minnesota PCA 2016a).

Tribal regulations related to the harvest and protection of wild rice within reservation boundaries vary from tribe to tribe and are managed by tribe-specific wild rice committees. In addition to tribal regulations, treaties (e.g., 1854 Treaty Authority) and other agreements with the U.S. government have reserved off-reservation harvesting rights for some tribes.

Methodology

Potential impacts on surface water were assessed from construction and operation of the Applicant's proposed project and CN Alternatives. Impacts on surface waters from pipeline construction would be largely due to waterbody crossing procedures and ground disturbing activities near waterbodies. Potential impacts from normal pipeline operation typically are localized and would likely be associated with maintenance activities. Therefore, the ROI for the assessment of construction impacts on surface waters includes the construction work area for each surface water crossed by the Applicant's proposed project in Minnesota (typically 120 feet wide) as well as the area immediately downstream from the crossing for flowing surface waters, and in the immediate vicinity for crossings of non-flowing surface waters such as lakes and wild rice waterbodies. Similarly, the ROI for construction impacts for SA-04 is based on a 120-foot-wide construction work area and the areas immediately downstream of flowing surface waters and in the immediate vicinity of non-flowing surface waters. The assessment of operations impacts is based on the location of the 50-foot-wide permanent pipeline right-of-way centered on the pipeline for the Applicant's proposed project and SA-04, as well as areas immediately downstream of flowing surface waters and in the immediate vicinity of non-flowing surface waters. Operations impacts for continued use of the existing Line 3 were evaluated based on the location of the existing permanent right-of-way for that pipeline and assuming that the integrity digs typically would be limited to the permanent right-of-way. The integrity repairs would consist of pipe repair or replacement, and the impacts address the potential for these actions to occur in or near-surface waters.

Potential impacts on surface waters from construction and operation of the rail and truck alternatives were evaluated based on the locations of surface waters at or near the routes described in Chapter 4 and on general information provided by the Applicant about the potential locations of offloading facilities. The waterbodies crossed by the potential rail and truck routes already exist and would only require construction for those crossings that need repair or upgrades to accommodate additional truck or rail traffic. Therefore, a more qualitative assessment of existing conditions and impacts was performed for these routes than for the Applicant's proposed project and system alternative SA-04.

- Watersheds and surface waters within the ROIs for the Applicant's proposed project and CN Alternatives were identified using GIS datasets and layers in the following data sources:
- USGS National Hydrography Dataset,
- USACE Section 10 navigable waterways,
- NPS's NRI national datasets,
- Minnesota DNR's Public Waters Inventory,
- Minnesota-designated trout streams,
- Minnesota DNR-identified wild rice waterbodies, and
- Section 303(d)-listed impaired surface waters in each state.

Acreages of wild rice waterbodies that could be affected were estimated using maps of the Minnesota DNR-identified wild rice waterbodies and rivers database (Minnesota DNR 2009), classified according to U.S. Fish and Wildlife Service (USFWS) Circular No. 39 (EPA 2002). These maps were overlaid with the construction work area and permanent right-of-way for the Applicant's proposed project, and the 120-foot-wide construction work area for SA-04. Wild rice waterbodies may occur that were not identified within the DNR database.

Potential impacts on surface waters were evaluated by:

- Identifying the existing conditions of surface waters that would be crossed, such as water quality and impairment, fishery resources (i.e., trout streams), beneficial use designations, state and federal classifications, and watershed water quality.
- Comparing the Applicant's proposed construction methods described in Chapter 2 and the special wetland construction methods described in the Applicant's November 2016 EAW and associated construction BMP plans (Enbridge 2016a) to peer-reviewed literature and agency documents, including permit requirements and guidance manuals, related to the proposed pipeline construction methods.
- Considering the potential for construction and operation of the Applicant's proposed project and CN Alternatives to affect the identified surface waters. The specific environmental concerns addressed in the impact analysis are listed in the introduction to Section 5.2.1.2.4.
- A separate analysis was prepared to evaluate potential impacts on high-quality surface waters. This was also a GIS analysis, but it was conducted using datasets that can help distinguish between the quality of surface waters that may be affected by the proposed Project and CN Alternatives.

Broader regional indicators of surface water quality were also reviewed to identify regional differences in existing conditions and extent of impacts. Due to unavailability of data from other states, this analysis was limited to Minnesota. These broad regional issues in Minnesota were evaluated by buffering GIS shapefiles the Applicant's proposed project and CN Alternatives by 0.5 mile and identifying intersections of features indicative of surface water quality, including trout streams, wild rice lakes, LBS (high and outstanding) and Tullibee (cisco) Lakes. Intersections of same stream over 1 mile apart were counted as separate intersections.

No single one of the datasets listed above provides a complete indication of all relevant impacts to surface water. Together, though, these datasets provide a reasonably comprehensive indication of the potential impacts. For example, water crossing counts do not consider water quality indicators that are relevant in understanding the nature of the potential impacts of construction and operation. However, data on high quality surface waters and waterbody/waterway use designations can aid the reader in understanding the influence that water quality may have on the nature of the potential impacts.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with the qualitative descriptions of impacts that are contained in the text. The summary table at the end of the surface water section, for example, provides counts of wild rice waterbodies and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to these waterbodies is contained in the text of this section.

5.2.1.2.2 Existing Conditions

This section identifies surface waters that could be affected by construction and operation of the Applicant's proposed project and CN Alternatives. These include surface waters with beneficial use designations, state-designated/sensitive surface waters, NRI-listed rivers, impaired surface waters, wild rice waterbodies, and public waters in Minnesota. Information is presented on water quality, designated uses, and state and federal classifications.

Public waters have been defined in Minnesota Law since 1897. The waters included in the definition have evolved and been refined over the years. Significant clarification was given to which waters were included as public waters in the Public Waters Inventory process conducted in the late 1970s through the early 1980s. Public waters are protected from destruction and degradation because of their value to the people of Minnesota for water supplies; groundwater recharge potential; retention of water to prevent and minimize downstream flooding and property damage; entrapment of nutrients and sediment; recreational activities such as boating, swimming, fishing and hunting, and navigation; and wildlife habitat areas for spawning, rearing, feeding, and nesting of wildlife.

Applicant's Proposed Project

Drainage Basins and Watersheds

A "drainage basin" is an area of land where all surface water from rain and snowmelt converges to a single point at a lower elevation, such as a river, lake, reservoir, or wetland. Drainage basins are made up of smaller watershed units. Table 5.2.1.2-1 provides the number of acres of each watershed that would be crossed by the construction work area and permanent right-of-way for the Applicant's proposed project.

The Red River of the North Basin encompasses a 39,270-square-mile surface drainage area to the mainstem of the Red River of the North within the United States. The basin stretches from northeastern South Dakota and west-central Minnesota northward through eastern North Dakota and northwestern Minnesota into southern Manitoba. It ends where the Red River empties into the southern end of Lake Winnipeg. The Minnesota portion of the Red River Basin covers approximately 37,100 square miles in northwestern Minnesota in all or part of 21 counties. It contains approximately 17,840 miles of streams and 668,100 acres of lakes. Land use in the Red River Basin consists of 74 percent agricultural land, 12 percent forest, 4 percent water/wetlands, 3 percent urban, and 7 percent other (Minnesota PCA and Red River Watershed Management Board 2006).

Table 5.2.1.2-1. Major Drainage Basins and Watersheds Crossed by the Applicant's Proposed Project

Drainage Basin	State(s)	Watershed	HUC-8	Watershed Water Quality Score[a]	Applicant's Proposed Project	
					Construction[b] (acres)	Operation[c] (acres)
Red River of the North	ND, MN	Tamarac River	09020311	63	463.9	198.0
	ND, MN	Grand Marais Creek	09020306	58	39.0	17.1
	MN	Red Lake River	09020303	63	301.2	132.8
	MN	Clearwater River	09020305	70	719.4	323.9
	MN, ND	Wild Rice River	09020108	77	72.0	33.4
	MN	Snake River	09020309	66	242.2	105.7
Lake Superior	MN, WI	Nemadji River	04010301	80	161.3	72.0
	MN	St. Louis River	04010201	56	64.8	28.0
St. Croix River	MN	Kettle River	07030003	76	317.9	149.8

Table 5.2.1.2-1. Major Drainage Basins and Watersheds Crossed by the Applicant's Proposed Project

Drainage Basin	State(s)	Watershed	HUC-8	Watershed Water Quality Score[a]	Applicant's Proposed Project	
					Construction[b] (acres)	Operation[c] (acres)
Upper Mississippi River (Mississippi Headwaters)	MN	Mississippi River – Headwaters	07010101	89	251.2	112.7
	MN	Crow Wing River	07010106	79	664.1	299.8
	MN	Pine River	07010105	95	551.9	244.2
	MN	Leech Lake River	07010102	89	7.6	3.2
	MN	Mississippi River – Grand Rapids	07010103	83	621.0	298.5
	MN	Mississippi River – Brainerd	07010104	76	77.9	38.1

Source: USGS 2016, Minnesota DNR 2015.

[a] Minnesota Department of Natural Resources implements the Watershed Health Assessment Framework to calculate a watershed health index score that represents the overall health of the watershed based on parameters that are grouped into five main components: biology, connectivity, geomorphology, hydrology, and water quality. Water quality scores, shown in this table, are based on various indices such as temperature, dissolved oxygen, pH, nutrient load, turbidity/sedimentation, and contaminant concentrations. Index scores of 0 to 20 represent components that are heavily affected/low quality, scores of 40 to 60 represent moderately affected/moderate quality, and scores of 80 to 100 represent the least affected/high quality (scores of 20–40 and 60–80 are intermediate values).

[b] Watershed acres that would be crossed by the construction work area.

[c] Watershed acres that would be crossed by the permanent right-of-way during operations.

HUC-8 = 8-digit hydrologic unit code that delineates watershed boundaries, defined by the U.S. Geological Survey (2016)

The Lake Superior Basin encompasses 9,126 square miles in Minnesota and Wisconsin. The Minnesota part of the basin encompasses portions of Aitkin, Carlton, Cook, Itasca, Lake, Pine, and St. Louis counties, covering approximately 6,200 square miles. Streams within the basin flow to Lake Superior, which discharges into Lake Huron, and ultimately flows into the St. Lawrence Seaway via Lakes Erie and Ontario. Nearly one-fifth of the state's 15,000 lakes and over 150 trout streams are located in four of the seven counties that make up the basin in Minnesota. Forests cover approximately 84 percent of the basin (Minnesota PCA 2004).

The St. Croix River Basin covers approximately 7,760 square miles and extends from near Mille Lacs Lake in Minnesota on the west to near Cable, Wisconsin, on the east. Approximately 46 percent of the basin is located in Minnesota. The St. Croix River's headwaters are at St. Croix Lake near Solon Springs, Wisconsin, from where it flows west and south over 160 miles until it joins the Mississippi River at Prescott, Wisconsin. The upper 20 percent of the St. Croix River is entirely within Wisconsin, and the lower 80 percent (129 miles) of the river forms part of the boundary between Wisconsin and Minnesota.

The Upper Mississippi River Basin covers approximately 20,100 square miles in Minnesota. It stretches from the headwaters of the Mississippi River at Lake Itasca to Lock and Dam Number 2 near Hastings. From its start at Itasca State Park, the Mississippi River flows south 2,350 miles, to the Gulf of Mexico. The basin drains 15 of the 80 major watersheds in Minnesota and all or parts of 21 counties. It is the only basin in the State of Minnesota with its watersheds wholly in the state (Minnesota PCA 2000).

Surface Waters Crossed

Various surface waters would be crossed by the Applicant's proposed project, as shown in Table 5.2.1.2-2. The Applicant's proposed project also would cross numerous non-jurisdictional ditches/drains, for which flows are unknown. Crossing of non-jurisdictional ditches/drains would be permitted by local authorities within each county. Appendix G contains a complete list of surface waters that would be crossed by the Applicant's proposed project.

The Applicant's proposed project crosses a total of 56 public waters in Minnesota. These include 4 public water ditches, 14 artificial paths, 25 perennial streams/rivers and 13 intermittent streams/rivers.

Sensitive/Specially Designated Surface Waters

As described in Section 5.2.1.2.1, states designate certain surface waters based on beneficial uses and water quality. The Applicant's proposed project would require 46 crossings of designated surface waters (5 in North Dakota, 39 in Minnesota, and 2 in Wisconsin). It also would cross six trout streams, all of which are located in Minnesota. Appendix G provides the designated uses of the surface waters crossed by the Applicant's proposed project in each state.

Nationwide Rivers Inventory

The Applicant's proposed project would cross seven NRI-listed rivers in Minnesota, with two crossings of two rivers, for a total of nine NRI-listed river crossings (Table 5.2.1.2-3). These waterbody crossings also are shown in Appendix A.

Table 5.2.1.2-2. Surface Waters Crossed by the Applicant's Proposed Project

Waterbody Type/Flow	North Dakota	Minnesota (PWI)	Wisconsin	Total
Artificial path	2	15 (14)	0	17
Canal/ditch	4	49 (4)	0	53
Connector	0	4 (0)	0	4
Lake/pond – perennial	3	18 (0)	0	21
Stream/river – intermittent	9	72 (13)	5	86
Stream/river – perennial	6	34 (25)	5	45
Swamp/marsh	1	0 (0)	0	1
TOTAL	**25**	**192 (56)**	**10**	**227**

Source: USGS 2017.

Notes:

An artificial path is a feature that represents flow through a two-dimensional feature, such as a lake or a double-banked stream. An artificial path represents the flow of water into, through, and out of features (channel, estuary, lake/pond, playa, reservoir, swamp, marsh). A canal ditch specifies that it is artificial and that it is used to transport water, to drain or irrigate land, to connect two or more water bodies, or to serve as a waterway for watercraft. A connector establishes a known, but non-specific connection between two non-adjacent network segments that have flow.

Perennial waterbodies are those that hold water at all times, except in cases of extreme drought. Intermittent waterbodies are those that are wet only during part of the year, usually in spring, when rain and snowmelt saturate the ground surface.

PWI = Public Waters Inventory

Table 5.2.1.2-3. Rivers Listed in the Nationwide Rivers Inventory Crossed by the Applicant's Proposed Project

Waterbody	Outstanding Resource Value	Crossing Milepost
Pembina River	Scenery; Geology; Wildlife	ND 1.4 and 1.7
Middle River	Scenery	MN 62.3
Red Lake River	Scenery; Recreation	MN 91.9
Clearwater River	Scenery	MN 149.5
Shell River	Scenery	MN 209.5 and 215.3
Crow Wing River	Scenery; Recreation	MN 217.4
Willow River	Scenery	MN 292.8

Source: NPS 2011.

Notes:

Geology: The river or the area within the river corridor contains one or more examples of a geologic feature, process, or phenomenon that is unique or rare within the region of comparison.

Recreation: Recreational opportunities are, or have the potential to be, popular enough to attract visitors or are unique or rare within the region. Visitors are willing to travel long distances to use the river resources for recreational purposes.

Scenery: The landscape elements of landform, vegetation, water, color, and related factors result in notable or exemplary visual features and/or attractions.

Wildlife: The river or area within the river corridor contains nationally or regionally important populations of indigenous wildlife species, and/or provides exceptionally high-quality habitat for wildlife of national or regional significance, and/or may provide unique habitat or a critical link in habitat conditions for federal or state-listed (or candidate) threatened, endangered, or sensitive species.

Also see maps in Appendix A.

Impaired Surface Waters

Impaired surface waters have been identified by states as not meeting certain water quality criteria. Table 5.2.1.2-4 lists the impaired surface waters that would be crossed by the Applicant's proposed project, their impairment, and the milepost in each state where the crossing would occur. No impaired surface waters would be crossed in Wisconsin. The Applicant's proposed project would require 16 crossings of impaired surface waters. These impaired waterbody crossings are shown in Appendix A.

Table 5.2.1.2-4. Impaired Surface Waters Crossed by the Applicant's Proposed Project

State	Waterbody Name	Impaired Beneficial Use	Impairment	Crossing by Milepost
North Dakota	Tongue River Cutoff	Fish and other aquatic biota	Sedimentation/siltation; combination benthic/fishes bioassessments	ND 9.2
North Dakota	Pembina River	Fish and other aquatic biota	Metals (Se, Cd, Cu, Pb); sedimentation/siltation	ND 1.4 / 1.7
		Municipal/ domestic	Metals (Pb, As)	
		Recreation	*E. coli*	
Minnesota	Mississippi River	Aquatic consumption	Mercury in fish tissue	MN 296.7

Table 5.2.1.2-4. Impaired Surface Waters Crossed by the Applicant's Proposed Project

State	Waterbody Name	Impaired Beneficial Use	Impairment	Crossing by Milepost
Minnesota	Kettle River	Aquatic consumption	Mercury in fish tissue	MN 338.2
Minnesota	Walker Brook	Aquatic life	Dissolved oxygen	MN 151.4
Minnesota	Clearwater River	Aquatic consumption; aquatic life	Mercury in fish tissue; dissolved oxygen	MN 149.5
Minnesota	Mississippi River	Aquatic life	Dissolved oxygen	MN 165.1
Minnesota	Silver Creek	Aquatic recreation	Fecal coliform	MN 135.9
Minnesota	Tamarac River	Aquatic life	Aquatic macroinvertebrate bioassessments; fishes bioassessments	MN 54.4
Minnesota	Middle River	Aquatic life	Dissolved oxygen; turbidity; aquatic macroinvertebrate bioassessments	MN 62.3
Minnesota	Clearwater River	Aquatic consumption; aquatic life	Mercury in fish tissue; dissolved oxygen; turbidity	MN 103.0
Minnesota	Black River	Aquatic life	Dissolved oxygen	MN 82.6
Minnesota	Red River of the North	Aquatic consumption	Mercury in fish tissue	MN 27.6
Minnesota	Silver Creek	Aquatic recreation	Fecal coliform	MN 135.3 / 135.6

Sources: Iowa DNR 2017; North Dakota DH 2012; Minnesota PCA 2014, 2016b; Illinois EPA 2016.

Al = aluminum, As = arsenic, Cd = cadmium, Cu = copper, Pb = lead, PCBs = polychlorinated biphenyls, Se = selenium

Navigable Waterways

The Applicant's proposed project would require the following seven crossings of navigable waterways (five in Minnesota), as shown in Appendix A:

- Mississippi River – MN MP 296.7,
- Kettle River – MN MP 338.2,
- Sandy River – MN MP 305.9,
- Red Lake River – MN MP 91.9,
- Red River of the North – MN MP 27.6, and
- Pembina River – ND MPs 1.4 and 1.7.

Wild Rice Waterbodies

All wild rice waterbodies that would be crossed by the Applicant's proposed project occur between Clearbrook and Carlton. Seventeen wild rice waterbodies occur within 0.5 mile of the Applicant's proposed project. Four wild rice waterbodies could be affected by construction and operation of the

Applicant's proposed project: Mud Lake, Portage Lake, Peterson Lake, and an unnamed lake. The areas of wild rice waterbodies that would be affected by construction and operation of the Applicant's proposed project are listed in Table 5.2.1.2-5.

Table 5.2.1.2-5. Wild Rice Waterbodies Crossed by the Applicant's Proposed Project in Minnesota (acres)

Wild Rice Waterbody Type	Construction and Operation	Within 0.5 Mile of Centerline
Mud Lake	0.99	118.1
Peterson Lake	1.43	141.6
Portage Lake	2.11	74.9
Unnamed lake	0.3	54.1
TOTAL	**4.92**	**388.7**

Source: Minnesota DNR 2009b.

Continued Use of Existing Line 3

The existing Line 3 pipeline crosses the same drainage basins as the Applicant's proposed project. Various surface waters are crossed by existing Line 3, as shown in Table 5.2.1.2-6.

The existing Line 3 pipeline crosses a total of 53 public waters in Minnesota. These include four public water ditches, one connector, nine artificial paths, 24 perennial streams/rivers, 13 intermittent streams/rivers, one perennial lake/pond, and one intermittent swamp/marsh.

Eleven wild rice waterbodies occur within 0.5 mile of the existing Line 3. One wild rice waterbody (White Oak Lake) is crossed by the existing Line 3 corridor at the stream inlet to the lake basin portion of the wild rice lake boundary.

Table 5.2.1.2-6. Surface Waters Crossed by Existing Line 3

Waterbody Type/Flow	Number of Crossings (PWI)
Artificial path	11 (9)
Canal/ditch	57 (4)
Connector	3 (1)
Lake/pond – perennial	12 (1)
Stream/river – intermittent	66 (13)
Stream/river – perennial	48 (24)
Swamp/marsh	1
Swamp/marsh – intermittent	1 (1)
TOTAL	**199 (53)**

Table 5.2.1.2-6. Surface Waters Crossed by Existing Line 3

Waterbody Type/Flow	Number of Crossings (PWI)

Source: USGS 2017.

Notes:

An artificial path is a feature that represents flow through a two-dimensional feature, such as a lake or a double-banked stream. An artificial path represents the flow of water into, through, and out of features (channel, estuary, lake/pond, playa, reservoir, swamp, marsh). A canal ditch specifies that it is artificial and that it is used to transport water, to drain or irrigate land, to connect two or more water bodies, or to serve as a waterway for watercraft. A connector establishes a known, but non-specific connection between two non-adjacent network segments that have flow.

Perennial waterbodies are those that hold water at all times, except in cases of extreme drought. Intermittent waterbodies are those that are wet only during part of the year, usually in spring, when rain and snowmelt saturate the ground surface.

Also see maps in Appendix A.

PWI = Public Waters Inventory

System Alternative SA-04

Drainage Basins and Watersheds

Table 5.2.1.2-7 provides the number of acres of each watershed that would be crossed by the construction work area and permanent right-of-way for system alternative SA-04.

System alternative SA-04 follows the Applicant's proposed project in the Red River of the North Basin, as described above, before diverging from the Applicant's proposed project and entering the Minnesota River Basin. The Minnesota River Basin covers approximately 16,770 square miles. The Minnesota River flows southeast from its source at Big Stone Lake on the South Dakota border to Mankato, Minnesota, then northeast to join the Mississippi River at Fort Snelling (about 335 total miles). Thirteen major watersheds in Minnesota drain into the basin, which touches 37 counties.

Table 5.2.1.2-7. Major Drainage Basins and Watersheds Crossed by System Alternative SA-04

Drainage Basin (area)	State(s)	Watershed	HUC-8	Watershed Water Quality[a]	Construction[b] (acres)	Operation[c] (acres)
Red River of the North	ND	Goose	09020109	10.6%/37%	122.5	51.0
	ND	Park	09020310	9.6%/60.4%	75.7	31.6
	ND	Forest	09020308	NA	81.7	34.0
	ND	Lower Sheyenne	09020204	16.3%/25.2%	259.4	109.1
	ND	Turtle	09020307	NA	339.1	141.3
	ND	Maple	09020205	2.3%/0%	47.9	18.9
	ND	Western Wild Rice	09020105	52%/8%	776.0	323.3
	ND	Lower Pembina River	09020316	NA	240.8	100.3
	ND, MN	Bois De Sioux	09020101	53	209.3	87.2
	ND, MN	Upper Red	09020104	46	45.4	18.9
	ND, MN	Sandhill-Wilson	09020301	66	482.7	201.1

Table 5.2.1.2-7. Major Drainage Basins and Watersheds Crossed by System Alternative SA-04

Drainage Basin (area)	State(s)	Watershed	HUC-8	Watershed Water Quality[a]	Construction[b] (acres)	Operation[c] (acres)
	ND, MN	Tamarac River	09020311	63	347.2	22.6
	ND, MN	Elm-Marsh	09020107	27.5%/0%	362.1	150.9
	ND, MN	Grand Marais Creek	09020306	58	88.1	36.7
	MN	Mustinka	09020102	47	372.6	155.2
Minnesota River	MN	Hawk-Yellow Medicine	07020004	52	278.4	116.0
	MN	Le Sueur	07020011	52	555.3	231.4
	MN	Chippewa	07020005	64	572.7	238.6
	MN	Lower Minnesota	07020012	51	496.7	207.0
	MN	Middle Minnesota	07020007	47	298.6	124.4
	MN	Pomme de Terre	07020002	56	238.1	99.2
	MN	South Fork Crow	07010205	49	297.7	124.0
Upper Mississippi-Skunk-Wapsipinicon	MN, IA	Shell Rock	07080202	39	178.9	74.5
	MN, IA	Upper Wapsipinicon	07080102	39	994.6	414.4
	MN, IA	Upper Cedar	07080201	39	613.9	255.8
	IA, IL	Copperas-Duck	07080101	NA	185.7	77.4
	IA	Lower Wapsipinicon	07080103	NA	563.4	234.7
Upper Mississippi-Maquoketa-Plum	IA	Maquoketa	07060006	NA	752.1	313.4
Rock	IL	Green	07090007	NA	216.7	90.3
	IL	Lower Rock	07090005	NA	416.3	173.5
Upper Illinois	IL	Lower Fox	07120007	NA	261.2	108.86
	IL	Upper Illinois	07120005	NA	317.9	132.46
	IL	Des Plaines	07120004	NA	78.8	32.82
Lower Illinois	IL	Lower Illinois-Senachwine Lake	07130001	NA	400.6	166.92

Sources: USGS 2017; Minnesota DNR 2015; NRCS n.d.

[a]. Watershed water quality values for North Dakota are presented as two numbers: the percentage of total miles of rivers/streams in the watershed that are impaired and the percentage of total acres of lakes/reservoirs in the watershed that are impaired. Watershed health values for MN watersheds represent water quality scores, which are based on various indices such as temperature, dissolved oxygen, pH, nutrient load, turbidity/sedimentation, and contaminant concentrations. Index scores of 0 to 20 represent components that are heavily affected/low quality, scores of 40 to 60 represent moderately affected/moderate quality, and scores of 80 to 100 represent the least affected/high quality (scores of 20–40 and 60–80 are intermediate values). Iowa and Illinois do not categorize watershed health.

[b] Watershed acres that would be crossed by the construction work area.

[c] Watershed acres that would be crossed by the permanent right-of-way during operations.

HUC-8 = 8-digit Hydrologic Unit Code that delineates watershed boundaries, defined by the U.S. Geological Survey (2016); NA = not available

The Rock River Basin occupies the northwest portion of Illinois. It includes watersheds of the Rock, Green, Kishwaukee, and Pecatonica rivers, in addition to areas drained by the Galena, Apple, and Plum rivers and other small tributaries entering directly into the Mississippi River. The Rock River originates in the Horicon Marsh in Dodge County, Wisconsin, and flows in a generally southerly direction until it enters Illinois just south of Beloit. There, it flows in a southwesterly direction until it joins the Mississippi River at Rock Island. The river is about 163 miles long in Illinois, and its total length is about 318 miles. The basin covers 6,481 square miles (Sinclair 1996).

The Upper Illinois River Basin encompasses 10,949 square miles upstream from Ottawa, Illinois, on the Illinois River. It includes parts of 16 counties in northeastern Illinois (62 percent of the basin), 13 counties in northwestern Indiana (28 percent of the basin), 7 counties in southeastern Wisconsin (10 percent of the basin), and 1 county in southwestern Michigan (< 0.1 percent of the basin) (USGS 2004).

The Lower Illinois River Basin covers 18,000 square miles of central and west-central Illinois between the upper end at Ottawa and the confluence of the Illinois River with the Mississippi River near Grafton. The basin includes all of 22 and parts of 19 counties in Illinois. Agriculture accounts for 88 percent of the overall land area, whereas forests account for 7 percent and urban areas account for about 2 percent (USGS 2000).

Surface Waters Crossed

The types of surface waters crossed by system alternative SA-04 are listed in Table 5.2.1.2-8. System alternative SA-04 would cross numerous non-jurisdictional ditches/drains, for which flows are unknown. Crossing of non-jurisdictional ditches/drains would be permitted by local authorities within each county. Appendix G contains a complete list of surface waters that would be crossed by system alternative SA-04.

SA-04 would cross a total of 49 public waters in Minnesota. These include 11 public water ditches, 6 artificial paths, 8 perennial streams/rivers and 24 intermittent streams/rivers.

Table 5.2.1.2-8. Surface Waters Crossed by System Alternative SA-04

Waterbody Type/Flow	North Dakota	Minnesota (PWI)	Iowa	Illinois	Total
Artificial path	10	6 (6)	5	16	37
Canal/ditch	17	71 (11)	0	3	91
Connector	0	1 (0)	0	0	1
Lake/pond – intermittent	0	0 (0)	4	0	4
Lake/pond – perennial	5	3 (0)	4	1	13
Stream/river – intermittent	74	81 (24)	152	77	384
Stream/river – perennial	13	10 (8)	54	19	96
Swamp/marsh	2	0 (0)	4	4	10
TOTAL	**121**	**172 (49)**	**223**	**120**	**636**

Source: USGS 2017.

Table 5.2.1.2-8. Surface Waters Crossed by System Alternative SA-04

Waterbody Type/Flow	North Dakota	Minnesota (PWI)	Iowa	Illinois	Total

Notes:

An artificial path is a feature that represents flow through a two-dimensional feature, such as a lake or a double-banked stream. An artificial path represents the flow of water into, through, and out of features (channel, estuary, lake/pond, playa, reservoir, swamp, marsh). A canal ditch specifies that it is artificial and that it is used to transport water, to drain or irrigate land, to connect two or more water bodies, or to serve as a waterway for watercraft. A connector establishes a known, but non-specific connection between two non-adjacent network segments that have flow.

Perennial waterbodies are those that hold water at all times, except in cases of extreme drought. Intermittent waterbodies are those that are wet only during part of the year, usually in spring, when rain and snowmelt saturate the ground surface.

Also see maps in Appendix A.

PWI = Public Waters Inventory

Sensitive/Specially Designated Surface Waters

System alternative SA-04 would require 56 crossings of designated surface waters, of which 18 are in North Dakota, 18 are in Minnesota, and 20 are in Iowa. Illinois designates only a small number of its surface waters, principally in the Chicago area, and none of these waterways would be crossed by system alternative SA-04. System alternative SA-04 would not cross any trout streams. Of the 636 (172 in Minnesota) surface waters crossed by system alternative SA-04, a total of 526 are unnamed and do not have designations. Appendix G provides the designated uses of the surface waters crossed by system alternative SA-04 in each state.

Nationwide Rivers Inventory

System alternative SA-04 would cross five NRI-listed rivers (one in Minnesota), with two crossings of one river, for a total of six crossings of NRI-listed rivers (Table 5.2.1.2-9). These waterbody crossings also are shown in Appendix A.

Table 5.2.1.2-9. Rivers Listed in the Nationwide Rivers Inventory Crossed by System Alternative SA-04

Waterbody	Outstanding Resource Value	Crossing by Milepost
Pembina River	Scenery; Geology; Wildlife	ND 1.4 and 1.7
Minnesota River	Scenery; Recreation; Wildlife; History	MN 406.6
Rock River	Recreation	IL 694.5
Indian Creek	Scenery	IL 759.9
Fox River	Scenery, Recreation; Geology	IL 762.9

Source: NPS 2011.

Notes:

Geology: The river or the area within the river corridor contains one or more examples of a geologic feature, process, or phenomenon that is unique or rare within the region of comparison.

History: The river or area within the river corridor contains a site(s) or feature(s) associated with a significant event, an important person, or a cultural activity of the past that was rare or one-of-a-kind in the region.

Recreation: Recreational opportunities are, or have the potential to be, popular enough to attract visitors or are unique or rare within the region. Visitors are willing to travel long distances to use the river resources for recreational purposes.

Scenery: The landscape elements of landform, vegetation, water, color, and related factors result in notable or exemplary visual features and/or attractions.

Table 5.2.1.2-9. Rivers Listed in the Nationwide Rivers Inventory Crossed by System Alternative SA-04

Wildlife: The river or area within the river corridor contains nationally or regionally important populations of indigenous wildlife species, and/or provides exceptionally high-quality habitat for wildlife of national or regional significance, and/or may provide unique habitat or a critical link in habitat conditions for federal or state-listed (or candidate) threatened, endangered, or sensitive species.

Also see maps in Appendix A.

Impaired Surface Waters

Table 5.2.1.2-10 lists the impaired surface waters that would be crossed by system alternative SA-04, their impairment, and the milepost in each state where the crossing would occur. System alternative SA-04 would require 32 crossings of impaired waterways. These impaired waterbody crossings are shown in Appendix A.

Table 5.2.1.2-10. Impaired Surface Waters Crossed by System Alternative SA-04

State	Waterbody Name	Impaired Beneficial Use	Impairment	Crossing by Milepost
North Dakota	Wild Rice River	Fish and other aquatic biota	Sedimentation/siltation; dissolved oxygen	ND 213.0
North Dakota	Antelope Creek	Fish and other aquatic biota	Sedimentation/siltation; benthic-macroinvertebrate bioassessments; temperature	ND 203.9
North Dakota	Wild Rice River	Fish and other aquatic biota	Sedimentation/siltation; combination benthic/fishes bioassessments; dissolved oxygen	ND 185.6/173.3
North Dakota	Sheyenne River	Recreation	Fecal coliform	ND 167.5
North Dakota	Maple River	Fish and other aquatic biota	Sedimentation/siltation	ND 154.7
		Recreation	*E. coli*	
North Dakota	Rush River	Fish and other aquatic biota	Sedimentation/siltation; combination benthic/fishes bioassessments	ND 149.8
North Dakota	North Branch Elm River	Fish and other aquatic biota	Sedimentation/siltation; combination benthic/fishes bioassessments	ND 126.2
North Dakota	Goose River	Fish and other aquatic biota	Fishes bioassessments	ND 120.0
North Dakota	Cole Creek	Fish and other aquatic biota	Combination benthic/fishes bioassessments	ND 96.9

Table 5.2.1.2-10. Impaired Surface Waters Crossed by System Alternative SA-04

State	Waterbody Name	Impaired Beneficial Use	Impairment	Crossing by Milepost
North Dakota	Turtle River	Fish and other aquatic biota	Sedimentation/siltation; combination benthic/fishes bioassessments; metals (Cd, Se)	ND 69.1
		Municipal/ domestic	Chloride and metals (As, Se, Cd)	
North Dakota	Park River	Fish and other aquatic biota	Metals (Cd, Se, Pb, Cu)	ND 43.3
North Dakota	Forest River	Fish and other aquatic biota	Sedimentation/siltation; benthic-macroinvertebrate bioassessments	ND 53.9
North Dakota	Tongue River Cutoff	Fish and other aquatic biota	Sedimentation/siltation; combination benthic/fishes bioassessments	ND 9.2
North Dakota	Pembina River	Fish and other aquatic biota	Metals (Se, Cd, Cu, Pb); sedimentation/siltation	ND 1.4 / 1.7
		Municipal/ domestic	Metals (Pb, As)	
		Recreation	*E. coli*	
Minnesota	Minnesota River	Aquatic consumption	Mercury and PCBs in fish tissue	MN 406.6
		Aquatic life	Turbidity	
Minnesota	Cedar River	Aquatic life	Aquatic macroinvertebrate bioassessments; fishes bioassessments; turbidity	MN 478.6
		Recreation	Fecal coliform	
Minnesota	Pomme de Terre River	Aquatic consumption	Mercury in fish tissue	MN 277.5
		Aquatic life	Aquatic macroinvertebrate bioassessments; fishes bioassessments; turbidity	
		Aquatic recreation	Fecal coliform	
Minnesota	South Branch Rush River	Aquatic recreation	Fecal coliform	MN 383.4
Minnesota	Woodbury Creek	Aquatic recreation	Fecal coliform	MN 472.7
Minnesota	Otter Creek	Aquatic recreation	Fecal coliform	MN 484.2

Table 5.2.1.2-10. Impaired Surface Waters Crossed by System Alternative SA-04

State	Waterbody Name	Impaired Beneficial Use	Impairment	Crossing by Milepost
Minnesota	Twelvemile Creek	Aquatic life	Aquatic macroinvertebrate bioassessments; fishes bioassessments; turbidity	MN 247.5
		Aquatic recreation	*E. coli*	
Minnesota	Bois de Sioux River	Fish and other aquatic biota	Sedimentation/siltation; combination benthic/fishes bioassessments	MN 233.6
Iowa	Brophy Creek	Aquatic life	Biological – low biotic index	IA 664.1
Iowa	East Branch Buffalo Creek[a]	Aquatic life	Dissolved oxygen	IA 571.1
Iowa	Mississippi River	Aquatic life	Metals (Al)	IA 672.3
Illinois	Rock River	Fish consumption	Mercury and PCBs	IL 694.5
Illinois	Illinois River	Fish consumption	Mercury	IL 772.5
Illinois	Fox River	Fish consumption	PCBs	IL 762.9
Illinois	Aux Sable Creek	Aquatic recreation	Fecal coliform	IL 784.7
Illinois	Des Plaines River	Aquatic life	Aquatic macroinvertebrate bioassessments; fishes bioassessments; turbidity; metals (Cu),	IL 792.2
		Fish consumption	Mercury	

Sources: Iowa DNR 2017; North Dakota DH 2017; Minnesota PCA 2014, 2016b; Illinois EPA 2016.

[a] East Branch Buffalo Creek has been a pending listing since 2012.

Al = aluminum, As = arsenic, Cd = cadmium, Cu = copper, Pb = lead, PCBs = polychlorinated biphenyls, Se = selenium

Navigable Waterways

System alternative SA-04 would require the following nine crossings of navigable waterways (two in Minnesota), as shown in Appendix A:

- Minnesota River – MN MP 406.6,
- Bois de Sioux River – MN MP 233.6,
- Rock River – IL MP 694.5,
- Mississippi River – IA MP 672.3,
- Illinois River – IL MP 772.5,
- Fox River – IL MP 763.3,
- Des Plaines River – IL 792.2, and

- Pembina River – ND MPs 1.4 and 1.7.

Wild Rice Waterbodies

No wild rice waterbodies would be crossed by system alternative SA-04 (Great Lakes Indian Fish and Wildlife Commission 2017; Wisconsin DNR 2017).

Transportation by Rail

The potential rail routes cross the same drainage basins as does the Applicant's proposed project. Various surface waters are crossed by the rail beds that would be used by the rail alternative, as shown in Table 5.2.1.2-11. The potential rail routes also cross numerous non-jurisdictional ditches/drains, for which flows are unknown.

Table 5.2.1.2-11. Surface Waters Crossed by the Rail Alternative

Waterbody Type/Flow	Rail Route to Clearbrook	Rail Route to Superior North	Rail Route to Superior South	Total
Artificial path	6	9	15	30
Canal/ditch	30	50	62	142
Connector	1	4	4	9
Stream/river – intermittent	26	65	68	159
Stream/river – perennial	6	50	52	108
TOTAL	**69**	**178**	**201**	**448**

Source: USGS 2017.

Notes:

An artificial path is a feature that represents flow through a two-dimensional feature, such as a lake or a double-banked stream. An artificial path represents the flow of water into, through, and out of features (channel, estuary, lake/pond, playa, reservoir, swamp, marsh). A canal ditch specifies that it is artificial and that it is used to transport water, to drain or irrigate land, to connect two or more water bodies, or to serve as a waterway for watercraft. A connector establishes a known, but non-specific connection between two non-adjacent network segments that have flow.

Perennial waterbodies are those that hold water at all times, except in cases of extreme drought. Intermittent waterbodies are those that are wet only during part of the year, usually in spring, when rain and snowmelt saturate the ground surface.

Also see maps in Appendix A.

No wild rice waterbodies are crossed by rail lines that could be used to transport crude oil (Great Lakes Indian Fish and Wildlife Commission 2017; Wisconsin DNR 2017).

Transportation by Truck

The potential truck routes cross the same drainage basins as the Applicant's proposed project, except for the St. Croix River Basin. Various surface waters are crossed by the routes that could be used for the truck transport alternative, as shown in Table 5.2.1.2-12. The potential truck routes also cross numerous non-jurisdictional ditches/drains, for which flows are unknown.

No wild rice waterbodies are crossed by existing road networks that could be used to transport crude oil (Great Lakes Indian Fish and Wildlife Commission 2017; Wisconsin DNR 2017).

Table 5.2.1.2-12. Surface Waters Crossed by the Truck Alternative

Waterbody Type/Flow	Truck Route Gretna to Clearbrook Terminal	Truck Route Gretna to Superior Terminal	Total
Artificial path	7	15	22
Canal/ditch	28	48	76
Connector	0	5	5
Stream/river – intermittent	23	50	73
Stream/river – perennial	9	40	49
TOTAL	**67**	**158**	**225**

Source: USGS 2017.

Notes:

An artificial path is a feature that represents flow through a two-dimensional feature, such as a lake or a double-banked stream. An artificial path represents the flow of water into, through, and out of features (channel, estuary, lake/pond, playa, reservoir, swamp, marsh). A canal ditch specifies that it is artificial and that it is used to transport water, to drain or irrigate land, to connect two or more water bodies, or to serve as a waterway for watercraft. A connector establishes a known, but non-specific connection between two non-adjacent network segments that have flow.

Perennial waterbodies are those that hold water at all times, except in cases of extreme drought. Intermittent waterbodies are those that are wet only during part of the year, usually in spring, when rain and snowmelt saturate the ground surface.

Also see maps in Appendix A.

Existing Line 3 Supplemented by Rail

Existing conditions for the existing Line 3 supplemented by rail alternative are similar to those described above for continued use of the existing Line 3 pipeline and the rail alternative.

Existing Line 3 Supplemented by Truck

Existing conditions for the existing Line 3 supplemented by truck alternative are similar to those described above for continued use of the existing Line 3 pipeline and the truck alternatives.

5.2.1.2.3 Regional Analysis of the Quality of Existing Surface Water Conditions

This analysis provides a summary of general quality comparisons of surface water conditions across Minnesota as well as more detailed potential effects on specific surface water resources along the Applicant’s proposed project and the CN Alternatives.

The north-central and northeast portion of Minnesota consist of water resources that are generally the highest quality recreational water resources in the state. To describe the general region wide or state wide difference in surface water resource quality across Minnesota, different general methods can be used including the Minnesota PCA ecoregion concept to guide typical water quality conditions and Minnesota DNR WHAF. Quality of existing surface water conditions are discussed using each of these frameworks below.

- **Minnesota PCA Ecoregion Concept to Guide Typical Water Quality Conditions**: The State is divided into seven different ecoregions based on soils. Ecoregions have similar soil, geomorphology, land use and natural vegetation. The Northern Lakes and Forests (NLF) Ecoregion typically has the highest water quality as compared to other ecoregions, especially those that are representative with areas more dominated by altered landscapes. The Minnesota PCA offers a guide to typical water quality conditions in these seven "ecoregions," large expanses of land containing a geographically distinct collection of plants, animals, natural communities and environmental conditions."[7]

- **Minnesota DNR WHAF:** Another approach used to describe surface water quality conditions across landscapes in Minnesota is the WHAF Tool, developed by the Minnesota DNR which uses the science of watershed health. The science of watershed health is based on a whole-system approach. Ecological processes interact to provide services such as clean air and water, available groundwater, and diverse plant and animal communities. The science of health explores how all the parts system work together to provide a "healthy watershed". In order to explore the watershed system in a consistent, systematic way, the ecological processes have been divided into five different components: Biology, Connectivity, Geomorphology, Hydrology and Water Quality. A suite of watershed health index scores have been calculated that represent many of the important ecological relationships within and between the components. These scores are built on statewide GIS data that is compared consistently across Minnesota to provide a baseline health condition report for each of the 81 major watersheds in the state. The Watershed Health Assessments consist of health scores that rank the condition of Minnesota's watersheds from 0 (poor health condition, red) to 100 (good health condition, green). Watershed report cards indicate poorer water quality related to altered land use indicators as depicted in this analysis[8] (Appendix J-1).

The ecoregion approach used to assess water quality by the Minnesota PCA and the WHAF Tool developed by the Minnesota DNR are useful in describing existing surface water conditions across Minnesota. In general, the north-central and northeast forested portions of Minnesota are the least affected and have the highest quality surface water resources, and areas in the west and south agricultural portions of the state have the most affected surface water resources and are of poorer quality.

Specifically, the data indicate that there are higher quality resources in the NLF Ecoregion of the State. Lower nutrients (mainly phosphorus) and chlorophyll-a (algae) and greater transparency are indicative of lakes in this ecoregion. Streams in this ecoregion exhibit lower nutrients, turbidity, and fecal coliform, as well as lower temperature and biological oxygen demand conditions. A spatial distribution of lakes and streams depicted in Appendix J-2 and J-3, which show lakes and streams relative to pipeline routes across the state. There are a large number of lakes and streams in north-central and northeast Minnesota and they are of the highest quality when comparing Ecoregion data.

Three selected watersheds, each representing potential pipeline routing areas through the state were reviewed. These included the Pine River watershed (north-central), Chippewa River (west) and Le Sueur River (south). The watershed health index scores indicate the best health scores are represented in the Pine River and the worst scores in the Chippewa and Le Sueur River watersheds accordingly. Further, in general, statewide maps indicate better health scores across the north and east and poorer scores across the south and west as depicted by analysis of the five different components: Biology,

7 https://www.pca.state.mn.us/quick-links/eda-guide-typical-minnesota-water-quality-conditions

8 http://www.dnr.state.mn.us/whaf/index.html

Connectivity, Geomorphology, Hydrology and Water Quality (Appendix J-1). Water quality scores for the Applicant's proposed project and SA-04 are provided in Tables 5.2.1.2-1 and 5.2.1.2-7.

Trout Streams

Several trout streams are intersected by the Applicant's proposed project. Often because of their non- or minimally-affected watersheds and their location, soils and geologic setting within the state, these streams represent high-quality cold oxygenated water necessary for trout survival.

The Applicant's proposed project passes within 0.5 mile of 17 designated trout streams or protected tributaries to designated trout streams. Truck and rail routes pass within 0.5 mile of 35 to 44 of these streams. In contrast, Route SA-04 crosses within two designated trout streams or protected tributaries to designated trout streams (Table 5.2.1.2-13)**.** Though more streams/ditches are crossed in southern areas, the analysis indicates the quality of the streams crossed in northern routes is greater since many are trout waters.

Table 5.2.1.2-13. High-Quality Surface Water Resources within 0.5 Mile of Route Centerline

High-Quality Resources	Applicant's Proposed Project	System Alternative SA-04	Transport by Truck	Transport by Rail (North)	Transport by Rail (South)
Trout Streams	17	2	44	35	39
Wild Rice Lakes	17	0	15	13	18
Lakes of High and Outstanding Biological Significance	8	1	8	10	16
Tulibee Lakes	4	0	8	9	4

Wild Rice Lakes

Minnesota has more acres of natural wild rice (*Zizania palustris*) than any other state in the country. Wild rice has been historically documented in 45 of Minnesota's 87 counties and in all corners of the state. Anecdotal information suggests an even broader distribution prior to European settlement. Wild rice is an important social and cultural component for American Indian tribes and rural Minnesota communities.

A DNR assessment found over 1,200 lakes and rivers in 54 counties that currently contain or historically had wild rice. Over 64,000 acres of wild rice (out of roughly 2 million basin acres) were found on these waters. More than half of the acreage was found in Aitkin, Cass, Crow Wing, Itasca, and St. Louis counties.

Lakes of Biological Significance (high and outstanding)

LBS were identified and classified by DNR subject matter experts on objective criteria for four community types (aquatic plants, fish, amphibians, and birds). Unique plant or animal presence was the primary measure of a lake's biological significance. Lakes were rated and grouped for each of the following communities: aquatic plants, fish, birds, and amphibians. Lakes were assigned one of three biological significance classes (outstanding, high, or moderate). This assessment viewed outstanding and high sites as they are representative of the highest quality conditions. Many Minnesota lakes have not been sampled for plants and/or animals, so this list of lakes would be periodically revised as additional biological data become available.

There are a large number of lakes with high and outstanding biological significance in the NLF. The Applicant's proposed project is near (< 0.5 mile) eight of these lakes in this ecoregion (see Table 5.2.1.2-13).

Tullibee Lakes

Minnesota has about 650 tullibee lakes, more than any other state in the lower 48. Many of these waters are prized by anglers because tullibee (also known as cisco, or lake herring in Lake Superior) provide a high-energy feast for walleye, northern pike, muskellunge, and lake trout. Changes in land use and climate are causing many lakes to lose tullibee. Keeping forested land intact can help maintain water quality in lakes with tullibee and other coldwater species. The Tullibee Lake Watershed Forest Stewardship Project[9] is engaging owners of private woodlands and other conservation partners to protect vulnerable waters in north-central Minnesota.

Other Spatial Indicators of the Quality of Surface Water

Ditches

An evaluation was also done on the number of public water ditches crossed by the routes. High numbers of ditches is an indication of landscape alteration that adversely affects water resources, thus diminishing the quality of water resources in the area. An image of the total number of ditches, including private, in the vicinity Applicant's proposed project and alternatives is depicted on a statewide map in Appendix J-4.

Perennial Cover

Areas that tend to rate low in perennial cover, terrestrial habitat quality and connectivity have poorer overall health index scores as depicted in watershed health index scores for the Pine, Chippewa and Le Sueur River Watersheds (Appendix J-5).

Wetlands

Minnesota's six million acres of peatlands represent a major component of the state's natural heritage. In a world-wide context, the patterned peatlands in Minnesota are extremely valuable for the study of ecological and developmental processes in peatlands as noted in "Recommendations for the Protection of Ecologically Significant Peatlands in Minnesota" (Minnesota DNR 1984). The number of wetlands statewide is also depicted in viewing watershed health index scores under Loss of Hydrologic Storage, Wetland Loss in (Appendices J-6 through J-7).

Walleye Lakes

Walleyes and walleye fishing is an important heritage to all Minnesotans, and can be an indicator of ecological condition of lakes. Walleye lakes are fairly dispersed across the state, however habitat suitable for reproduction and self-sustaining populations has a much higher presence in the high-quality waters representative of the NLF Ecoregion.

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[9] http://www.dnr.state.mn.us/tullibeelake.html

Existing Surface Water Conditions in the Region of Interest

Applicant's Proposed Project

The Applicant's proposed project follows a route south of Clearbrook following an existing pipeline right-of-way, and then follows an existing transmission line corridor easterly toward Carlton. The Applicant's proposed project, along with northern pipeline route alternatives discussed in Section 6.3.1.2 (RA-06, RA-07, and RA-08), all pass through a large number of streams, lakes, wetlands, and accompanying resources, all of which are generally of high quality. The Applicant's proposed project is located within 0.5 mile of 17 wild rice lakes, 17 trout streams and 8 lakes of high and outstanding biodiversity significance, and 4 tullibee lakes. See Table 5.2.1.2-13 for comparison of resources intersected.

System Alternative SA-04

System alternative SA-04 lies in an agriculture dominated area and has surface water resources of poorer quality. This is especially shown in Minnesota PCA's Ecoregion Concept for assessing surface waters, in the Minnesota DNR WHAF Tool, in evaluating specific high-quality surface water indicators (see Table 5.2.1.2-13), as well as altered landscape indicators such as ditching as an indicator of poorer water quality or altered landscape. These indicators are seen in areas to the south and west that tend to rate low in perennial cover, terrestrial habitat quality and connectivity that reduce overall health index scores.

Truck Route Gretna to Clearbrook Terminal

This route follows U.S. Highway 2 from Clearbrook to Duluth then crosses the St. Louis River Estuary over the Richard I. Bong Bridge to Superior Wisconsin. There are numerous waters intersected by this route including 44 trout stream and designated trout stream tributaries and 14 wild rice lakes as well as the St. Louis River Estuary. There are 8 tullibee lakes and 8 lakes of high and outstanding biodiversity significance. Like all northern pipeline routes (RA-06, RA-07, RA-08, and the Applicant's proposed project) and the Superior North Rail Route, the Truck Route passes through a large number of streams, lakes, wetlands and accompanying resources, all of which are generally of high quality.

Alternative Rail Route to Superior North

The Superior North Rail Route like the northern pipeline routes (RA-06, RA-07, RA-08, and the Applicant's proposed project) and the Truck Route passes through a large number of streams, lakes, wetlands, and accompanying resources, all of which are generally of high quality. This route passes 35 trout streams, 13 wild rice lakes, 10 lakes of high and outstanding biodiversity significance, and 9 tullibee lakes. The truck and rail routes pass more sensitive resources overall than all other routes. See Table 5.2.1.2-13 for comparison of proximal resources.

Alternative Rail Route to Superior South

The Superior South Rail Route like the northern pipeline routes (RA-06, RA-07, RA-08, and the Applicant's proposed project), Truck Route, and Superior North Rail Route passes through a large number of streams, lakes, wetlands and accompanying resources, all of which are generally of high quality. This route passes 39 trout streams, 18 wild rice lakes, 16 lakes of high and outstanding biodiversity significance and 4 tullibee lakes. The truck and rail routes pass more sensitive resources overall than all other routes. See Table 5.2.1.2-13 for comparison of proximal resources.

5.2.1.2.4 Impact Assessment

This section addresses the impact analysis conducted for the Applicant's proposed project and the CN Alternatives. The analysis assessed potential impacts on surface waters in the ROIs, as described in Section 5.2.1.2.1, related to the following concerns:

- Runoff and flows – increases in stormwater runoff and erosion, increases in TSS concentrations and increased sedimentation, changes in stream flows from water withdrawals and discharges, and disruption of flow paths or local hydrologic connectivity;
- Surface water and aquatic habitat quality – degradation of surface water quality, degradation of aquatic habitat from instream and other construction activities including vegetation removal near waterbodies, degradation of water quality and habitat from releases of drilling mud during HDD crossings;
- Channel morphology and stability – changes in channel morphology and stability caused by channel and streambank modifications; and
- Disturbance of wild rice waterbodies.

Many pipeline construction activities have the potential to affect surface water flow and quality. These activities include clearing and grading, dewatering and trenching, blasting, access road construction, waterbody crossings, surface water withdrawals and discharges (e.g., for hydrostatic test water), fueling and use of hazardous materials, and restoration or reclamation of construction areas. Construction of the offloading facilities for the rail and truck alternatives also would include many of the activities listed above, including clearing and grading, dewatering, access road construction, surface water withdrawals (e.g., for dust control), fueling and use of hazardous materials, and restoration or reclamation of some of the areas affected by construction. The potential impacts on surface water from these activities are addressed below for the Applicant's proposed project and CN Alternatives. After the discussion of construction impacts, the potential impacts of operations on surface waters are addressed for the Applicant's proposed project and each CN Alternative.

Applicant's Proposed Project (from Neche to Superior)

The Applicant's proposed project would require 227 surface water crossings (192 in Minnesota) (listed in Table 5.2.1.2-2), including 46 state-designated use/sensitive surface waters, 9 (7 in Minnesota) NRI-listed rivers (listed in Table 5.2.1.2-3), 16 (12 in Minnesota) impaired surface waters (listed in Table 5.2.1.2-4), 6 trout streams, and 7 (6 in Minnesota) navigable river crossings. The potential impacts of construction on these surface waterbodies are addressed below.

<u>Construction Impacts</u>

Runoff and Flows

Increases in Stormwater Runoff and Erosion. Clearing and grading would be required within the construction work area for the pipeline, mainline valves (MLVs), new and expanded pump stations, and cathodic protection sites—as well as for access roads and ATWS, including pipe yards. Newly cleared areas and new impervious surfaces could cause increased stormwater runoff and erosion into nearby surface waters. Consequently, this increased runoff and erosion would increase TSS concentrations and sedimentation. The Applicant would obtain construction stormwater NPDES permits in each state for the pipeline, MLVs, pump stations, cathodic protection sites, access roads and ATWS, and pipe yards prior to construction. NPDES permits require outline BMPs for erosion and sediment control and pollution prevention, regulate, discharges into surface waters impaired waters, pollution prevention, and require inspection of these items at construction sites. As part of the construction stormwater NPDES permits, the Applicant would be required to develop a Stormwater Pollution Prevention Plan (SWPPP) that would include a site description identifying construction activities and the locations of stormwater discharges and receiving waters. The SWPPP would describe erosion and sediment controls to be implemented during construction, stormwater pollution management, waste disposal, maintenance and inspection practices, and any additional requirements to prevent stormwater pollution.

The Applicant's Environmental Protection Plan (Appendix E) describes the Applicant-proposed measures to be used during construction that likely would be stipulated in the SWPPP and NPDES permits, including temporary sediment and erosion control such as slope breakers, sediment barriers (e.g., silt fence, straw bales, and bio-logs), stormwater diversions, trench breakers, mulch, and erosion control blankets. These temporary controls would be placed across the entire construction work area at the base of slopes greater than 5 percent where the base is less than 50 feet from surface waters, until the area is revegetated and there is no potential for scouring or sediment transport to surface waters. Trench breakers would be used at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep accumulated trench water out of the waterbody. Permanent berms, as approved by permit conditions, would be installed on all slopes greater than 3 percent to prevent erosion and sedimentation into surface waters once construction is complete, unless otherwise specified by permit conditions.

To further reduce the potential for long-term erosion and sedimentation, disturbed areas at waterbody crossings would be restored and stabilized to the extent practicable after pipeline installation. The Applicant proposes to reestablish streambank vegetation in North Dakota using North Dakota Seed Mix 2, in Minnesota using Minnesota Seed Mix 2, and in Wisconsin using Wisconsin Seed Mix 1 (described in Appendix C of the Applicant's Environmental Protection Plan [Appendix E]) unless an alternate seed mix is requested by a landowner or agencies such as the Minnesota Board of Water and Soil Resources (Minnesota BWSR). These seed mixes have been developed by the Applicant to reestablish herbaceous vegetation quickly following pipeline construction.

By complying with these NPDES permit conditions and implementing the Applicant-proposed measures to minimize impacts, the impact of increases in stormwater runoff and erosion from clearing and grading due to construction would be short term to long term and minor.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation. In addition to clearing and grading, construction activities such as blasting, trenching, waterbody crossings, establishment of ATWS and access road construction, and water discharges may cause increased suspended solids and sedimentation in surface waters crossed. The Applicant's proposed temporary erosion controls, SWPPP requirements, and NPDES permit requirements described above would be implemented during these activities to prevent sediment transport into surface waters during construction.

The Applicant anticipates the need for blasting from MP 354.6 to 356.6 in Carlton County, Minnesota, due to shallow bedrock. Blasting can increase TSS and sedimentation in surface waters near the blast site. Prior to construction, the Applicant would develop a Blasting Plan, which would adhere to all stipulations set forth by federal (Title 29 Code of Federal Regulations [CFR], Part 1926 Safety and Health Regulations for Construction/Subpart U – Blasting and the Use of Explosives) and state regulations and include measures to protect nearby surface waters from these impacts. Therefore, impacts on TSS from this localized blasting event likely would be temporary and negligible to minor.

During pipeline construction across a waterbody, the extent and duration of sedimentation and increased erosion potential depend on the soils and topography of the site and the proposed crossing method. The types of methods that may be used include the wet crossing method (wet trench), dry crossing methods (dam-and-pump and flume), and HDD or guided bore as described in Appendix E. Construction of the pipeline across the waterbody using dry open-cut methods would occur in a dry area created by temporary dams upstream and downstream of the work area. TSS and sedimentation would increase when flow is returned to the dry channel but would readily dissipate in the downstream vicinity of the crossing. As a result, impacts from increases in TSS concentrations and increased sedimentation in surface waters crossed using dry open-cut crossing methods would be temporary to short term and minor. However, some streams are not spring fed, instead they originate from surface water flow. Consequently they are relatively more susceptible to erosion, low light conditions, and surface water temperature changes. Many of these may already be subjected to sediment influx from other sources and therefore are susceptible to moderate to major impacts from additional sediment. The sediment would impact the substrate, turbidity, flow, from the point of construction at the crossing include any area affected just upstream, and continue to impact the stream as the water flows downstream.

Wet open-cut methods involve excavation of the channel and banks in the wetted channel, and excavated soils would be in direct contact with surface water. The Applicant would install sediment containment devices (e.g., in-water BMPs such as floating silt curtains) to contain the excavated material and minimize the potential for increased sedimentation (Appendix E). The in-water BMPs would remain in place until construction is completed. If the Applicant maintains compliance with NPDES permit conditions and implements Applicant-proposed measures, impacts on surface water quality due to increases in TSS concentrations and increased sedimentation in surface waters crossed using the wet open-cut crossing method would be temporary to short term and minor.

Changes in Stream Flows from Water Withdrawals and Discharges. The Applicant would withdraw water for hydrostatic testing, dust control, trench dewatering, and HDD installation. Hydrostatic testing would require approximately 120 million gallons of water (between 11 and 17 million gallons for each of seven construction spreads) (Enbridge 2016b), which the Applicant would obtain from lakes, streams, or groundwater wells. The proportion of water that would be obtained from groundwater versus surface water has not been determined. Water appropriation needs for dust control, trench dewatering, and HDD installation have not been determined. Prior to construction, the Applicant would obtain water appropriation permits from the state agencies with jurisdiction (listed in Section 5.2.1.2.1). These permits would require identification of and rationale for choosing specific surface water sources; requested maximum pumping rates and maximum annual volumes of water to be used; monitoring of pumping rates during appropriation with an approved device or method; and reporting of daily, monthly, and/or yearly appropriation amounts.

In accordance with water use permit conditions, the Applicant has proposed the measures described below in the Environmental Protection Plan (Appendix E). If surface water is used, hose intakes would be equipped with a screen to prevent entrainment of aquatic species, and adequate waterbody flow rates and volumes would be maintained to protect aquatic life and allow for downstream uses. The Applicant is currently evaluating transferring water from one test section to another in order to minimize the total quantity of water needed to complete the hydrostatic test.

Hydrostatic test water would be discharged from a test section in accordance with an Industrial NPDES permit in one of two ways: (1) into well-vegetated upland areas using controlled-flow velocity with a dewatering structure such as a silt fence and straw bales or into geotextile filter bags that are used to avoid soil erosion, sediment transport, and bottom scouring; or (2) into the waterbody from which it was withdrawn to prevent the spread of invasive species or degradation in water quality; the discharge rate would not exceed the permitted applicable discharge rate (Appendix E). Water would be treated as specified in NPDES permits prior to discharge; and the Applicant would monitor pH, dissolved oxygen levels, and any other parameters required by the permit, as described in Appendix D of the Environmental Protection Plan (Appendix E). Hydrostatic test water withdrawal and discharges would avoid the use of surface waters with commercially or recreationally important species, including trout streams and ORVWs, as intake sources and discharge locations. Discharges would adhere to all conditions set forth in an MPCA Industrial Wastewater NPDES permit. With adherence to water appropriation and NPDES permit conditions and implementation of Applicant-proposed measures, alterations in stream flows from water appropriation and discharge during construction would be temporary and minor.

Disruption of Flow Paths or Local Hydrologic Connectivity. "Hydrologic connectivity" is the water-mediated transport of matter, energy, and organisms within or between elements of the hydrologic cycle (i.e., the continuous movement of water on, above, and below the Earth's surface) (Pringle 2003). Pipeline construction may disrupt flow paths and groundwater-surface water interaction due to clearing and grading of riparian vegetation, water appropriation and discharge, and channel and streambank modifications caused by waterbody crossings. Hydrologic connectivity can be decreased if barriers are constructed to prevent the natural flow of water and can be increased if natural barriers are removed. Disruption of hydrologic connectivity and the natural interaction between groundwater and surface water can affect water quality by altering the acidity, dissolved oxygen levels, and nutrient and contaminant loads in surface waters, thereby affecting the aquatic environment. It also can allow the spread of invasive species and prevent migration and reproduction of species.

With implementation of the Applicant-proposed measures described above to prevent or minimize erosion and sedimentation, monitor stream flows during water appropriation and discharge, and restore streambanks to their original attributes after construction, impacts on flow and hydrologic connectivity during construction along the construction work area would be temporary to permanent and minor to major. Potential impacts that are permanent and major would be associated with specific site features that are sensitive to disruption of hydrologic connectivity. Springs and other surface water features that are dependent on shallow groundwater have the potential for permanent and major impacts.

Construction would create temporary and permanent access roads that also could affect hydrologic connectivity. The Applicant would restore temporary access roads, including roads that were widened and graded, to preconstruction conditions upon completion of construction. The restoration would include seeding disturbed areas with a suitable seed mix for the area. The Applicant would leave any improved roads intact if requested by the respective landowner. Impacts on hydrologic connectivity associated with temporary access roads is expected to be short term and negligible to minor, depending on the location of the roads. Impacts from permanent access roads are discussed in the operations section below.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality. Because only minor increases in stormwater runoff would occur during construction, the potential for stormwater to carry contaminants into surface waters is low. The impact of contaminants in stormwater runoff on surface water quality therefore would be short term and negligible to minor, continuing until vegetative cover is restored to approximate preconstruction conditions.

Trout rely on coldwater habitats for survival, and exposure to sunlight from vegetation removal can cause adverse warming of the water. Therefore, construction NPDES permits typically prohibit removal of woody vegetation and replacement with grassy vegetation near trout streams unless the reasons are absolutely necessary and completely documented in the SWPPP. Further, to minimize stormwater discharge into and temperature increases in trout streams, NPDES permits typically require that impervious surfaces be minimized; discharges be made into vegetated areas or grass swales, avoiding impervious surfaces when possible; and Infiltration or other volume reduction practices be used to reduce runoff in excess of pre-Project conditions. By complying with these NPDES permit conditions and implementing the Applicant-proposed measures to minimize impacts, it is not likely that construction would impact water temperature in surface waters crossed.

During construction, surface water may become contaminated from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals as a result of activities such as fuel storage, equipment refueling, and equipment maintenance. To protect surface water resources, the Applicant would store petroleum products, hazardous chemicals, and lubricating oils; conduct refueling, maintenance, and lubricating operations; and perform concrete coating activities in upland areas more than 100 feet from surface waters (Appendix E). Concrete wash water, grindings, and slurry disposal would be limited to a designated area and would not be discharged to surface waters. Rinse water, used in conjunction with a cleaning pig to remove any accumulated construction debris, dirt, and dust prior to hydrostatic testing, would be treated and disposed of or discharged in accordance with applicable NPDES permit conditions. During HDD installation, drilling mud and slurry would be stored away from the waterbody in an earthen berm sediment control structure, in tanks, or by other methods so that it does not flow into the waterbody. Excess drilling mud would be disposed of offsite at an approved disposal facility. In addition to these prevention measures, the Applicant would be responsible for cleaning up small spills through procedures described in the Environmental Protection Plan (Appendix E), including notifying proper personnel (e.g., the onsite spill coordinator) and agencies, stopping the work activity that caused the spill, using absorbent booms and pads to contain and recover released materials in water, and disposing of contaminated response materials at approved facilities. With adherence to NPDES permit conditions and implementation of Applicant-proposed measures, impacts on surface water quality from small leaks and spills during construction would be temporary and minor.

Potential impacts on surface water due to an unanticipated crude oil release are discussed in Chapter 10.

For Section 303(d)-listed surface waters, which already have an impairment that prevents a beneficial use, degradation of water quality is of particular concern. Aquatic life, human health, and recreational activities are already at risk in these surface waters, and further degradation of water quality may exacerbate an existing impairment, cause additional impairments, interfere with restoration activities, or delay attainment of water quality standards. NPDES permits would require identification of impaired waters. If the impaired waters have an approved TMDL implementation plan, the plan must be incorporated into the SWPPP, and discharges must comply with specified TMDLs. With adherence to the above NPDES permit conditions and implementation of Applicant-proposed measures, impacts of construction activities on Section 303(d)-listed surface waters would be temporary to short term and negligible to minor.

Degradation of Aquatic Habitat from Instream Construction Activities. Pipeline construction across surface waters has the potential to alter and degrade aquatic habitat through increased sedimentation and erosion, disruption or alteration of stream flow, and streambank disturbance. High mortality rate for freshwater mussels living in gravel-bedded or sand-bedded channels, negative and greatly reduced survival rates for fish eggs resulting from silt deposits have been documented.

Stream crossings would be designed as close to perpendicular to the axis of the stream channel as engineering and routing constraints allow to create the shortest possible crossing length to minimize disturbance to the stream. The Applicant has proposed primary and alternative crossing methods for the Applicant's proposed project based on various factors, including waterbody size, sensitivity (e.g., trout stream), water levels, soil/sediment stability installation, and anticipated season of installation (Appendix G). If a pipeline route is approved, the Applicant would be required to coordinate with the appropriate state agencies to determine waterbody crossing methods for each waterbody and to obtain crossing permits.

In general, surface waters with stable banks in mineral soil with noticeable flow at the time of construction would be crossed using dry crossing methods, HDD, or guided bore. Surface waters that are dry during construction and selected surface waters that consist of ditches in peatland with no banks or impoundments (e.g., beaver dams and plugged culverts), with stagnant or no noticeable flow conditions, and that would not support dams necessary to isolate and dry the construction area, likely would be crossed using the wet open-cut method.

One of two types of dry open-cut crossing methods would be used for certain sensitive surface waters. The dam-and-pump method would be used for surface waters of low flow, those with meandering channels, and those for which fish passage is not a concern; the flume method would be used in narrow surface waters with defined banks and a straight channel across the construction work area with a solid substrate. Appendix E provides additional details on water crossing methods. Dry crossing methods are advantageous because they limit sediment release and downstream transport, maintain stream flow, reduce the potential for trench sloughing, and provide a dry working environment for pipe installation. However, dry crossing methods are slower than wet trenching, may require fish salvage, and create a short-term barrier to fish passage.

Crossings constructed using either dry open-cut crossing method would release sediments after the dams are removed and natural waterbody flow returns. However, the sediments would readily dissipate to negligible levels in the downstream area in the vicinity of the crossing. As a result, the potential impact on aquatic habitat of using the dry crossing method is expected to be temporary to short term and minor for each crossing.

Wet open-cut crossings would be used to limit the duration of instream disturbance, as construction and pipeline installation via this method is rapid, and where dry crossing methods and HDD are not permitted. Instream construction activities for wet open-cut crossing methods would be completed within 24 hours for minor surface waters (i.e., those less than or equal to 10 feet wide at the water's edge at the time of crossing), within 48 hours for intermediate surface waters (i.e., those greater than 10 feet wide but less than 100 feet wide at the water's edge at the time of crossing), and as specified in applicable permits or by the Applicant for major surface waters (i.e., those greater than 100 feet wide at the time of crossing). The erosion and sedimentation control measures discussed above would be implemented during and after wet open-cut crossings, and disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation. As a result, instream construction activities for wet open-cut crossings would cause short-term and minor impacts on aquatic habitat.

Guided bore crossings would be used at narrow wetlands and at shallow ditches adjacent to roads or railroads. Disturbance to the water in the ditch is avoided because the guided bore method involves boring an auger from one side of the ditch to a hole on the other side. This method is not suitable in areas with a high water table, loose sand and gravel substrates, or steep slopes. It also requires excavations and ATWS on either side of the crossing and increases the potential for streambank subsidence; if dewatering is required, sediment release is possible. However, successful bore crossings would cause no impact on aquatic habitat.

HDD crossings would be used to avoid impacts on certain sensitive surface waters, such as impaired waters and coldwater fishery resources; particularly deep, wide, or high-flow surface waters; and where appropriate based on subsurface substrate conditions and length of the drill path. HDD crossings are advantageous because they do not disturb streambeds or streambanks and they maintain stream flow and fish passage. However, they require ATWS on both sides of the crossing, which involves vegetative clearing, soil disturbance, and subsequent restoration activities. Woody vegetation in riparian areas typically would not be cleared for the purpose of ATWS unless approved by appropriate regulatory agencies, as stipulated in permits issued for the Project (Appendix E). Installation of HDD crossings has the potential for inadvertent releases (discussed below). However, successful HDD crossings would cause no impact on aquatic habitat.

Degradation of Water Quality and Habitat from Releases of Drilling Mud during HDD Crossings. Geotechnical surveys would be conducted to determine which surface waters to be crossed are geologically suitable for HDD. During drilling, fluid (water, bentonite clay, and possible Minnesota PCA-approved additives) is circulated through the drilling pipe to lubricate the drill bit, remove drill cuttings, and stabilize the open hole. The potential exists for an inadvertent release or “frac-out” of this drilling fluid to occur when pressurization of the drill hole is beyond the containment capability of the overburden soil material, which would allow the drilling fluid to flow to the ground or riverbed surface. Although bentonite clay is non-toxic, drilling mud can smother aquatic wildlife and increase turbidity in affected surface waters. Additives may be mixed with the drilling fluids/mud for viscosity or lubricating reasons. Only Minnesota PCA-approved non-hazardous additives approved under permit conditions would be used, and a Material Safety Data Sheet for the drilling fluid would be maintained onsite. If a frac-out occurred near the streambank, bank stability may be compromised. Construction personnel would monitor the crossing to detect releases of drilling mud.

When used in appropriate conditions and completed successfully, HDD Crossings have the potential to reduce the amount of sedimentation produced by conventional techniques (Golder 1998). Consequently, HDD can provide a cost effective and environmentally viable solution to water crossings. This appealing potential has encouraged its use in sensitive crossings such as wetlands and trout streams. Despite increased use over time a serious risk of inadvertent releases or ‘frac-outs’ exists (Golder 1998).

Multiple conditions can lead to frac-outs, such as circulation losses when drilling into highly permeable gravels and inaccurate drilling of pilot holes. The amount of fluid released is related to variables such as the pressure exerted on the fluid by the hydraulic system. Finally, “the subsequent dispersion from the release point will then be a function of the energy, or sediment transport characteristics of the receiving waterbody” (Golder 1998).

Negative impacts from frac-outs include: toxicity of drilling mud to aquatic organisms; the effects of spills or inadvertent releases of drilling fluid; and the disposal of drilling wastes. Slade (2000), reports "short-term effects of releasing drilling fluid into wetlands include temporary displacement of resident fauna, smothering of benthic organisms and plant root systems, increased turbidity of water quality, and effects on water chemistry and wetland hydrology." A release can reduce densities and emergence of adult benthic invertebrates, change hydrological and soil conditions, change fish physiology, behavior, and habitat suitability; and cause long-term impacts on the aquatic ecosystem (Golder 1998). Slade 2000, also identifies additional environmental considerations for the drill rig set-up with respect to water resources and sensitive areas: containment and storage placement of raw fluids, water appropriation and water storage areas, delineation of the "no fueling" areas, and disposal of drilling fluid and cuttings upon completion.

It can be difficult to predict the probability of an occurrence. Yet loss of circulation is common in HDD operations. Longer crossings and HDDs passing through glacial tills, boulders and gravels, have a higher risk of failure. Slade 2000, studied a pipeline construction project from Stockbridge to Freedom Junction Michigan (Enbridge). This was a 35-mile, 16-inch crude petroleum pipeline using 11 HDDs to cross through wetlands, streams and state recreational areas. Results determined multiple relatively minor releases requiring less clean up and two major frac-outs resulting in significant (volume, location, ecology) issues.

It is important to consider the implications (on organisms, sediment, physical disturbance) of potential frac-outs and clean-up operations, identify the pros and cons of each type of crossing method, then match the appropriate technique to each crossing based on the site characteristics and conditions. Therefore, this Project would take all of these into consideration for deciding what technique is applied to each site when using HDD[1] (see HDD contingency plan). This Project would follow BMPs to minimize potential impacts for all crossings during this Project.

The HDD operator would constantly monitor drilling fluid pressures during pilot hole operations and, if a loss in fluid pressure or circulation were identified, the operator would notify onsite construction observers who would visually monitor the portion of the drill path where the drill tool is located to determine whether a drilling mud release occurred. If a release occurred, the Applicant would implement containment, response, and clean-up procedures as outlined in the Applicant's Environmental Protection Plan (Appendix E) to limit the potential for drilling mud to reach surface water. These procedures include containment using straw bales, sandbags, pumps and hoses, vacuum trucks; response activities including adjusting drill rates and pump volumes or stopping drilling, removal of mud with pumps and appropriate storage away from the waterbody prior to disposal; and coordination with appropriate agencies to discuss additional containment or clean-up requirements. If the frac-out caused impacts on the streambank, the bank would be restored to the extent possible using the channel and streambank modification BMPs described above. If a frac-out occurred and went undetected or was not quickly contained, impacts on surface water quality could be long-term and major. However, with implementation of the Applicant-proposed measures to respond to a drilling mud release during HDD construction, the impact of a release could be short term and minor to major.

Changes in Channel Morphology and Stability Caused by Channel and Streambank Modifications

Dry and wet open-cut waterbody crossing methods involve excavation of the streambed and potential changes to streambank stability and channel morphology. As described in the Environmental Protection Plan (Appendix E), temporary erosion control measures would be implemented as appropriate to minimize the impacts of surface water crossing activities; rock riprap, geotextile fabric, and other bioengineering techniques would be used to stabilize streambanks as needed. However, rock riprap can cause additional bank erosion.

After pipeline installation at river beds and streambeds crossed using dry crossing methods, the trench would be backfilled to restore the streambed or river bed to approximately preconstruction conditions. Although the pipeline trench created with the wet open-cut crossing technique also would be backfilled, it would be more difficult to restore the streambed or river bed to approximately preconstruction conditions. Sediments in those surface waters would continue to be deposited and it is likely that the streambed or river bed eventually would return to preconstruction conditions. For either type of crossing method, there would be little or no impediment to water flow. In addition to backfilling, streambanks would be restored to preconstruction grades when practicable. If the slope is determined to be unstable, the banks would be reshaped to prevent slumping. After reestablishing the grade, streambanks would be restored with appropriate vegetation.

The use of open-cut crossing methods for pipeline construction, along with the measures described above, would result in short-term to long-term and minor impacts on channel morphology and streambank stability. Construction of crossings using the HDD method would result in no impact on channel morphology or streambank stability.

Disturbance of Wild Rice Waterbodies

Wild rice waterbodies can be susceptible to disturbance in all habitats (lake or river) and are sensitive to temperature changes, contaminants, and hydrology changes—all of which on their own or in combination could affect germination and production. Four wild rice waterbodies would be crossed by the Applicant's proposed project, with about 5 acres of the delineated waterbody basins within the construction work area. Construction would occur across the edge of the basins within the existing pipeline corridor but not through the wild rice stands on Mud Lake, Peterson Lake, and Portage Lake (Appendix A). In addition, some or all of the wild rice areas occur along the margins of larger waterbodies where the Applicant would use site-specific waterbody crossing techniques, including HDD. HDD would be used to cross the unnamed wild rice waterbody at Hay Creek and the crossing of Shell River, a wild rice waterbody. At this location and at other sites where HDD is used as the crossing method, the wild rice waterbodies would not be affected unless a frac-out occurs (see above for information on frac-outs).

Where HDD is not used, the wild rice waterbodies would be crossed using applicable wetland crossing methods for the water saturation conditions at the crossing (see Appendix E for a description of the wet waterbody and wetland construction methods). Trenched crossing could remove the rice plants and disturb sediments and increase sedimentation within the remainder of the waterbody. Although the Applicant would restore the hydrology and soils of the affected wild rice waterbodies after construction, rice yield would be reduced in the portion of the waterbody directly affected by the repair or replacement activities for the first growing season after construction. To minimize impacts of construction through wild rice waterbodies, the Applicant would implement applicable measures identified in the Environmental Protection Plan (Appendix E). This plan contains measures to reduce or avoid impacts on wild rice during construction. Avoidance measures include use of a narrower construction work area, reseeding, monitoring, and use of timber mats, and would incorporate any additional measures proposed by local and state agencies to reflect existing regional policies and procedures to protect wild rice. Wild rice stands also would be monitored for overall condition, function, and vegetative regrowth after construction until the permit conditions are met.

Although not anticipated, construction-related impacts on wild rice waterbodies could include longer than expected recovery time for native wild rice stands (i.e., could affect rice waterbodies beyond the first growing season after construction), introduction of contaminants, introduction of invasive aquatic plants and non-native strains of wild rice, and altered lakebed conditions—all of which could be detrimental to wild rice germination and production. These potential impacts would be reduced through Project-specific SPCC plans, invasive species management plans, and post-construction monitoring of vegetation for a period of time until permit conditions are met, as described in the Applicant's Environmental Protection Plan (Appendix E). With implementation of these measures, impacts on wild rice waterbodies are expected to be short term and minor. However, if HDD frac-out, introduction of contaminants, introduction of invasive aquatic plants and non-native strains of wild rice, and altered lakebed conditions occur as a result of construction, impacts could be major.

Operations Impacts

Runoff and Flows

Increases in Stormwater Runoff and Erosion. After the pipeline is installed, revegetation of the permanent right-of-way may require up to several years to reestablish to approximately preconstruction conditions, except for areas where new impervious surfaces are created, as addressed below. Runoff patterns along the non-impervious portions of the permanent right-of-way therefore would be altered during the first few years of operation, resulting in impacts of increased runoff and erosion that would be short term and negligible to minor. These changes could be more significant at streams within forested habitat. After vegetation is reestablished along the permanent right-of-way, surface water runoff and erosion would return to approximately preconstruction conditions. The Applicant would conduct regular monitoring of the right-of-way and would be able to identify areas where changes may occur to the topography or vegetation. If any such changes are identified, the Applicant would make the appropriate repairs and improvements.

Within Minnesota, expansion of the Clearbrook terminal, modification of three pump stations, construction of four new pump stations, and installation of 27 MLVs would add approximately 67 acres of impervious surfaces, with approximately 30 acres of that area between Clearbrook and Carlton. Stormwater retention ponds would be located at each pump station, consisting of an additional approximately 10 acres. No new permanent facilities are proposed outside of Minnesota for the Applicant's proposed project. The new and expanded facilities would be required to manage stormwater runoff through NPDES permits and SWPPPs as described above and through installation of stormwater retention ponds. Impacts on surface water from increased stormwater runoff from these facilities would be permanent and negligible to minor.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation. During the first few years of operation, there may be a small increase in surface water runoff and erosion as revegetation continues, potentially resulting in increases in TSS and sedimentation in nearby surface waters. The impact of this increase on surface waters would be short term and negligible to minor.

The pipeline right-of-way in upland areas would be maintained in an herbaceous vegetative state during operation to allow access along the right-of-way for inspection, monitoring, and maintenance. The permanent removal of riparian vegetation within the permanent right-of-way in areas adjacent to waterbody crossings would result in localized alterations in habitat, streambank stability loss and erosion, and sedimentation. The Applicant would conduct regular monitoring of the right-of-way and would be able to identify streambank areas where changes may occur to the topography or vegetation. If any such changes are identified, the Applicant would make the appropriate repairs and improvements. With implementation of these measures, the impacts associated with the localized changes to topography or vegetation would result in short-term to permanent and minor impacts in the vicinity of the alteration.

During operation, the Applicant would implement its Integrity Management Program, which has the potential to require excavation and repair or replacement of sections of the pipeline. This could result in topographical changes and loss of vegetation in localized areas for relatively short periods of time, which would alter runoff patterns and could increase erosion. The Applicant would implement measures to minimize impacts during and after these activities, similar to the measures incorporated into the Project during construction. As a result, the impacts of these integrity management activities would be similar to those experienced during construction, but over a much smaller area. The impacts from increased TSS and sedimentation in nearby surface waters would be short term and negligible to minor for each local occurrence, but would occur periodically over the life of the Project.

Changes in Stream Flows from Water Withdrawals and Discharges. Normal operation of the Applicant's proposed project would not require withdrawal or discharge of water. However, during the repair or replacement of pipe as part of the Applicant's Integrity Management Program described above, it may be necessary to withdraw and discharge water to hydrostatically test sections of pipe and for dust control during the integrity digs and backfilling activities. The frequency with which hydrostatic testing would occur, locations of testing, and amount of water needed for testing and dust control are not defined. As described for pipeline construction, the Applicant would be required to obtain water appropriation and NPDES permits for testing procedures, and the volume of water would be substantially less than for construction. With adherence to permits and implementation of BMPs, impacts associated with alterations in stream flows from water appropriation and discharge would be temporary and negligible.

Disruption of Flow Paths or Local Hydrologic Connectivity. Integrity management digs would result in minor alterations of topography and stormwater flows at the excavation sites. With implementation of the Applicant-proposed measures described above to avoid changes to stormwater runoff and restore streambanks to their original attributes after work is completed, impacts on flow and hydrologic connectivity in the areas excavated for pipe repair or replacement would be temporary to short term and negligible to minor.

Permanent access roads during operation also could affect hydrologic connectivity. It is anticipated that permanent access roads would require local or state permits, which likely would require culverts to minimize the changes to hydrologic connectivity. Although the extent of the changes in those cases would depend on the topography of the area and the design of the roadway, the impact on hydrologic connectivity likely would be permanent and minor. For access roads without culverts, the extent of changes to hydrologic connectivity could be greater, again dependent on the topography of the area and the design of the roadway. Where those roadways are present, the impact on hydrologic connectivity likely would be permanent and minor.

Other permanent aboveground facilities, such as pump stations and MLVs, also would affect hydrologic connectivity. Due to the relatively small footprints of these facilities, it is anticipated that the impact of their presence would be permanent but negligible to minor.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality. The pipeline right-of-way in upland areas would be maintained in an herbaceous vegetative state during operation to allow access along the right-of-way for inspection, monitoring, and maintenance. The permanent removal of riparian vegetation in areas adjacent to waterbody crossings would allow more light to enter the waterbody and could cause long-term to permanent but negligible to minor increases in temperature at these locations. These effects would be more pronounced in areas where forest habitat is removed and herbaceous vegetation used for revegetation.

During normal operation, there would be no other measurable changes to water quality in surface waters. The minor changes within the major drainage basins and watersheds crossed by the Applicant's proposed project would not result in degradation of the watershed water quality score. As a result, water quality would not change in the surface waters of the basins and watershed along the route, including impaired surface waters. Therefore, watershed surface water quality would not be affected during normal operation of the Project.

Minor accidental fuel and lubricant leaks and spills could be released from maintenance and inspection vehicles. Any refueling, fuel storage, or vehicle maintenance would follow the Applicant-proposed measures set forth in the Environmental Protection Plan (Appendix E). Thus, minor leaks and spills during operations would result in temporary and negligible to minor impacts on surface water quality. The potential impacts of a crude oil release on surface water quality are addressed in Chapter 10.

Degradation of Aquatic Habitat from Instream Activities. Instream excavations may be required to repair or replace pipe segments buried beneath surface waters. This would result in impacts similar to those described for surface water crossings. The excavations to reach the pipe segments may be accomplished using the wet open-cut method or more likely would involve use of one of the dry open-cut methods.

Integrity management excavations accomplished using either of the dry open-cut crossing methods would release sediments after the dams are removed and natural waterbody flow returns. However, the sediments would readily dissipate to negligible levels in the downstream area in the vicinity of the crossing. As a result, the potential impact of using the dry open-cut method for instream integrity digs on aquatic habitat is expected to be temporary to short term and minor for each crossing.

If the wet open-cut method is used for integrity digs, the Applicant would implement the erosion and sediment control measures discussed above for construction of surface water crossings. These measures would be implemented during and after wet open-cut integrity digs, and if streambanks are disturbed, they would be restored and stabilized as soon as practical after completion of the pipe repair or replacement. As a result, instream integrity dig activities for using the wet open-cut method would result in short-term and minor impacts on aquatic habitat.

Changes in Channel Morphology and Stability Caused by Channel and Streambank Modifications

Excavation and repair or replacement of pipe may be required within surface waters or at the banks of surface waters. The excavations to reach the pipe segments may be accomplished using the wet open-cut method, or more likely would involve use of one of the dry open-cut methods.

Integrity management excavations accomplished using either of the dry open-cut crossing methods would involve backfilling of the trench, after the repair or replacement is made, to the approximate contours of the river bed or streambed. This could result in a minor, temporary change in channel morphology until the natural sedimentation processes of the waterbody return the affected area to essentially match the nearby morphology. If streambanks are affected by the digs, they would be restored to preconstruction grades when practicable. If the slope is determined to be unstable, the banks would be reshaped to prevent slumping. After reestablishing the grade, streambanks would be restored with appropriate vegetation. As a result, the potential impact on channel morphology and stability of using the dry open-cut method for instream integrity digs is expected to be temporary to short term and negligible to minor for each crossing.

The impacts associated with using the wet open-cut method for instream integrity digs may require a longer period of time for natural sedimentation processes to accomplish the same result. If streambanks are affected by the digs, they would be restored as described above. As a result, the potential impact on channel morphology and stability of using the wet open-cut method for instream integrity digs is expected to be short term and minor for each crossing.

Disturbance of Wild Rice Waterbodies

The wild rice waterbodies crossed by HDD at Hay Creek and Shell River would not be affected during operations. Wild rice waterbodies would not be affected by normal pipeline operation unless it is necessary to repair or replace a section of pipe within the waterbody as a part of the Applicant's Integrity Management Program. In that event, the impacts would be similar to those of the original crossing construction. Although the Applicant would restore the hydrology and soils of the affected portion of the wild rice waterbody after construction, rice yield in the portion of the waterbody affected by the repair or replacement activities could be reduced for the first growing season after completion of the activity. It is likely that only a portion of the approximately 3 acres of wild rice waterbodies within the permanent right-of-way would require repair or replacement at any one time; these activities could result in short-term and negligible to minor impacts. However, if replacement of a section of pipe within the waterbody resulted in, introduction of contaminants, introduction of invasive aquatic plants and non-native strains of wild rice, and altered lakebed conditions impacts could be major.

Continued Use of Existing Line 3

<u>Construction Impacts</u>

Continued use of Line 3 would not require construction because the full length of the pipeline was previously installed. As a result, there would be no construction impacts on surface water from continued use of the existing Line 3 pipeline.

<u>Operations Impacts</u>

Operations impacts for continued use of the existing Line 3 would be similar to those discussed for the Applicant's proposed project. However, continued use of Line 3 at its present capacity would require more frequent activities associated with Applicant's Integrity Management Program than for the Applicant's proposed project or for SA-04. The Applicant estimated that an average of 267 integrity digs (i.e., excavations to repair or replace sections of pipe) would be required per year (see Section 4.2.3 for more detail). These activities may result in extensive disturbance at surface water crossings and near-surface waters. The impacts of the integrity excavations, backfilling, and revegetation are described below; impacts would be comparable to new pipeline construction but on a smaller scale as they would be localized in the area of each integrity dig.

Runoff and Flows

Increases in Stormwater Runoff and Erosion. The existing Line 3 pipeline has been in place for decades, and the vegetative cover is well established. As a result, stormwater runoff and erosion would continue at the same level as in the past.

During operation, the Applicant would implement its Integrity Management Program, which can require excavation and repair or replacement of sections of the pipeline. This could result in topographical changes and loss of vegetation in localized areas for relatively short periods of time, which would alter runoff patterns and could increase erosion. The Applicant would implement measures to minimize impacts during and after these activities, similar to the measures incorporated into the Project during construction. As a result, the impacts of these integrity management activities on stormwater runoff and erosion would be short term and negligible to minor for each local occurrence, but would occur periodically over the life (i.e., permanently) of the Project. As noted above, the number of integrity digs required for the decades-old existing pipeline would be substantially greater than for new pipe, and the impacts would occur more frequently than for a new pipeline.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation. As noted above, the existing Line 3 pipeline has been in place for decades, and the vegetative cover is well established. Therefore, stormwater runoff and erosion would continue at the same level as in the past. No increase in eroded soils reaching surface waters with stormwater runoff would occur, and TSS and sedimentation in those waters would not change.

During operation, the Applicant would implement its Integrity Management Program, which has the potential to require excavation and repair or replacement of sections of the pipeline. In upland areas, this could result in topographical changes and loss of vegetation in localized areas for relatively short periods of time, which would alter runoff patterns and could increase erosion and the potential for eroded soil to reach nearby surface waters. This could result in increases in TSS and sedimentation within the affected surface waters. The Applicant would implement measures to minimize impacts during and after these activities, similar to the measures incorporated into the Project during construction. As a result, the impacts of these integrity management activities on TSS and sedimentation would be short term and negligible to minor for each local occurrence, but would occur periodically over the life of the Project.

Repair or replacement of sections of pipe buried under surface waters would be accomplished using the wet open-cut method or more likely would involve use of one of the dry open-cut methods. Integrity management excavations accomplished using either of the dry open-cut crossing methods would release sediments after the dams are removed and natural waterbody flow returns, which would increase both TSS and downstream sedimentation. However, the sediments would readily dissipate to negligible levels in the downstream area in the vicinity of the crossing. As a result, the potential impact of increased TSS and sedimentation from using either of the dry open-cut methods for instream integrity digs is expected to be short term and minor for each crossing.

If the wet open-cut method is used for integrity digs, the Applicant would implement comparable erosion and sediment control measures as discussed above for construction of surface water crossings. It was assumed that these measures would be implemented during and after wet open-cut integrity digs. If streambanks are disturbed, they would be restored and stabilized as soon as practical after completion of pipe repair or replacement. As a result, instream integrity dig activities using the wet open-cut method would be expected to result in short-term and minor impacts on aquatic habitat.

For all integrity digs addressed above, the number of digs required for the decades-old existing pipeline would be substantially greater than for new pipe, and the impacts would occur more frequently than for a new pipeline.

Changes in Stream Flows from Water Withdrawals and Discharges. Continued normal operation of existing Line 3 would not require withdrawal or discharge of water beyond current requirements, if any.

However, during the repair or replacement of pipe as part of the Applicant's Integrity Management Program described above, it may be necessary to withdraw and discharge water to hydrostatically test sections of pipe and for dust control during the integrity digs and backfilling activities. The frequency with which hydrostatic testing would occur, locations of testing, and amount of water needed for testing and dust control are not defined. As described for pipeline construction, the Applicant would be required to obtain water appropriation and NPDES permits for testing procedures, and the volume of water would be substantially less than for construction. With adherence to permits and implementation of BMPs, minor alterations in stream flows from water appropriation and discharge would be temporary and negligible.

Disruption of Flow Paths or Local Hydrologic Connectivity. Integrity management digs would result in minor alterations of topography and stormwater flows at the excavation sites. With implementation of the Applicant-proposed measures described above to avoid changes to stormwater runoff and restore streambanks to their original attributes after work is completed, impacts on flow and hydrologic connectivity in the areas excavated for pipe repair or replacement would be temporary to short term and negligible to minor.

Permanent access roads during operation also could affect hydrologic connectivity. It is anticipated that permanent access roads would require local or state permits, which likely would require culverts to minimize the changes to hydrologic connectivity. Although the extent of the changes in those cases would depend on the topography of the area and the design of the roadway, the impact on hydrologic connectivity likely would be permanent and minor. For access roads without culverts, the extent of changes to hydrologic connectivity could be greater, again dependent on the topography of the area and the design of the roadway. Where those roadways are present, the impact on hydrologic connectivity likely would be permanent and minor to major.

Other permanent aboveground facilities, such as pump stations and MLVs, also would affect hydrologic connectivity. Due to the relatively small footprints of these facilities, it is anticipated that their presence would result in permanent but negligible to minor impacts.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality. As noted above, the existing Line 3 pipeline has been in place for decades, and the vegetative cover is well established. During operation, there would be no potential for increased runoff to carry contaminants to nearby surface waters; and continued operation would not influence temperature changes to the water beyond those currently occurring, if any. As a result, normal operations would not affect water quality, including temperature.

Similarly, maintenance of the permanent right-of-way during operation would be expected to continue at the current level of activity. Consequently, the current level of contamination of surface waters, if any, would not change because of minor leaks and spills of petrochemicals and other chemicals from maintenance vehicles using the permanent right-of-way and nearby areas. Because of the increased need for integrity digs for the decades-old pipeline, the number of vehicles transiting the permanent right-of-way and nearby areas would increase, with the potential for an increase in the number of small leaks from the vehicles. Although this would increase the potential for petrochemicals to reach surface waters, the Applicant would implement the BMPs described for construction of the Applicant's proposed project, which would minimize the impacts. The impact on surface water quality related to small leaks from vehicles used during integrity digs would be +temporary to short term and negligible to minor.

During operation, the Applicant would implement its Integrity Management Program, which can require excavation and repair or replacement of sections of the pipeline. This could result in topographical changes and loss of vegetation in localized areas for relatively short periods of time, which would alter runoff patterns and could increase erosion and the potential for contaminants to reach nearby surface waters. In addition, repair or replacement of sections of pipe buried under surface waters would result in changes to water quality in the area of and immediately downstream of the excavated pipe section. The Applicant would implement measures to minimize impacts during and after these activities, similar to the measures incorporated into the Project during construction. As a result, the impacts of these integrity management activities on surface water quality would be short term and negligible to minor for each local occurrence, but they would occur periodically over the life of the Project. As noted above, the number of integrity digs required for the decades-old existing pipeline would be substantially greater than for new pipe, and the impacts would occur more frequently than for a new pipeline.

During normal operation, there would be no other measurable changes to water quality in surface waters. The minor changes within the major drainage basins and watersheds crossed by the existing Line 3 would not result in degradation of the watershed water quality score. As a result, water quality would not change in the surface waters of the basins and watershed along the route, including impaired surface waters. Therefore, watershed surface water quality would not be affected during normal operation of the Project.

Potential impacts on surface water due to an unanticipated crude oil release are discussed in Chapter 10.

Degradation of Aquatic Habitat from Instream Activities. Instream excavations may be required to repair or replace pipe segments buried beneath surface waters. This would result in impacts similar to those described for surface water crossings. The excavations to reach the pipe segments may be accomplished using the wet open-cut method or more likely would involve using one of the dry open-cut methods.

Integrity management excavations accomplished using either of the dry open-cut crossing methods would release sediments after the dams are removed and natural waterbody flow returns. However, the sediments would readily dissipate to negligible levels in the downstream area in the vicinity of the crossing. As a result, the potential impact of using the dry open-cut method for instream integrity digs on aquatic habitat is expected to be temporary to short term and minor for each crossing.

If the wet open-cut method is used for integrity digs, the Applicant would implement the erosion and sediment control measures discussed above for construction of surface water crossings. These measures would be implemented during and after wet open-cut integrity digs, and if streambanks are disturbed, they would be restored and stabilized as soon as practical after completion of the pipe repair or replacement. As a result, instream integrity dig activities for using the wet open-cut method would result in short-term and minor impacts on aquatic habitat.

Changes in Channel Morphology and Stability Caused by Channel and Streambank Modifications

Excavation and repair or replacement of pipe may be required within surface waters or at the banks of surface waters. The excavations to reach the pipe segments may be accomplished using the wet open-cut method or more likely would involve use of one of the dry open-cut methods.

Integrity management excavations accomplished using either of the dry open-cut crossing methods would involve backfilling of the trench, after the repair or replacement is made, to the approximate contours of the river bed or streambed. This could result in a minor, temporary change in channel morphology until the natural sedimentation processes of the waterbody return the affected area to essentially match the nearby morphology. If streambanks are affected by the digs, they would be restored to preconstruction grades when practicable. If the slope is determined to be unstable, the banks would be reshaped to prevent slumping. After reestablishing the grade, streambanks would be restored with appropriate vegetation. As a result, the potential impact on channel morphology and stability of using the dry open-cut method for instream integrity digs is expected to be temporary to short term and negligible to minor for each crossing.

The impacts associated with using the wet open-cut method for instream integrity digs may require a longer period of time for natural sedimentation processes to accomplish the same result. If streambanks are affected by the digs, they would be restored as described above. As a result, the potential impact on channel morphology and stability of using the wet open-cut method for instream integrity digs is expected to be short term and minor for each crossing.

Disturbance of Wild Rice Waterbodies

One wild rice waterbody is located within the permanent right-of-way for the existing Line 3 route. However, the pipeline is not installed within the waterbody but only crosses the dry basin portion of the wild rice lake boundary. If excavation and repair or replacement of a segment of pipeline in this area are required, no direct impacts on the wild rice waterbody would occur. This activity could result in topographical changes and loss of vegetation in the area near the wild rice waterbody for a relatively short period of time. Although there is a potential that these changes could alter runoff patterns and increase erosion, the Applicant would implement measures to minimize changes in stormwater runoff and erosion, as described above, during and after the integrity dig. Consequently, the impacts on a wild rice waterbody of an integrity dig near the waterbody would be short term and negligible. However, if introduction of contaminants, introduction of invasive aquatic plants and non-native strains of wild rice, and altered lakebed conditions occur as a result of an integrity dig, impacts could be major.

System Alternative SA-04

System alternative SA-04 would require 636 waterbody crossings (172 in Minnesota) (see Table 5.2.1.2-8 for the types of surface waters crossed), including 56 state-designated use/sensitive surface waters, 6 (1 in Minnesota) NRI-listed river crossings (listed in Table 5.2.1.2-9), 32 (8 in Minnesota) impaired surface water crossings (listed in Table 5.2.1.2-10), and 9 (2 in Minnesota) navigable waterway crossings.

The types of activities that could result in impacts during construction and operation of SA-04 would be essentially the same as those described for the Applicant's proposed project. As a result, some of those activities are briefly mentioned below, with more details provided in the sections above for construction and operation of the Applicant's proposed project. Construction and operation of SA-04 would affect more surface waters because the route crosses substantially more surface waters than the Applicant's proposed project.

Construction Impacts

Construction impacts for system alternative SA-04 would include impacts of the same type, magnitude, and duration as discussed above for the Applicant's proposed project; specific crossing methods for each waterbody and the construction timeline for system alternative SA-04 have not been developed. If SA-

04 is constructed, it was assumed that the Applicant would implement the same Applicant-proposed measures identified for the Applicant's proposed project (Appendix E) and would implement all necessary requirements mandated by North Dakota, Minnesota, Iowa, and Illinois permits to reduce impacts on surface water for the route.

Based on the spacing of pump stations along the Applicant's proposed project, and estimated 16 new pump stations would be required and located approximately every 50 miles along system alternative SA-04. Each pump station would require approximately 8 acres of land and would be within the construction work area. The assumption for facility location assumed that MLVs would be sited in a manner similar to that of the Applicant's proposed project: near water crossings, significant environmental resources, and populated areas. Hydraulic analysis of operation of the pipeline on system alternative SA-04 is not available; therefore, the specific locations of pump stations and MLVs were not available at the time of preparation of this EIS analysis.

Runoff and Flows

Increases in Stormwater Runoff and Erosion. Clearing and grading would be required for construction of the SA-04 pipeline, MLVs, new and expanded pump stations, cathodic protection sites, and for access roads and ATWS, including pipe yards. Newly cleared areas and impervious surfaces could cause increased stormwater runoff and erosion into nearby surface waters; however, the Applicant would comply with the requirements of applicable permit programs that are in place to manage potential impacts. This would include NPDES permits that would specify various stormwater and erosion control measures to be implemented, such as requiring stormwater to be routed around exposed soil areas through conveyance channels and stormwater discharges to be directed from the site to vegetated areas in order to increase sediment removal and infiltrate stormwater on the site when feasible. With adherence to NPDES permit stipulations and use of appropriate BMPs, similar to those described above for the Applicant's proposed project, impacts from increases in stormwater runoff and erosion from clearing and grading during construction would be short term to long term and minor.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation. In addition to clearing and grading, other construction activities such as blasting, trenching, waterbody crossings, ATWS and access road construction, and water discharges may cause increased suspended solids and sedimentation in the surface waters crossed by SA-04. The Applicant-proposed measures for temporary erosion controls, SWPPP requirements, and NPDES permit requirements described above for the Applicant's proposed project would be implemented during these activities to prevent sediment transport into surface waters during construction. During pipeline construction across a waterbody, the extent and duration of sedimentation and increased erosion potential depend on the soils, sediments, and topography of the crossing site and the proposed crossing method used.

The need for blasting along system alternative SA-04 is not known. If blasting was required, the Applicant would develop a Blasting Plan prior to construction that would include measures to protect nearby surface waters from impacts. Therefore, impacts on TSS from this localized blasting event likely would be temporary and negligible to minor.

Specific crossing methods for surface waters have not been determined for system alternative SA-04. When using the dry crossing method, increases in TSS and sedimentation would be localized and temporary in surface waters crossed because construction of the pipeline across the waterbody would occur in a dry area created by the temporary dams upstream and downstream of the work area. TSS and sedimentation would increase when flow is returned to the dry channel but would readily dissipate to negligible levels downstream in the vicinity of the crossing. As a result, impacts would be temporary to short term and minor.

Wet open-cut methods involve excavation of the channel and banks in the wetted channel, and excavated soils would be in direct contact with surface water. With adherence to NPDES permit stipulations and use of appropriate BMPs, similar to those described above for the Applicant's proposed project, impacts from increases in TSS concentrations and increased sedimentation in surface waters from using open-cut wet crossings would be temporary to short term and minor.

Changes in Stream Flows from Water Withdrawals and Discharges. Construction of SA-04 would require water withdrawal for hydrostatic testing, dust control, trench dewatering, and HDD installation, which would be sourced from lakes, streams, or groundwater wells. Approximately 11 to 17 million gallons would be required for hydrostatic testing for each construction spread; the number of construction spreads for SA-04 has not been determined, but substantially more spreads would be required than for the Applicant's proposed project because of the greater length of the route (about 795 miles for SA-04 versus about 340 miles for the Applicant's proposed project). The volume of water appropriation needed for dust control, trench dewatering, and HDD installation for system alternative SA-04 has not been determined. If a route permit is issued for this route, the Applicant would need to obtain a Water Appropriation Permit from each state crossed by the route prior to construction.

Hydrostatic test water would be discharged from a test section in one of two ways, as described for the Applicant's proposed project. Discharges would adhere to all conditions set forth in NPDES and water appropriation permits, including discharge over approved energy dissipation measures (e.g., sand bags, plastic sheeting, or natural rock riprap) and the sedimentation control measures as described above. With adherence to water appropriation and NPDES permit conditions and implementation of Applicant-proposed measures, impacts on stream flows from water appropriation and discharge during construction of SA-04 would be temporary and minor.

Disruption of Flow Paths or Local Hydrologic Connectivity. As described above for the Applicant's proposed project, pipeline construction may disrupt flow paths and groundwater-surface water interaction due to clearing and grading of riparian vegetation, water appropriation and discharge, construction of temporary and permanent access roads, and channel and streambank modifications caused by waterbody crossings. With implementation of measures similar to those described for the Applicant's proposed project to prevent erosion and sedimentation, to monitor stream flows during water appropriation and discharge, and to restore streambanks to their original attributes following construction, impacts on flow and hydrologic connectivity during construction of SA-04 would be temporary to permanent and minor to major.

Construction would involve creation of both temporary and permanent access roads that also could affect hydrologic connectivity. The Applicant would restore temporary access roads, including roads that were widened and graded, to preconstruction conditions upon completion of construction. The restoration would include seeding disturbed areas with a suitable seed mix for the area. The Applicant would leave any improved roads intact if requested by the respective landowner. Impacts on hydrologic connectivity associated with temporary access roads for SA-04 is expected to be short term and negligible to minor, depending on the location of the roads. Impacts from permanent access roads are discussed in the operations section below.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality*.* Because only minor increases in stormwater runoff would occur during construction, as noted above, the potential for stormwater to carry contaminants into surface waters is low. The impact of contaminants in stormwater runoff on surface water quality therefore would be short term and negligible to minor, continuing until vegetative cover is restored to approximate preconstruction conditions.

Surface water along SA-04 could become contaminated from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities such as fuel storage, equipment refueling, and equipment maintenance. However, to protect surface water resources, NPDES permits for construction of the route would require secondary containment of hazardous materials, prohibition of engine degreasing at work sites, containment and collection of liquid and solid wastes, and a spill prevention and response plan for fueling and maintenance of vehicles. Similar treatment/disposal or discharge measures to those described for the Applicant's proposed project would be necessary for handling concrete wash water, grindings, drilling mud and slurry, and rinse water generated by construction and hydrostatic testing.

In addition, the Applicant would be responsible for cleaning up small spills during construction of the route through procedures similar to those described in the Environmental Protection Plan (Appendix E) for the Applicant's proposed project, including notifying proper personnel (e.g., the onsite spill coordinator) and agencies, stopping the work activity that caused the spill, using absorbent booms and pads to contain and recover released materials in water, and disposing of contaminated response materials at approved facilities.

For Section 303(d)-listed surface waters, which already have an impairment that prevents a beneficial use, degradation of water quality is of particular concern. NPDES permits for construction of SA-04 likely would require identification of Section 303(d) waters with phosphorus, turbidity, dissolved oxygen, or biotic impairment within 1 mile of construction. If the impaired waters have an approved TMDL implementation plan, the plan likely would be required to be incorporated into the SWPPP, and discharges must comply with specified TMDLs. With adherence to these permit conditions and implementation of Applicant-proposed measures, impacts on surface water quality from small leaks and spills during construction would be temporary to short term and minor.

Degradation of Aquatic Habitat from Instream Construction Activities*.* Pipeline construction across surface waters has the potential to alter and degrade aquatic habitat through increased sedimentation and erosion, disruption or alteration of stream flow, and streambank disturbance. High mortality rate for freshwater mussels living in gravel-bedded or sand-bedded channels, negative and greatly reduced survival rates for fish eggs resulting from silt deposits have been well documented. The specific crossing method for each crossing has not been determined for construction of SA-04 but would be selected based on various factors, including waterbody size, sensitivity (e.g., trout stream), water levels, soil/sediment stability, and anticipated season of installation. If a route permit is issued for this route, the Applicant would be required to obtain crossing permits for the surface waters crossed by the route.

Similar to construction of the Applicant's proposed project, dry and wet open-crossing crossing methods would be used. Each method has advantages and disadvantages for minimizing potential impacts on aquatic habitats. Assuming that erosion and sedimentation control measures would be the same as those discussed above for the Applicant's proposed project and that disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation, using the dry open-cut crossing method would result in temporary to short-term and minor impacts on aquatic habitat for each crossing; with use of the wet open-cut method, the impact on aquatic habitat would be short term and minor.

If selected for certain crossings along the route (e.g., roads and ditches), successful guided bore crossings would result in no impacts on aquatic habitat. In addition, HDD crossings likely would be used to avoid impacts on certain sensitive surface waters, such as impaired waters and coldwater fishery resources; and particularly deep, wide, or high-flow surface waters. The use of HDD crossings would be determined based on evaluations of subsurface substrate conditions and length of the drill path. HDD crossings are advantageous because they do not disturb streambeds or streambanks, and they maintain stream flow and fish passage. Construction of an HDD crossing is slower than a dry crossing, and there is the potential for inadvertent releases (discussed below). As described above for the Applicant's proposed project, successful HDD crossings would result in no impacts on aquatic habitat during construction of SA-04.

Degradation of Water Quality and Habitat from Drilling Mud Releases during HDD Crossings. Specific locations to implement HDD crossings have not been determined for system alternative SA-04. Geotechnical surveys would need to be conducted along the route of SA-04 to determine which surface waters would benefit from use of the HDD method and which of those surface waters are in areas that are geologically suitable for HDD. During drilling, fluid (water, bentonite clay, and possible additives) is circulated through the drilling pipe to lubricate the drill bit, remove drill cuttings, and stabilize the open hole. The potential exists for an inadvertent release or frac-out of this drilling fluid when pressurization of the drill hole is beyond the containment capability of the overburden soil material, which would allow the drilling fluid to flow to the ground or riverbed surface. Risk of HDD frac-out is discussed above in the assessment of impacts on surface water and aquatic habitat quality from the Applicant's proposed project. If a frac-out occurred during construction of the route and went undetected or was not quickly contained, impacts on surface water quality could be long term and major. However, with implementation of measures similar to those described for the Applicant's proposed project to respond to a drilling mud release during HDD construction along SA-04, the impact of a release of drilling fluid on surface water quality and streambank structure would be short term and minor.

Changes in Channel Morphology and Stability Caused by Channel and Streambank Modifications

Dry and wet open-cut waterbody crossing methods involve excavation of the streambed and potential changes to streambank stability and channel morphology. To minimize impacts on surface waters, the Applicant would consider crossing surface waters at the narrowest section of a waterbody where feasible, avoiding crossing when possible, and avoiding crossing on or under the beds of trout streams unless there is no feasible alternative. The Applicant would adhere to these stipulations when feasible, and each waterbody crossing would be approved prior to construction. Similar to construction of the Applicant's proposed project, temporary erosion control measures during construction of SA-04 would be implemented as necessary during waterbody crossing activities; and rock riprap, geotextile fabric, and other bioengineering techniques would be used to stabilize sites as needed. Following crossing construction, river beds and streambeds would be restored to approximately preconstruction conditions, with no impediments to water flow; and streambanks would be restored to preconstruction grades when practicable. If the slope is determined to be unstable, the banks would be reshaped to prevent slumping. Finally, streambanks would be restored with appropriate vegetation.

The use of dry or wet open-cut crossings for pipeline construction, along with the Applicant-proposed measures described above, would result in short-term to long-term minor impacts on channel morphology and streambank stability. Successful construction of HDD crossings, where implemented for construction of SA-04, would result in no impacts on channel morphology or streambank stability.

Disturbance of Wild Rice Waterbodies

No wild rice waterbodies are within or adjacent to the construction work area of SA-04. Therefore, construction of this alternative would not affect those surface waters.

Operations Impacts

Operations impacts for system alternative SA-04 would include the same types, magnitudes, and durations of impacts discussed for the Applicant's proposed project, but impacts would occur in more surface waters because more surface waters would be crossed by system alternative SA-04 compared to the Applicant's proposed project. The locations, numbers, and types of permanent aboveground facilities that would be constructed for system alternative SA-04 have not been determined. The potential impacts on surface water resources from a crude oil release are discussed in Chapter 10.

Runoff and Flows

Increases in Stormwater Runoff and Erosion*.* After the pipeline is installed, revegetation of the permanent right-of-way may require up to several years to reestablish to approximately preconstruction conditions, except for areas where new impervious surfaces are created, as addressed below. Runoff patterns along the non-impervious portions of the permanent right-of-way would be altered during the first few years of operation, resulting in impacts on runoff and erosion that would be short term to long term and negligible to minor. After vegetation is reestablished along the permanent right-of-way, surface water runoff and erosion would return to approximately preconstruction conditions. These effects would be more pronounced in areas where forest habitat is removed and herbaceous vegetation used for revegetation. The Applicant would conduct regular monitoring of the right-of-way and would be able to identify areas where changes may occur to the topography or vegetation. If any such changes are identified, the Applicant would make the appropriate repairs and improvements.

The number, types, and locations of associated facilities that would be required for pipeline operation along SA-04 have not been determined. However, the Applicant would be required to manage stormwater runoff at these new facilities as stipulated in NPDES permits and SWPPPs, which include the use of permanent stormwater control systems. As a result, the potential impacts on surface water due to increased stormwater runoff from impervious surfaces would be negligible to minor and permanent.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation*.* During the first few years of operation, surface water runoff and erosion may slightly increase as revegetation continues, resulting in short-term and negligible to minor impacts related to increases in TSS and sedimentation. Similar to the Applicant's proposed project, the permanent right-of-way for SA-04 in upland areas would be maintained in an herbaceous vegetative state during operation to allow access for inspection, monitoring, and maintenance. The permanent removal of large woody vegetation also would result in permanent but minor and localized alterations in habitat, streambank stability loss and erosion, and sedimentation. The Applicant would conduct regular monitoring of the right-of-way and would be able to identify streambank areas where changes may occur to the topography or vegetation. If any such changes are identified, the Applicant would make the appropriate repairs and improvements. In other portions of the permanent right-of-way, there would be a permanent but negligible impact from increased TSS and sediments in surface water.

Changes in Stream Flows from Water Withdrawals and Discharges. Normal operation of the route would not require withdrawal or discharge of water. However, during the repair or replacement of pipe as part of the Applicant's Integrity Management Program described above, it may be necessary to withdraw and discharge water to hydrostatically test sections of pipe and for dust control during the integrity digs and backfilling activities. The frequency with which hydrostatic testing would occur, locations of testing, and amount of water needed for testing and dust control are not defined. However, as described for pipeline construction, the Applicant would be required to obtain water appropriation and NPDES permits for testing procedures and the volume of water would be substantially less than for construction. With adherence to permits and implementation of existing BMPs, minor alterations in stream flows from water appropriation and discharge would be temporary and negligible.

Disruption of Flow Paths or Local Hydrologic Connectivity. Integrity management digs would result in minor alterations of topography and stormwater flows at the excavation sites. With implementation of the Applicant-proposed measures described above to avoid changes to stormwater runoff and restore streambanks to their original attributes after work is completed, impacts on flow and hydrologic connectivity during in the areas excavated for pipe repair or replacement would be temporary to short term and negligible to minor.

Permanent access roads during operation also could affect hydrologic connectivity. It is anticipated that permanent access roads would require local or state permits, which likely would require culverts to minimize the changes to hydrologic connectivity. Although the extent of the changes in those cases would depend on the topography of the area and the design of the roadway, the impact on hydrologic connectivity likely would be permanent and minor. For access roads without culverts, the extent of changes to hydrologic connectivity could be greater, again dependent on the topography of the area and the design of the roadway. Where those roadways are present, the impact on hydrologic connectivity likely would be permanent and minor.

Other permanent aboveground facilities, such as pump stations and MLVs, also would affect hydrologic connectivity. Due to the relatively small footprints of these facilities, it is anticipated that their presence would result in permanent but negligible to minor impacts.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality. The permanent right-of-way of SA-04 in upland areas would be maintained in an herbaceous vegetative state during operation to allow access along the right-of-way for inspection, monitoring, and maintenance. The permanent removal of riparian vegetation in areas adjacent to waterbody crossings would allow more light to enter the waterbody and could cause long-term to permanent but negligible to minor increases in temperature at these locations. These effects would be more pronounced in areas where forest habitat is removed and herbaceous vegetation used for revegetation.

During normal operation, there would be no other measurable changes to water quality in surface waters. The minor changes within the major drainage basins and watersheds crossed by system alternative SA-04 would not result in degradation of the watershed water quality score. As a result, water quality would not change in the surface waters of the basins and watershed along the route, including impaired surface waters. Therefore, watershed surface water quality would not be affected during normal operation of the Project.

Minor fuel and lubricant leaks and spills could occur from maintenance and inspection vehicles operating along SA-04. However, any refueling, fuel storage, or vehicle maintenance would follow measures similar to those in the Applicant's proposed Environmental Protection Plan (Appendix E). Thus, minor leaks and spills would result in temporary and negligible to minor impacts on surface water quality. The potential impacts of an unanticipated crude oil release are discussed in Chapter 10.

Degradation of Aquatic Habitat from Instream Activities. Instream excavations may be required to repair or replace pipe segments buried beneath surface waters. This would result in impacts similar to those described for surface water crossings. The excavations to reach the pipe segments may be accomplished using the wet open-cut method or more likely would involve use of one of the dry open-cut methods.

Integrity management excavations accomplished using either of the dry open-cut crossing methods would release sediments after the dams are removed and natural waterbody flow returns. However, the sediments would readily dissipate to negligible levels in the downstream area in the vicinity of the crossing. As a result, the potential impact on aquatic habitat of using the dry open-cut method for instream integrity digs is expected to be temporary to short term and minor for each crossing.

If the wet open-cut method is used for integrity digs, the Applicant would implement the erosion and sediment control measures discussed above for construction of surface water crossings. These measures would be implemented during and after wet open-cut integrity digs; if streambanks are disturbed, they would be restored and stabilized as soon as practical after completion of the pipe repair or replacement. As a result, instream integrity dig activities using the wet open-cut method would result in short-term and minor impacts on aquatic habitat.

Changes in Channel Morphology and Stability Caused by Channel and Streambank Modifications

Excavation and repair or replacement of pipe may be required within or at the banks of surface waters. The excavations to reach the pipe segments may be accomplished using the wet open-cut method or more likely would involve use of one of the dry open-cut methods.

Integrity management excavations accomplished using either of the dry open-cut crossing methods would involve backfilling of the trench, after the repair or replacement is made, to the approximate contours of the river bed or streambed. This could result in a minor, temporary change in channel morphology until the natural sedimentation processes of the waterbody return the affected area to essentially match the nearby morphology. If streambanks are affected by the digs, they would be restored to preconstruction grades when practicable. If the slope is determined to be unstable, the banks would be reshaped to prevent slumping. After reestablishing the grade, streambanks would be restored with appropriate vegetation. As a result, the potential impact on channel morphology and stability of using the dry open-cut method for instream integrity digs is expected to be temporary to short term and negligible to minor for each crossing.

Using the wet open-cut method for instream integrity digs may require a longer period of time for natural sedimentation processes to accomplish the same result. If streambanks are affected by the digs, they would be restored as described above. As a result, the potential impact on channel morphology and stability of using the wet open-cut method for instream integrity digs is expected to be short term and minor for each crossing.

Disturbance of Wild Rice Waterbodies

Impacts on wild rice waterbodies would not occur during operations, as no wild rice waterbodies occur within or near the permanent right-of-way for SA-04.

Transportation by Rail

Construction Impacts

Transportation of crude oil by rail would require development of rail loading and offloading facilities, and replacement and upgrade of existing rail access (described in Section 4.2.6). As currently envisioned, the rail loading facility would be constructed and operated in Gretna, Canada. Those facilities would require permitting by provincial and national entities in Canada, and therefore are not addressed in this EIS. The offloading facilities would be sited near the existing Enbridge terminal in Clearbrook, Minnesota, and near the existing Enbridge terminal in Superior, Wisconsin. The specific locations of the offloading facilities have not been identified. The existing rail line near Clearbrook would need to be upgraded to a Class 1 standard, and a portion of abandoned line near Clearbrook would need to be re-installed. New construction would be required in undeveloped areas at both offloading facility locations.

Transportation of crude by rail will not require construction within waterbodies and thus no impacts on instream habitat, water quality, channel morphology or stream flow will occur.

Runoff and Flows

Increases in Stormwater Runoff and Erosion*.* Clearing and grading would be required for construction of new facilities and access roads, resulting in changes to stormwater runoff and erosion and the potential for runoff to reach nearby surface waters. It is likely that stormwater NPDES permits would be required, along with measures to address erosion and sediment controls to be implemented during construction, stormwater pollution management, waste disposal, maintenance and inspection practices, and any additional requirements to prevent stormwater pollution. Newly cleared areas and impervious surfaces could cause increased stormwater runoff and erosion into nearby surface waters; however, the requirements of applicable permit programs are in place to manage potential impacts. This includes NPDES permits that would specify various stormwater and erosion control measures to be implemented, such as requiring stormwater to be routed around exposed soil areas through conveyance channels and stormwater discharges to be directed from the site to vegetated areas in order to increase sediment removal and infiltrate stormwater on the site when feasible. With adherence to stipulations in NPDES permits and use of appropriate BMPs, similar to those described above for the Applicant's proposed project, impacts on surface waters from increases in stormwater runoff and erosion from clearing and grading during construction of facilities would be short term and minor.

The improvements required for the rail lines would be accomplished on the existing rail embankments and would not be expected to alter stormwater runoff and erosion patterns; consequently, no impacts on surface waters would be associated with rail line improvements.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation*.* The temporary erosion controls, SWPPP requirements, and NPDES permit requirements described above would be implemented during construction of the offloading and related facilities to prevent sediment transport into nearby surface waters during construction. As a result, there would be no or small increases in TSS concentrations and sedimentation in nearby water crossings. Therefore, construction of these facilities likely would result in temporary negligible impacts related to increased TSS concentrations and sedimentation in surface waters.

The improvements required for the rail lines would be accomplished on the existing rail embankments and, as noted above, would not be expected to result in a substantial change in stormwater runoff or erosion patterns. Although construction activities could cause a small increase in erosion in some locations, the impact of increased TSS and sedimentation in nearby surface waters would be temporary and negligible.

Changes in Stream Flows from Water Withdrawals and Discharges. Construction of the offloading facilities would require water for dust control and other construction activities such as preparation of concrete. Water also may be required for hydrostatic testing of new storage tanks if they are included in the design. The source of the water, whether it would be withdrawn from surface waters or a PWS, is not known. If obtained from surface waters, it was assumed that appropriate BMPs would be implemented such as those described in the Environmental Protection Plan (Appendix E), and that all necessary permits (e.g., NPDES permits for discharges) would be obtained. Consequently, impacts on surface waters would be expected to be temporary and negligible to minor. If water is obtained from public water supplies provided by a local utility, there would be no withdrawals of surface water and therefore no impact.

Disruption of Flow Paths or Local Hydrologic Connectivity. Construction of the offloading facilities may disrupt flow paths and groundwater-surface water interaction due to clearing and grading and water appropriation (for dust control and other construction-related activities) and discharge. With implementation of measures similar to those described for the Applicant's proposed project to prevent erosion and sedimentation and, if applicable, to monitor stream flows during water appropriation and discharge, impacts on flow and hydrologic connectivity during construction of the offloading and related facilities would be temporary to short term and minor.

Construction of the offloading facilities also would involve creation of temporary and permanent access roads that could affect hydrologic connectivity. Applicable permits likely would stipulate that temporary access roads, including roads that were widened and graded, be restored to preconstruction conditions upon completion of construction. The restoration likely would include seeding disturbed areas with a suitable seed mix for the area. Impacts on hydrologic connectivity associated with temporary access roads likely would be short term and negligible to minor, depending on the location of the roads. Impacts from permanent access roads are discussed in the operations section below.

Because the improvements required for the rail lines would be accomplished on the existing rail embankments, they would not be expected to affect hydrologic connectivity.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality. Because only minor increases in stormwater runoff would occur during construction of offloading facilities, the potential for stormwater to carry contaminants into surface waters is low. Surface water near construction areas could become contaminated from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities such as fuel storage, equipment refueling, and equipment maintenance. However, to protect surface water resources, NPDES permits for construction of the route would require secondary containment of hazardous materials, prohibition of engine degreasing at work sites, containment and collection of liquid and solid wastes, and a spill prevention and response plan for fueling and maintenance of vehicles. Similar treatment/disposal or discharge measures to those described above for the Applicant's proposed project would be necessary for handling concrete wash water and rinse water generated by construction and hydrostatic testing, if such testing is done.

In addition, permits would stipulate the Applicant's responsibility for cleaning up small spills during construction, using procedures similar to those described in the Environmental Protection Plan (Appendix E) for the Applicant's proposed project, including notifying proper personnel (e.g., the onsite spill coordinator) and agencies, stopping the work activity that caused the spill, using absorbent booms and pads to contain and recover released materials in water, and disposing of contaminated response materials at approved facilities.

With implementation of the above practices and adherence to the requirements of NPDES permits, impacts related to degradation of water quality on nearby surface waters from small spills and leaks during construction would be temporary and negligible to minor.

Disturbance of Wild Rice Waterbodies

No wild rice waterbodies are located within the general area for the new rail access route from Gully to Clearbrook, and the offloading facility near Clearbrook in Minnesota. Therefore, no impacts on wild rice waterbodies are expected from construction associated with the rail alternative. No wild rice waterbodies are located in the general area for the new rail offloading facility near Superior in Wisconsin.

Operations Impacts

During operations, transportation of crude by rail will not impact instream habitat, channel morphology or stream flow.

Runoff and Flows

Increases in Stormwater Runoff and Erosion. The offloading facilities would be designed to comply with NPDES permits and other permitting requirements that control runoff from industrial sites. The increase in impermeable surfaces would alter runoff patterns; however, with adherence to permitting requirements, a substantial increase in stormwater runoff and erosion would not be anticipated. Consequently, potential impacts on surface waters from increases in stormwater runoff and erosion would be permanent and negligible to minor.

Rail transport would be conducted on existing embankments, with no changes to stormwater runoff or erosion patterns and no impact on surface waters.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation. Operation of the rail facilities and train transportation would likely not result in increased runoff or introduction of eroded materials into nearby surface waters, causing increases in TSS concentrations or sedimentation, therefore, no impact would occur.

Disruption of Flow Paths or Local Hydrologic Connectivity. The presence of the permanent offloading facilities would affect hydrologic connectivity. The specific locations and acreages covered by permanent facilities were not known at the time this EIS was prepared. However, the footprints of these facilities would be relatively small in comparison to the hydrogeologic flows in the areas near the facilities. Consequently, it is anticipated that the impact of their presence would be permanent but negligible to minor.

Permanent access roads during operation also could affect hydrologic connectivity. It is anticipated that permanent access roads would require local or state permits, which likely would require culverts to minimize the changes to hydrologic connectivity. Although the extent of the changes in those cases would depend on the topography of the area and the design of the roadway, the impact on hydrologic connectivity likely would be permanent and minor. For access roads without culverts, the extent of changes to hydrologic connectivity could be greater, again dependent on the topography of the area and the design of the roadway. Where those roadways are present, the impact on hydrologic connectivity likely would be permanent and minor.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality. Operation of unit trains would increase the amount of materials dropping from the trains to the railroad bed from the current level. Material reaching the railroad bed could include materials from brakepad consumption, lubrication, and fuel drips and leaks. The increase above current conditions is expected to be minor and typical of cargo transport by rail. If petrochemicals reach areas of the railroad bed adjacent to surface waters, it is possible that the petrochemicals could migrate to the surface water and create a sheen. However, the quantity of materials leaking during normal operation would be small, and the associated impact on surface water quality likely would be temporary and minor. The potential impacts on surface water resources due to an unanticipated crude oil release are discussed in Chapter 10.

Disturbance of Wild Rice Waterbodies

Because no wild rice waterbodies are located within the general area for the offloading facility near the Clearbrook terminal in Minnesota or the offloading facility near the Superior terminal in Wisconsin, no impacts on wild rice waterbodies would occur from operation of these facilities. Rail transport routes through Minnesota and Wisconsin would cross near multiple wild rice waterbodies. Degradation of surface water quality from drips, leaks, and mechanical wear from train transportation could result in temporary and negligible to minor impacts on wild rice waterbodies.

Transportation by Truck

Transportation of crude oil by truck would require development of truck loading and offloading facilities, transport on existing roadways, construction of new roadways to access the offloading terminals, and also may require roadway improvements near the facilities (described in Section 4.2.7). As currently envisioned, the truck loading facility would be constructed and operated in Gretna, Canada. Those facilities would require permitting by provincial and national entities in Canada and therefore are not addressed in this EIS. The offloading facilities would be sited within and adjacent to the existing Enbridge terminals in Clearbrook, Minnesota, and in Superior, Wisconsin. The specific locations of the offloading facilities have not been identified. New construction would be required in undeveloped areas at both offloading facility locations.

<u>Construction Impacts</u>

Transportation of crude by truck will not require construction within waterbodies and thus no impacts on instream habitat, water quality, channel morphology or stream flow will occur.

Runoff and Flows

Increases in Stormwater Runoff and Erosion*.* Clearing and grading would be required for construction of new facilities, new roadways, access roads, and roadway improvements, resulting in changes to stormwater runoff and erosion and the potential for runoff to reach nearby surface waters. It is likely that stormwater NPDES permits would be required, along with measures to address erosion and sediment controls to be implemented during construction, stormwater pollution management, waste disposal, maintenance and inspection practices, and any additional requirements to prevent stormwater pollution. Newly cleared areas and impervious surfaces could cause increased stormwater runoff and erosion into nearby surface waters; however, requirements of applicable permit programs are in place to manage potential impacts. This includes NPDES permits that would specify various stormwater and erosion control measures to be implemented, such as requiring stormwater to be routed around exposed soil areas through conveyance channels and stormwater discharges to be directed from the site to vegetated areas in order to increase sediment removal and infiltrate stormwater on the site when feasible. With adherence to NPDES permit stipulations and use of appropriate BMPs, similar to those described for the Applicant's proposed project, impacts on surface waters from increases in stormwater runoff and erosion from clearing and grading during construction would be short term and minor.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation. The temporary erosion controls, SWPPP requirements, and NPDES permit requirements described above likely would be required during construction of the offloading and related facilities, including new roads, to prevent sediment transport into nearby surface waters during construction. As a result, no increases or small increases in TSS concentrations and sedimentation would occur in nearby water crossings. Therefore, construction of facilities for the truck alternative would result in temporary negligible impacts related to increased TSS concentrations and sedimentation in surface waters.

Changes in Stream Flows from Water Withdrawals and Discharges. Construction of offloading and related facilities would require water for dust control and other construction activities such as preparation of concrete. Water may also be required for hydrostatic testing of new storage tanks if they are included in the design. The source of the water, whether it would be withdrawn from surface waters or a PWS, is not known. If obtained from surface waters, it was assumed that appropriate BMPs would be implemented such as those described in the Environmental Protection Plan (Appendix E), and that all necessary permits (e.g., NPDES permits for discharges) would be obtained. Consequently, impacts on surface waters would be expected to be temporary and negligible to minor. If water is obtained from public water supplies provided by a local utility, there would be no withdrawals of surface water and therefore no impact.

Disruption of Flow Paths or Local Hydrologic Connectivity. Construction of the offloading facilities may disrupt flow paths and groundwater-surface water interaction due to clearing and grading and water appropriation (for dust control and other construction-related activities) and discharge. With implementation of measures similar to those described for the Applicant's proposed project to prevent erosion and sedimentation and, if applicable, to monitor stream flows during water appropriation and discharge, impacts on flow and hydrologic connectivity during construction of the offloading and related facilities would be temporary to short term and minor.

Construction would involve creation of both temporary and new permanent roadways roads that also could affect hydrologic connectivity. Applicable permits likely would stipulate that temporary access roads, including roads that were widened and graded, be restored to preconstruction conditions upon completion of construction. The restoration likely would include seeding disturbed areas with a suitable seed mix for the area. Impacts on hydrologic connectivity associated with temporary access roads likely would be short term and negligible to minor, depending on the location of the roads. Impacts from permanent access roads are discussed in the operations section below.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality. Because only minor increases in stormwater runoff would occur during construction, the potential for stormwater to carry contaminants into surface waters is low. Surface water near construction areas could become contaminated from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities such as fuel storage, equipment refueling, and equipment maintenance. However, to protect surface water resources, NPDES permits for construction of the route would require secondary containment of hazardous materials, prohibition of engine degreasing at work sites, containment and collection of liquid and solid wastes, and a spill prevention and response plan for fueling and maintenance of vehicles. Similar treatment/disposal or discharge measures to those described for the Applicant's proposed project would be necessary for handling concrete wash water and rinse water generated by construction and hydrostatic testing, if such testing is done.

In addition, permits would stipulate responsibilities for cleaning up small spills during construction using procedures similar to those described in the Environmental Protection Plan (Appendix E) for the Applicant's proposed project. These efforts include notifying proper personnel (e.g., the onsite spill coordinator) and agencies, stopping the work activity that caused the spill, using absorbent booms and pads to contain and recover released materials in water, and disposing of contaminated response materials at approved facilities.

With implementation of the above practices and compliance with requirements of NPDES permits, the impact on nearby surface waters of small leaks and spills during construction would be temporary and negligible to minor.

Disturbance of Wild Rice Waterbodies

No wild rice waterbodies are located within the general area for the truck access and offloading facility near the Clearbrook terminal in Minnesota. Therefore, no impacts on wild rice waterbodies are expected from construction associated with the truck alternative.

<u>Operations Impacts</u>

During operations, transportation of crude by truck will not impact instream habitat, channel morphology or stream flow.

Runoff and Flows

Increases in Stormwater Runoff and Erosion. The offloading facilities would be designed to comply with NPDES permits and other permitting requirements that control runoff from industrial sites. New roadways and improvements to existing roadways would be expected to comply with state and local permitting requirements, although there would be an increase in runoff, and the increase in impermeable surfaces would alter runoff patterns. With adherence to permitting requirements, there likely would not be a substantial increase in stormwater runoff or erosion. Therefore, the impact on surface waters due to changes in stormwater runoff and erosion would be permanent and negligible to minor.

Increases in Total Suspended Solids Concentrations and Increased Sedimentation. As noted above, *o*peration of the truck offloading facilities would not likely result in substantial increased runoff or introduction of eroded materials into nearby surface waters. Therefore, TSS and sedimentation in the surface waters are not likely to increase, with no associated impact from operation of the facilities.

Construction of new roadways and improvement of new roadways would increase runoff and the potential for eroded materials and materials on the roadway to reach nearby surface waters. If surface waters are adjacent to or near the roadways, an increased amount of these materials could reach nearby surface waters. However, the quantity of materials reaching surface waters likely would be small, and the associated impact on surface water from increases in TSS and sedimentation would be temporary and minor.

Disruption of Flow Paths or Local Hydrologic Connectivity. The presence of the permanent offloading facilities would affect hydrologic connectivity. The specific locations and acreages covered by permanent facilities are not known. However, the footprints of these facilities would be relatively small in comparison to the hydrogeologic flows in the areas near the facilities. Consequently, it is anticipated that their presence would result in permanent but negligible to minor impacts.

It is anticipated that permanent access roads constructed for the truck alternative would require local or state permits, which likely would require culverts to minimize the changes to hydrologic connectivity. Although the extent of the changes in those cases would depend on the topography of the area and the design of the roadway, the impact on hydrologic connectivity likely would be permanent and minor.

Surface Water and Aquatic Habitat Quality

Degradation of Surface Water Quality. Operation of trucks on the highways and other roadways would increase the amount of materials dropping from the trucks to the roadway. Material reaching the roadway primarily would consist of materials from brakepad consumption, lubrication, and petrochemical drips and leaks from engines. The increase above current conditions is expected to be minor and typical of transport of cargo by truck. If petrochemicals reach areas of the roadway adjacent to surface waters, it is possible that the petrochemicals could migrate to the surface water and create a sheen. However, the quantity of materials leaking during normal operation would be small, and the associated impact on surface water quality likely would be temporary and minor. The potential impacts on surface water resources due to an unanticipated crude oil release are discussed in Chapter 10.

Disturbance of Wild Rice Waterbodies

Because no wild rice waterbodies are located within the general area for the truck offloading facilities, no impacts on wild rice waterbodies would occur from operation of these facilities. Truck transport routes through Minnesota and Wisconsin would occur near multiple wild rice waterbodies. Degradation of surface water quality from drips, leaks, and mechanical wear from truck transportation could result in temporary and negligible to minor impacts on wild rice waterbodies.

Existing Line 3 Supplemented by Rail

Surface water impacts associated with the combined use of the existing Line 3 pipeline and the rail alternative would be the same as those identified for the continued operation of the existing Line 3 pipeline in addition to those of the rail alternative identified above.

Existing Line 3 Supplemented by Truck

Surface water impacts associated with the combined use of the existing Line 3 pipeline and the truck alternative would be the same as those identified for the continued operation of the existing Line 3 pipeline in addition to those of the truck alternative identified above.

5.2.1.2.5 Regional Analysis of Impacts on Quality of Existing Surface Water Conditions

For northern Minnesota streams, the conversion of forested perennial cover to grassland dominated cover can have an overall effect on local hydrology by affecting the smaller peak flows. This is the yearly bankfull flow that shapes the channel and builds the floodplain (Verry 2001). Removing permanent perennial cover along streams also reduces instream quality and habitat by increasing water temperatures, negatively affecting trout and other sensitive aquatic organisms. Nutrient export from converted landscapes can also increase to lakes or streams when changing from forested to open grassland cover. The amount may be dependent on soil, slope and other factors (Radomski 2005). The overall effects of changes in forest cover on hydrology, nutrient export and temperature are dependent on the condition of the nearby watershed. The greater the landscape alteration the more potential for these changes. Quantifiable estimates of impacts from land use change activities is available and has been used to predict hydrology and water quality changes to surface waters with the use of computer modeling programs.

Northern forested wetlands that are converted to open linear landscapes can allow for invasive species or other aggressive plants to develop monocultures and displace native vegetation. Corridors are often prone to infestations of narrowleaf (*Typha angustifolia*) or hybrid cattail (*Typha X glauca*) which are not listed as an invasive plant but have been an aggressive nuisance with previous pipeline development.

5.2.1.2.6 Summary and Mitigation

Summary

At any specific surface water location along all the alternatives impacts may be short-term and minor with appropriate use of construction and operation practices; however, due to the great lengths of all alternatives the total impact would be additive and distributed along the routes. The importance of these impacts is determined by the distance of the alternative, number of surface water interactions, and the quality of surface water resources affected.

Potential impacts of the Applicant's proposed project and the CN Alternatives to surface waters from construction and normal operations range from no impact to permanent impacts (Table 5.2.1.2-14) and from negligible to major, with the exception of instances where a "frac-out" might occur during HDD activities. Temporary impacts are mostly related to construction, and permanent impacts are identified for various operational practices. There are potential minor to major construction impacts on wild rice waterbodies for the Applicant's proposed project. SA-04, does not have wild rice waterbodies located within the ROI and thus no impacts would occur to these resources.

Greater potential for construction-related impacts would likely occur for the Applicant's proposed project and SA-04, which would both require pipeline construction over long distances. Since rail and truck would rely mainly on existing infrastructure, construction-related impacts would be limited to new offloading facilities adjacent to the Clearbrook and Superior terminals and re-installation/upgrade of a limited length of track in the vicinity of Clearbrook. Continued use of existing Line 3 would not require new construction and thus no impacts would be expected.

Table 5.2.1.2-14. Summary of Potential Impacts on Surface Waters for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Increases in stormwater runoff and erosion from newly cleared areas and impervious surfaces	Short-term to long-term/minor impacts • 227 waterbody crossings (192 in MN) • 46 designated waterbody crossings • 6 trout stream crossings • 9 NRI-listed river crossings (7 in MN) • 16 impaired waterbody crossings (12 in MN) • 7 navigable waterway crossings (6 in MN)	No impact	Short-term to long-term /minor impacts • 636 waterbody crossings (172 in MN) • 56 designated waterbody crossings • 6 NRI-listed river crossings (1 in MN) • 32 impaired waterbody crossings (8 in MN) • 9 navigable waterway crossings (2 in MN)	Short-term /minor impacts • 448 waterbody crossings	Short-term to long-term /minor impacts • 225 waterbody crossings	Short-term /minor impacts • 448 waterbody crossings	Short-term to long-term /minor impacts • 225 waterbody crossings
Increases in total suspended solids concentrations and increased sedimentation	Temporary to short-term/negligible to minor impacts	No impact	Temporary to short-term/negligible to minor impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts
Changes in stream flows from water withdrawals and discharges	Temporary/minor impacts	No impact	Temporary/minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts

Table 5.2.1.2-14. Summary of Potential Impacts on Surface Waters for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Disruption of flow paths or local hydrologic connectivity	Temporary to permanent negligible to major impacts	No impact	Temporary to permanent negligible to major impacts	Temporary to short-term / negligible to minor impacts	Temporary to short-term / negligible to minor impacts	Temporary to permanent negligible to major impacts	Temporary to permanent negligible to major impacts
Degradation of surface water quality	Temporary to short-term/negligible to minor impacts	No impact	Temporary to short-term/negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts
Degradation of aquatic habitat from instream activities	Temporary to short-term/minor impacts (*from dry and wet open-cut crossings*); no impact (*from guided bore and HDD crossings*)	No impact	Temporary to short-term/minor impacts (*from dry and wet open-cut crossings*); no impact (*from guided bore and HDD crossings*)	No impact	No impact	No impact	No impact
Degradation of water quality and habitat from releases of drilling mud during HDD crossings	Short-term/minor impacts (*if quickly contained*) to long-term/major impacts (*if undetected or uncontained)*	No impact	Short-term/minor impacts (*if quickly contained*) to long-term/major impacts (*if undetected or uncontained)*	No impact	No impact	No impact	No impact
Changes in channel morphology and stability caused by channel and streambank modifications	Short-term to long-term/ minor impacts (*from dry and wet open-cut crossings*); no impact (*from guided bore and HDD crossings*)	No impact	Short-term to long-term/ minor impacts (*from dry and wet open-cut crossings*); no impact (*from guided bore and HDD crossings*)	No impact	No impact	No impact	No impact

Table 5.2.1.2-14. Summary of Potential Impacts on Surface Waters for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Disturbance of wild rice waterbodies	Short-term/minor to major impacts • 5 acres • 5 waterbodies	No impact	No impact • No wild rice waterbodies along the route	No impact • No wild rice waterbodies in the general area of rail offloading facilities	No impact • No wild rice waterbodies in the general area of truck offloading facilities	No impact	No impact
Operations Impacts							
Increases in stormwater runoff and erosion	Short-term to permanent/ negligible to minor impacts	Short-term to permanent/ negligible to minor impacts	Short-term to permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts	Short-term to permanent/ negligible to minor impacts	Short-term to permanent/ negligible to minor impacts
Increases in total suspended solids concentrations and increased sedimentation	Short-term to permanent/ negligible to minor impacts	Short-term to permanent/ negligible to minor impacts	Short-term to permanent/ negligible to minor impacts	No impact	Temporary/ minor impacts	Short-term to permanent/ negligible to minor impacts	Temporary to permanent/ negligible to minor impacts
Changes in stream flows from water withdrawals and discharges	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	No impact	No impact	Temporary/ negligible impacts	Temporary/ negligible impacts
Disruption of flow paths or local hydrologic connectivity	Temporary to permanent/ negligible to minor impacts from access roads	Temporary to permanent/ negligible to minor impacts from access roads	Temporary to permanent/ negligible to minor impacts from access roads	Permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts	Temporary to permanent/ negligible to minor impacts	Temporary to permanent/ negligible to minor impacts

Table 5.2.1.2-14. Summary of Potential Impacts on Surface Waters for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Degradation of surface water quality	Temporary to permanent/ negligible to minor impacts	Temporary to short-term/ negligible to minor impacts	Temporary to permanent/ negligible to minor impacts	Temporary/ minor impacts	Temporary/ minor impacts	Temporary to permanent/ negligible to minor impacts	Temporary to permanent/ negligible to minor impacts
Degradation of aquatic habitat from instream activities	Temporary to short-term/minor impacts from integrity digs	Temporary to short-term/ minor impacts from integrity digs	Temporary to short-term/minor impacts from integrity digs	No impact	No impact	Temporary to short-term/minor impacts from integrity digs	Temporary to short-term/ minor impacts from integrity digs
Changes in channel morphology and stability caused by channel and streambank modifications	Temporary to short-term/negligible to minor impacts from integrity digs	Temporary to short-term/ negligible to minor impacts from integrity digs	Temporary to short-term/negligible to minor impacts from integrity digs	No impact	No impact	Temporary to short-term/ negligible to minor impacts from integrity digs	Temporary to short-term/ negligible to minor impacts from integrity digs
Disturbance of wild rice waterbodies	Short-term/ negligible to major impacts • 3 acres • 5 waterbodies	Short-term/ negligible to major impacts • 1 wild rice waterbody in proximity	No impact • No wild rice waterbodies occur along this route	Temporary/ negligible to minor impacts • Multiple wild rice water bodies along rail routes	Temporary/ negligible to minor impacts • Multiple wild rice water bodies along truck routes	Short-term/ negligible impacts • 1 wild rice waterbody in proximity	Short-term/ negligible impacts • 1 wild rice waterbody in proximity

HDD = horizontal directional drilling, NRI = Nationwide Rivers Inventory

[a] **No single dataset in this summary tableprovides a complete indication of all relevant impacts to surface water. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, water crossing counts do not consider water quality indicators that are relevant in understanding the nature of the potential impacts of construction and operation. However, data from the impaired waters dataset or wild rice and trout stream data indicating high water quality can aid the reader in understanding the quality of the waters crossed. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.**

[b] **Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-68 through 5-98. This table, for example, provides counts of wild rice waterbodies, and a general**

assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to these waterbodies is contained in the text of this section.

[c] **The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-68 to 5-80. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[d] **Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on pages 5-80 to 5-84. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[e] **SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-84 to 5-92. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[f] **The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-92 to 5-95. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[g] **The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-95 to 5-98. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

During operations, continued use of existing Line 3, the Applicant's proposed project, and SA-04 could all require integrity digs that have the potential for localized limited impacts. The potential for integrity digs however, would likely be lower for the Applicant's proposed project or SA-04 as they would be new pipelines, whereas the other alternatives would include continued use of existing Line 3, which is projected to require a number of integrity digs (see Chapter 4).

Construction Impacts

Runoff and Flows

Construction of the Applicant's proposed project and the CN Alternatives, except for continued use of the existing Line 3, would cause changes to runoff and flows. The disruption of flow paths and local hydrologic connectivity for Applicant's preferred rout and SA-04 could result in permanent impacts. Permanent impacts would also result from construction of aboveground pipeline facilities and permanent access roads for pipeline alternatives and offloading facilities for the rail and truck transport alternatives. These impacts would occur along approximately 795 miles (250 in Minnesota) for SA-04 compared to approximately 340 miles in Minnesota for the Applicant's proposed project. For the rail and truck alternatives, construction impacts would occur over a smaller total area and would include areas near the offloading terminals and the new and improved roadways. Individual impacts on runoff and flows at any specific surface water location along all the alternatives is anticipated to be minor with appropriate use of construction and operation practices, however due to the great lengths of all alternatives the total impact would be additive and distributed along the routes. The importance of these impacts is determined by the distance of the alternative, number of surface water interactions, and the quality of surface water resources affected.

Surface Water and Aquatic Habitat Quality

Construction would mainly result in temporary impacts on surface water quality for the pipeline alternatives unless drilling fluids are released during HDD crossings and remain uncontained or undetected. In that event, the water quality impact would be long term and major. Construction of the pipeline alternatives would result in temporary impacts on aquatic habitat quality; construction of the rail and truck alternatives would only affect aquatic habitats for those areas where needed upgrades and surface waters coincide, such as improved river crossings. There would be a substantial difference in the number of surface waters affected by pipeline crossings: the Applicant's proposed project would cross 227 (192 in Minnesota) surface waters, and SA-04 would cross 636 (172 in Minnesota) surface waters. However, the existing condition of water resources as represented through comparisons of state geographic areas indicate the Applicant's proposed project crosses higher quality surface water resources. The number of surface water ditches and the lack of perennial cover as well as ecoregion water quality are good indicators of the specific type of poorer surface water quality areas crossed by or near SA-04. High-quality surface water resources are managed most appropriately with long-term watershed "protection" strategies to maintain existing conditions.

SA-04 also would cross more NRI-listed river crossings (fewer in Minnesota—one vs. seven for the Applicant's proposed project) and impaired waterbody crossings (12 in Minnesota for the Applicant's proposed project and 8 in Minnesota for SA-04). If construction activities are not properly mitigated or managed, impacts on impaired or low-quality waterbodies may cause further degradation of the waterbody, exacerbate an existing impairment, cause additional impairments, interfere with restoration activities, and/or delay attainment of water quality standards. Impaired waters are more related to watershed-scale factors such as lack of perennial cover and ditching and/or more direct hydrology impacts of tiling related to agriculture as well as the lack of natural stream conditions. Restoration in some areas after construction could be managed through improved runoff and instream management with newly added perennial vegetation and properly sloped banks at crossings.

Impacts on high-quality waterbodies (i.e., trout streams, NRI-listed rivers, and wild rice waterbodies) may decrease the suitability of surface water as a habitat for sensitive species or degrade the existing beneficial use of the waterbody. There are a large number of lakes and streams in north-central and northeast Minnesota and they are of the highest quality when comparing ecoregion data and watershed health index scores as well as other specific indicators such as tullibee lakes, wild rice lakes, LBS and trout streams. Further, in general, statewide maps indicate better health scores across the north and east and poorer scores across the south and west as depicted by analysis of the five different indicator components (Biology, Connectivity, Geomorphology, Hydrology and Water Quality). Keeping high-quality surface waters off impaired waters listings is highly important to state agencies, however, keeping these resources in their current condition is just as important for maintaining surface water health components. Removing riparian zone vegetation such as trees and shrubs and herbaceous layers within the surface water areas of the NLF Ecoregion may be a permanent or take decades to recover whereas southern areas generally have fewer trees and other perennial cover and are often plowed to the stream edge. Recovery in southern Minnesota areas within SA-04 would generally happen more quickly, often within the first year. Effects of individual stream crossings on aquatic habitat and temperature of streams in the NLF would potentially be greater.

Channel Morphology and Stability

Pipeline construction impacts on channel morphology and stability would be short term to long term and minor, except where an HDD or guided bore crossing method is used; impacts on channel morphology and stability are not anticipated to occur at those locations. As noted above, SA-04 would cross a substantially greater number of surface waters (fewer in Minnesota) compared to the Applicant's proposed project. The rail and truck alternatives could affect channel morphology or stability in the areas where improved river crossings are needed.

Wild Rice Waterbodies

Construction of SA-04, the rail alternative, and the truck alternative would not affect any wild rice waterbodies. Construction of the Applicant's proposed project would result in impacts on approximately 5 acres of wild rice waterbodies.

<u>Operations Impacts</u>

Runoff and Flows

For all routes, the impacts of operation on runoff and flows range from temporary to permanent at each affected location. For the pipeline alternatives, short-term impacts would result from periodic integrity digs to repair or replace segments of pipe, including the need for hydrostatic test water for new pipe segments. The decades-old existing Line 3 would require substantially more digs than either of the two new pipeline alternatives.

Permanent impacts on stormwater runoff would result from the presence of new aboveground pipeline facilities and permanent access roads, and new offloading facilities and associated new and improved roads. The operator of the new and expanded facilities would be required to manage stormwater runoff through NPDES permits and SWPPPs and through installation of stormwater retention ponds. These impacts would occur along a greater distance for the SA-04 alternative compared to both pipeline alternatives. Impacts on runoff and flows from the rail and truck alternatives would be limited to the offloading facilities and new and improved roads/rails, and nearby areas.

Temporary to permanent disruption of flow paths and local hydrologic connectivity would result from construction of aboveground pipeline facilities and permanent access roads for pipeline alternatives and offloading facilities for the rail and truck transport alternatives. These impacts would occur along approximately 795 miles (250 miles in Minnesota) for SA-04 compared to approximately 340 miles for the Applicant's proposed project. Removing riparian zone vegetation such as trees and shrubs and herbaceous layers within the surface water areas of the NLF Ecoregion may be permanent or take decades to recover whereas southern areas generally have fewer trees and other perennial cover and are often plowed to the stream edge. Recovery in southern Minnesota areas within SA-04 would generally happen more quickly, often within the first year. Final recovery during operation may not represent historic natural riparian zone quality in the NLF. Effects on runoff and quality during operation in the NLF would potentially be greater than historic natural conditions.

Surface Water and Aquatic Habitat Quality

Impacts on water quality during operation primarily would be temporary for all CN Alternatives but would occur periodically over the life of the Project. In areas where woody riparian vegetation would be permanently removed from the permanent rights-of-way for the Applicant's proposed project and SA-04, the effect on water temperature would be permanent. This impact would occur along a substantially longer (shorter in Minnesota) pipeline route for SA-04. Removing riparian zone vegetation such as trees and shrubs and herbaceous layers within the surface water areas of the NLF Ecoregion may be permanent or take decades to recover whereas southern areas generally have fewer trees and other perennial cover and are often plowed to the stream edge. Recovery in southern Minnesota areas within SA-04 would generally happen more quickly, often within the first year. Effects on habitat, temperature of streams and runoff rate and quality in the NLF would potentially be greater. Surface water temperature would not be affected by continued use of the existing Line 3.

The primary impact on water quality and habitat quality during operations likely would result from periodic integrity digs to repair or replace segments of pipe installed across surface waters. This would occur more often for continued use of the existing Line 3 because of its age compared to a new pipeline. The rail and truck alternatives would not affect instream habitats.

Channel Morphology and Stability

Operation of all pipeline alternative routes could result in impacts on channel morphology and stability, primarily from periodic integrity digs that are expected to be temporary. Integrity digs would occur substantially more often for the existing Line 3 because of its age compared to a new pipeline. The rail and truck alternatives would not affect channel morphology or stability.

Wild Rice Waterbodies

Integrity digs for the Applicant's proposed project during operation could affect as much as 3 acres of wild rice waterbodies, and integrity digs for continued use of the existing Line 3 could affect up to 1 acre of wild rice waterbodies. Operation of SA-04 would not affect wild rice waterbodies. Drips, leaks, and mechanical wear from normal train and truck transportation for the rail and truck alternatives could lead to impacts on nearby wild rice waterbodies. Large numbers of wild rice lakes exist in the NLF, and this is represented by several lakes within 0.5 mile of the alternatives in this ecoregion including train and truck routes.

Mitigation

In addition to the Applicant-proposed measures to avoid or minimize impacts that would be incorporated into the Project and the stipulations in permits required for the Project, Minnesota DNR identified the following mitigation measures for consideration by the Commission to further avoid and minimize impacts:

- Where riparian vegetation is removed at surface water crossings, revegetate the construction work area with a minimum 50-foot-wide buffer of woody vegetation to reduce runoff, erosion, water quality degradation, sunlight penetration, and water temperature warming, and increase bank stability.
- Longer term impacts of clearing in temporary work areas could be offset by reestablishing or enhancing the existing cover type within up to 500 feet of waterbodies, depending on topography.
- After construction on state forest lands or state Wildlife Management Areas, tree planting on all temporary workspaces could be accomplished to reduce erosion and runoff, as well as to ensure that forested areas within the riparian zone are restored to forest cover.

Rock riprap should be considered or permitted only when infrastructure (public or private) is at risk. Natural channel design and bioengineering methods should be considered the primary means of streambed and streambank restoration and stabilization.

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5.2.1.3 Wetlands

A wetland is a land area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of a distinct ecosystem. Wetlands are defined in a variety of ways for federal, state, and local regulatory protection; however, the common factors that distinguish wetlands from other landforms or waterbodies are the presence of a hydrophytic (waterlogged) vegetation community, hydric soils,[10] and hydrology. All wetlands provide a variety of functions of social significance, including: surface water storage (flood control), shoreline stabilization (wave damage protection/shoreline erosion control), stream flow maintenance (maintaining aquatic habitat and aesthetic appreciation opportunities), groundwater recharge (some types replenish water supplies), sediment removal and nutrient cycling (water quality protection), aquatic productivity (fishing, shellfishing, and waterfowl hunting), production of trees (timber harvest), production of herbaceous growth (livestock grazing and haying), production of peaty soils (peat harvest), and wildlife habitat (hunting, trapping, plant/wildlife/nature photography, nature observation, and aesthetics) (EPA 2002a, 2006).

The analysis of impacts to wetlands during construction of the Applicant's proposed project and CN Alternatives considered changes to wetland characteristics and functions by alteration or loss of the plant communities through removal or cover with fill, and by alteration or loss of the hydrologic conditions that maintain wetland plant communities and wetland soils. Construction and operations impacts considered included:

- Changes to forested and scrub/shrub wetland characteristics and functions
- Changes to emergent wetland characteristics and functions
- Changes to Minnesota Public Waters Wetlands characteristics and functions
- Changes to Minnesota calcareous fen characteristics and functions
- Changes to Wetland Reserve Program wetland characteristics and functions
- Changes to wetland mitigation bank easements characteristics, functions and availability

This section first describes the existing wetlands, including Public Waters Wetlands, calcareous fen wetlands, and wetland conservation easements, within the area along the Applicant's proposed project and each of the CN Alternatives where wetlands could be affected by construction and operation of the Project. The potential Project-related impacts of the Applicant's proposed project on wetlands during construction and operation then are discussed, along with measures the Applicant would implement to minimize impacts. Next, the potential impacts to wetlands during construction and operation are addressed for each CN Alternative (continued use of existing Line 3, SA-04, transportation by rail, transportation by truck, and existing Line 3 supplemented by rail or truck). A summary and comparison of potential Project-related impacts are included at the end of the section, with potential mitigation measures to be considered.

Potential impacts to wetlands due to an unanticipated crude oil release are discussed in Chapter 10.

[10] A soil that forms under conditions of water saturation long enough during the growing season to develop anaerobic conditions in the upper part of the soil.

5.2.1.3.1 Regulatory Context and Methodology

Regulatory Context

General Wetlands

Federal and State Jurisdictional Wetlands

CWA Sections 404/10 Individual Permits and associated state CWA Section 401 Individual Water Quality Certification for the Project in Minnesota are under the jurisdiction of USACE – St. Paul District and Minnesota PCA. USACE requires that projects first avoid impacts to wetlands to the extent practicable, then minimize potential impacts to the extent practicable, and lastly may require compensation be provided for unavoidable impacts (addressed below).

For CWA Section 401 certification, Minnesota PCA is responsible for non-reservation wetlands in Minnesota, Wisconsin DNR is responsible for wetlands in Wisconsin, and North Dakota DH's Division of Water Quality is responsible for wetlands in North Dakota. USEPA is responsible for 401 certifications on reservation lands, with the exception of Grand Portage and Fond du Lac Bands in Minnesota, and Mole Lake and Lac du Flambeau Bands in Wisconsin, which have their own 401 programs. Permitting for system alternative SA-04 would require obtaining a CWA Section 401 certification from Iowa DNR and Illinois DNR. Adherence to state-specific general construction and stormwater permit conditions, buffer laws, and other state and local resource protection measures also would be required, which would serve as a duplicative mechanism for oversight and protection of jurisdictional wetland resources.

In Minnesota, the Wetland Conservation Act (WCA) protects wetlands and applies to all wetlands except Public Waters Wetlands (described below). The WCA requires projects that affect wetlands to try to avoid the impact, minimize any unavoidable impacts, and replace any lost wetland functions. Responsibility for administration of the WCA is shared by local government units and Minnesota BWSR (Minn. R. Ch. 8420), and is enforced by Minnesota DNR.

In North Dakota, the Office of the State Engineer is responsible for first review of a project permit that affects a wetland. If the project does not have a large-scale impact on the state, it is directed to a jurisdictional Water Resource District Board for review and approval (North Dakota AC 89-02-01-09). In Illinois, the Interagency Wetland Act of 1989, administered by Illinois DNR, establishes a zero net loss for wetlands in the state, which would require mitigation by the Applicant for any wetlands affected (Illinois DNR 2000). Iowa relies solely on CWA Section 401 for wetland permitting and does not have supplemental required regulations (Iowa AC 567-61.2). In Wisconsin, Wisconsin DNR regulates wetlands in addition to USACE and reviews projects for water resources permits, including wetland crossings, and may require compensatory mitigation under Wisconsin Statute § 281.36 and Wisconsin Administrative Code NR 299 and NR 103.

Compensatory Mitigation

Compensatory wetland mitigation may be required in federal and state-specific permitting for permanent impacts on forested, scrub/shrub, and emergent wetlands. The overall objective of compensatory wetland mitigation would be to compensate for lost wetland aquatic resource functions, taking into consideration what is available and feasible. Compensatory wetland mitigation would be consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for the purposes of Section 404 CWA, including, but not limited to:

- USACE, St. Paul District Draft Compensatory Mitigation Policy for Minnesota, dated January 23, 2009;
- Joint guidance between St. Paul District and Minnesota BWSR for Developing Mitigation Plan Performance Standards and Credit Release Schedules in Minnesota, dated December 16, 2015;
- USACE and EPA Final Rule Regarding Compensatory Mitigation for Losses of Aquatic Resources, dated April 10, 2008; and
- Minnesota Office of the Revisor of Statutes 7050.0186 Wetlands Standards and Mitigation, dated April 1, 2008 and wetland replacement regulations as described under the WCA.

Specially Designated Wetlands

Minnesota Public Waters Wetlands

Public Waters Wetlands are a subset of the State's jurisdictional wetlands regulated under Minnesota Statutes § 103G. Public Waters Wetlands are regulated as public waters under Minnesota DNR's License to Cross Public Waters program. Where Public Waters Wetlands occur, a License to Cross Public Waters would be required from Minnesota DNR.

Minnesota DNR is responsible for granting utility crossing licenses for any utility projects proposing to cross Public Waters Wetlands, if the crossing plans are reasonable, practical, and will adequately protect public safety and promote the public welfare (Minn. Stat. § 84.415, and §103G.315). The Applicant may request exemption from wetland replacement requirements under existing utility exemptions for those portions of the Project within Public Waters Wetlands that would be regulated under WCA standards. Utility crossing licenses generally are required for installation of electrical, pipeline, and communication projects and are granted for a term of 25 or 50 years.

Calcareous Fen Wetlands

Calcareous fens are wetlands characterized by a substrate of non-acidic peat and dependent on a constant supply of cold, oxygen-poor groundwater rich in calcium and magnesium bicarbonates. They are rare and typically occur on slight slopes where upwelling water eventually drains away and where surface water inputs are minimal.

Impacts on calcareous fens are regulated by Minnesota DNR under the WCA and the USACE under the CWA. Under this act, a calcareous fen may not be filled, drained, or otherwise degraded, wholly or partially, by any activity. If impacts are identified and deemed necessary by the Minnesota Commissioner of Natural Resources, a Fen Management Plan must be provided by the applicant (Minn. Stat. § 103G.223). Eight state-listed, rare plant species are known to be commonly found within calcareous fens; these plant species would be additionally protected under Minnesota's Endangered Species Act (Minn. Stat. § 84.0895).

Calcareous fens in Iowa and Illinois, where local state rules and regulations apply, would need to be surveyed and protected, if present along system alternative SA-04. In Iowa, 20 threatened plant species were identified in the calcareous fen wetlands located in the northern portion of the state. They would require compliance with the Threatened and Endangered Species Program managed by Iowa DNR. Projects with potential impacts on calcareous fen wetlands in Illinois would need to follow the State's Interagency Wetland Act of 1989 (20 ILCS 830).

Wetland Reserve Program

The Wetland Reserve Program, a voluntary federal program managed by the Natural Resources Conservation Service (NRCS), supported wetland conservation, restoration, and enhancement projects on private agricultural and pastoral land through easements and restoration cost-share agreements. The Wetland Reserve Program ran from 2009 to 2014 and was replaced by the Agricultural Conservation Easement Program of the Agricultural Act of 2014, which has the same objectives and implementation tools.

Minnesota Wetland Mitigation Bank Easements

The Minnesota BWSR Mitigation Banking Program administered under the WCA (Minn. R. 8420.0700 to 8420.0820) facilitates applying for or purchasing wetland credits toward future wetland impacts. The Minnesota BWSR oversees the program with local government units involved in landowner application and monitoring. Minnesota created 10 wetland bank service areas. The compensatory mitigation ratio can be increased if a compensation site or wetland mitigation bank is located in a different Bank Service Area than where the impact occurs.

Methodology

As a part of the evaluation of potential impacts to wetlands and effects on specially designated wetland resources, the following information sources were used to identify wetlands potentially affected by construction and operation of the Project:

- USFWS National Wetlands Inventory (NWI) database (USFWS 2016), classified using the Cowardin classification system (Cowardin et al. 1979);
- Minnesota DNR Public Waters Wetlands database (Minnesota DNR 2014), classified based on USFWS Circular No. 39 (EPA 2002b);
- Minnesota DNR calcareous fens database (Minnesota DNR 2008), ranked based on the conservation status ranking (or “S-rank”) methodology developed by NatureServe and its member natural heritage programs in North America (NatureServe 2016), and classified using Minnesota’s native plant community classifications (Minnesota DNR 2005);
- USGS Protected Area Database – Wetland Reserve Programs (USGS 2016); and
- Minnesota wetland mitigation bank easements database (Minnesota BWSR 2015).

No single one of the datasets listed above provides a complete indication of all relevant impacts to wetlands. Together, though, these datasets provide a reasonably comprehensive indication of the potential impacts. For example, counts of NWI wetland acres impacted do not consider the unique sensitivities of certain wetland communities. However, data from the calcareous fen database can aid the reader in understanding the extent of potential impacts on these unique and highly sensitive areas.

Furthermore, the quantitative information from the analysis of these datasets should be coupled the qualitative descriptions of impacts that are contained in the text. Tables in this section provide counts, for example, of acres of wetland within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to different types of wetlands is contained in the text of this section.

The ROI for the wetland evaluation encompasses areas that could be directly or indirectly affected by pipeline construction and areas within the footprints of new or expanded facilities required for the rail and truck alternatives.

Typical wetland disturbance effects for the Applicant’s proposed project and system alternative SA-04 were based on the Applicant’s proposed construction methods described in Chapter 2 and the special wetland construction methods described in the Applicant’s November 2016 EAW (Enbridge 2016). Wetland disturbance effects for the rail and truck alternatives were based on implementing general construction practices and BMPs.

Potential wetland impacts for the Applicant’s proposed project were evaluated by overlaying the footprints of the construction work area, ATWS, access roads, pipe yards, pipeline permanent right-of-way, MLV pads and driveways, and pump stations on the identified wetland maps. Comparisons of construction impacts between the Applicant’s proposed project and SA-04 were based on the evaluations of the Applicant’s proposed project and a 120-foot-wide construction work area centered on system alternative SA-04. Comparisons of operations impacts were based on the Enbridge-provided footprint for the Applicant’s proposed project permanent right-of-way and a 50-foot-wide permanent right-of-way for system alternative SA-04. It should be noted that the Applicant’s proposed project incorporates measures to avoid or minimize wetland impacts and these types of measures are accounted for in the impacts estimates. These same types of wetland impact reductions are not incorporated into SA-04 for this evaluation.

The potential wetland impacts of continued use of the existing, transportation by rail, transportation by truck, existing Line 3 supplemented by rail, and existing Line 3 supplemented by truck were qualitatively assessed based on publically available wetland information, potential locations for new facilities, and potential transportation routes.

5.2.1.3.2 Existing Conditions

Wetland Types

Wetlands potentially affected by the CN Alternatives were grouped into three wetland categories: forested wetland, scrub/shrub wetland, and emergent wetland.

General Wetlands

Forested wetlands are dominated by woody vegetation 20 feet or taller, including evergreen forest, deciduous forest, and mixed forest wetlands. Scrub/shrub wetlands are dominated by woody vegetation less than 20 feet tall including tall and low-growing woody shrubs. Woody wetlands include both forested and scrub/shrub wetlands: the term “woody wetlands” is sometimes used in this EIS when discussing forested and scrub/shrub wetlands. Emergent wetlands that would be crossed by the Applicant’s proposed project are dominated by erect, rooted, herbaceous wetland plants such as sedges, rushes, and grasses. Most of the emergent prairie wetlands that were previously in the region have been converted to croplands. Federal and state jurisdictional wetlands occur along the routes for the CN Alternatives, including specially designated wetlands.

Detailed maps that show the locations of wetlands and calcareous fens are in Appendix A.

Specially Designated Wetlands

Specially designated wetlands are identified as high-value wetlands resources based on environmental and socioeconomic factors such as size, environmental function, presence of high-value resources, habitat qualities, species diversity, and participation in federally and state-funded conservation programs. Specially designated wetlands and their values are of specific concern to state and local agencies. The specially designated wetlands addressed in this analysis are:

- Minnesota DNR's Public Waters Inventory – Public Waters Wetlands,
- Minnesota calcareous fen wetlands,
- NRCS managed wetlands, and
- Minnesota BWSR Mitigation Banking Program wetlands.

Minnesota Public Waters Wetlands

Public Waters Wetlands include wetlands 10 acres or larger in unincorporated areas or 2.5 acres or larger in incorporated areas. Because of the size of these wetlands and their associated environmental and socioeconomic functions, they are afforded legal protection in Minnesota. Public Waters Wetlands are categorized by wetland type as defined in USFWS Circular No. 39 (EPA 2002). Public Waters Wetlands that potentially would be crossed include Type 3 wetlands (inland, shallow fresh marshes), Type 4 wetlands (inland, deep fresh marshes), and Type 5 wetlands (open fresh water).

Minnesota Calcareous Fen Wetlands

As noted above, calcareous fens are rare peat-accumulating wetlands formed as a result of groundwater upwelling through calcareous substrates; they are designated in Minnesota as ORVWs. Because of their regional rarity, biodiversity, and sensitivity to disturbance, calcareous fens are afforded legal protection in Minnesota.

Wetland Reserve Program and Minnesota Board of Water and Soil Resources Banking Program

Wetlands identified under the NRCS or state Wetland Reserve Programs and Minnesota BWSR Mitigation Banking Program include those wetlands that are a part of an existing federally funded or state-managed Wetland Reserve Program. These wetlands are of significance as they offer landowners the voluntary opportunity to protect, restore, enhance, and develop mitigation wetlands under a protective easement managed by NRCS or Minnesota BWSR. Pipeline construction through or placement of facilities on wetland reserves or mitigation banks may prevent these wetlands from being eligible for these programs. During pipeline operation, the permanent right-of-way and potentially some adjacent areas would be subject to disturbance (1) during activities associated with the Applicant's Integrity Management Program (e.g., excavation to repair or replace sections of pipe); and (2) during maintenance of the right-of-way (e.g., brush cutting, mowing).

5.2.1.3.3 Impact Assessment

This section addresses the potential impacts to wetlands during construction and operation of the Applicant's proposed project and the CN Alternatives. Impacts from construction and operation of the Applicant's proposed project and SA-04 were evaluated quantitatively, using state and federal wetland maps. Wetland disturbance effects for existing Line 3 were estimated based on the existing conditions along Enbridge's Mainline corridor (e.g., the Alberta Clipper Final EIS [DOS 2009]). Wetland disturbance effects for the rail and truck alternatives were based on existing conditions in the potential locations for new infrastructure, general construction practices, and BMPs. Potential impacts to wetlands associated with continued use of the existing Line 3, transportation by rail, transportation by truck, existing Line 3 supplemented by rail, and existing Line 3 supplemented by truck were qualitatively assessed based on publically available wetland information, potential locations for new facilities, and potential transportation routes.

Generally, pipeline and facility construction through wetlands can result in changes to vegetation, soils, hydrology, and wildlife habitats, including:

- Changes in wetland vegetation community composition, structure, and productivity due to modification of surface and subsurface flow patterns as a result of ground clearing and pipeline construction;
- Loss of sensitive plant species as a result of construction clearing and grading;
- Wetland soil disturbance as a result of mixing of topsoil and subsoil during trenching and backfilling;
- Changes to water-retaining substrates, thereby causing permanent alterations to their water-holding capacity;
- Alteration of surface and subsurface hydrology that is important for maintaining wetland communities and microhabitats as a result of trenching and backfilling during pipeline construction;
- Sedimentation of wetlands and fluctuations in wetland hydrology as a result of trenching, dewatering, and stockpiling activities;
- Reduction in wildlife habitat and forage productivity, and increased risk of soil erosion and weed invasion due to removal of vegetation;
- Potential spread of invasive species and noxious weed populations along the pipeline construction impact area; and
- Contamination from equipment drips or spills during refueling operations.

Generally, pipeline and facility operations can affect wetlands by:

- Disturbance to reclaimed wetlands within the permanent right-of-way as a result of excavation to repair or replace sections of pipe as a part of the Applicant’s Integrity Management Program, and as a result of right-of-way vegetation maintenance activities;
- Permanent modification of forested or scrub/shrub wetland plant community composition and structure in the permanent right-of-way as a result of vegetation management activities; and
- Establishment and spread of noxious weeds and invasive plants within the permanent right-of-way and at aboveground facilities due to ground disturbance as part of the Applicant’s Integrity Management Program, and as a result of right-of-way vegetation maintenance activities.

All construction through wetlands would need to be approved by the authorizing agencies and identified by milepost. In areas where permanent aboveground facilities are not proposed, construction of a pipeline through emergent wetlands would result primarily in short-term and minor impacts if the wetland can be restored to preconstruction conditions. If wetland impacts result in changes in hydrology and vegetation including introduction of invasive plant species to emergent wetlands they would result in long-term impacts. Construction of a pipeline through forested wetlands would result primarily in long-term or permanent and major impacts. Post-construction wetland reclamation and monitoring would be required for a period of time until reclamation standards and permit conditions are met, or otherwise could be offset through compensatory mitigation in an onsite or offsite location.

The Applicant would use BMPs to avoid and minimize impacts to wetlands from pipeline and facility construction and operation. Many of these BMPs also may be applicable to construction and operation of rail and truck offloading facilities. Unavoidable impacts to wetlands may require compensatory mitigation.

The Applicant has committed to implementing the following BMPs during construction to minimize wetland impacts:

- Developing and adhering to the Project-specific Construction Methods and Procedures for Wetland and Waterbody Crossings and site-specific crossing plans (Enbridge 2016);
- Using wetland crossings designed and approved by engineers, reviewed onsite by the Project engineer, and approved by agencies for each crossing;
- Committing to consideration of a variety of wetland and waterbody crossing techniques to identify the most appropriate site-specific methods, including open-cut (wet trench, push-pull with excavator, push-pull with swamphoe); dry crossing methods (dry trench, dam-and-pump, or flume); trench breakers; trenchless (guided bore, HDD); and those described in the Enbridge November 2016 EAW (Enbridge 2016);
- Implementing mitigation measures that protect adjacent waterbodies during construction including, but not limited to, use of a vegetated buffer, slope breakers, sediment barriers (i.e., silt fencing and sediment curtains), filtration devices during dewatering, or trench breakers;
- Conducting wetland shoreline stabilization measures, including the erosion controls identified above and erosion control blankets, mulching, seeding (with Minnesota BWSR seed mixes or other agency-approved seed mix), cat tracking, placing temporary slope breakers, and placing riprap where necessary;
- Developing and adhering to the wetland-specific avoidance measures in the Applicant's Environmental Protection Plan (Appendix E);
- Reducing temporary construction work area beyond the 50-foot-wide permanent right-of-way in wetlands areas from 70 feet to 45 feet, except in areas where trench wall failure or other construction constraints have been identified as a concern;
- Restoring wetland vegetation cover types following construction, as described in the Environmental Protection Plan;
- Co-locating the Project with existing rights-of-way unless co-location would result in a greater impact on wetlands or other sensitive resources;
- Minimizing impacts on sensitive wetland soils during wet conditions by use of timber mats, low-ground-weight equipment, and other methods identified in the Environmental Protection Plan;

- Designing and planning Project pipeline routes and infrastructure sites to reduce impacts on sensitive wetland resources;
- Adhering to the measures in the Environmental Protection Plan for monitoring for inadvertent release of drilling fluid during HDD construction and procedures for the containment, response, and cleanup to limit the potential for drilling mud to reach wetlands;
- Placing petroleum products storage, refueling, maintenance, and lubricating operations a minimum of 100 feet from wetlands;
- Placing concrete wash water, grindings, and slurry away from wetlands with no allowable discharge of these waste products into wetlands or waterbodies;
- During trench dewatering, pumping discharge water at controlled discharge rates into a filtration device located in a well-vegetated area and in a manner to prevent the migration of silt-laden water into wetlands;
- Posting signage during construction noting sensitive environmental features and wetlands;
- Cutting off wetland vegetation at ground level and removing it from wetland areas;
- Stripping the top 1 foot of topsoil or the amount of topsoil present, whichever is less, over the trench line, segregating it, and replacing it after pipe installation and backfilling in unsaturated wetlands;
- Avoiding the use of fertilizer, lime, and mulch in wetlands;
- Complying with USACE and state wetland permits, including compliance with permit conditions and long-term monitoring plans;
- Restoring wetlands to preconstruction contours;
- Maintaining wetland hydrology by using trench breakers in any area where the potential to drain, or partially drain, a wetland exists; sufficiently compacting the pipeline trench; and placing the pipeline on native material as opposed to gravel; and
- Using construction mats, as needed, to facilitate equipment access and pipeline installation and to minimize soil compaction and/or mixing.

Compensatory Mitigation

Compensatory wetland mitigation would be provided by the Applicant for permanent impacts on various types of wetlands, such as forested, scrub/shrub, and emergent wetlands, as required in the federal and state-specific permits issued. The overall objective of compensatory wetland mitigation would be to compensate for aquatic resource functions lost due to construction of the Applicant's proposed project, taking into consideration what is available and feasible. Although site-specific compensatory wetland mitigation has yet to be identified, it would continue to be considered in consultation with the permitting agencies to minimize and offset wetland impacts. Compensatory wetland mitigation would be consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA (see Section 5.2.1.3.1).

The assessments for the Applicant's proposed project and CN Alternatives are discussed within the following categories:

- General wetland impacts,

- Impacts on Minnesota Public Waters Wetlands,
- Impacts on Minnesota calcareous fen wetlands, and
- Impacts on federal and state Wetland Reserves and Minnesota BWSR Mitigation Bank easements.

Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

General Wetlands

The estimated acreages of wetlands potentially affected by construction of the Applicant's proposed project are presented in Table 5.2.1.3-1 (Appendix A). The Applicant's proposed project would potentially impact 618.2 acres of wetlands during construction. Of these 618.2 acres of wetland construction wetland impact, 195.7 acres of these will consist of forested wetlands. The majority of wetland impacts (85 percent) would occur within Minnesota.

Table 5.2.1.3-1. Estimated Acreage of Wetlands Crossed by the Applicant's Proposed Project

Wetland Classification	Con ROW[a]	Op ROW[a]	ATWS	Access Roads	Pump Stations	MLVs	Total[c]	
							Con	Op
North Dakota[a]								
Forested wetland	0.6	0.2	NA	NA	NA	NA	0.6	0.2
Scrub/shrub wetland	0.0	0.0	NA	NA	NA	NA	0.0	0.0
Emergent wetland	12.0	5.0	NA	NA	NA	NA	12.0	5.0
Wetland subtotal	***12.6***	***5.2***	***NA***	***NA***	***NA***	***NA***	***12.6***	***5.2***
Minnesota[b]								
Forested wetland	141.1	66.3	6.3	3.5	0.8	0.1	147.5	70.6
Scrub/shrub wetland	214.5	115.7	7.5	8.3	0.2	0.3	224.6	122.0
Emergent wetland	143.8	79.2	5.5	4.8	0.8	0.0	151.6	82.5
Wetland subtotal	***499.3***	***261.2***	***19.4***	***16.7***	***1.8***	***0.4***	***523.7***	***275.1***
Wisconsin[a]								
Forested wetland	47.6	19.4	NA	NA	NA	NA	47.6	19.4
Scrub/shrub wetland	19.7	8.0	NA	NA	NA	NA	19.7	8.0
Emergent wetland	14.6	5.6	NA	NA	NA	NA	14.6	5.6
Wetland subtotal	***81.9***	***33.0***	***NA***	***NA***	***NA***	***NA***	***81.9***	***33.0***
All States								
Forested wetland	189.3	85.9	6.3	3.5	0.8	0.1	195.7	90.2
Scrub/shrub wetland	234.2	123.7	7.5	8.3	0.2	0.3	244.3	130.0
Emergent wetland	170.4	89.8	5.5	4.8	0.8	0.0	178.2	93.1

Table 5.2.1.3-1. Estimated Acreage of Wetlands Crossed by the Applicant's Proposed Project

Wetland Classification	Con ROW[a]	Op ROW[a]	ATWS	Access Roads	Pump Stations	MLVs	Total[c]	
							Con	Op
WETLAND TOTAL	***593.8***	***299.4***	***19.4***	***16.7***	***1.8***	***0.4***	***618.2***	***313.3***

Source: USFWS 2016.

[a] Con ROW = estimated construction impact area in acres based on a 120-foot-wide construction work area centered on the pipeline route, including the 50-foot-wide permanent right-of-way; Op ROW = estimated operations impact area in acres based on a 50-foot-wide permanent right-of-way centered on the pipeline route

[b] Con = Enbridge-provided footprint for construction work area; Op = Enbridge-provided footprint for permanent right-of-way; additional temporary workspaces (ATWS), including pipe yards; and mainline valves (MLVs), including valve pads and driveways

[c] Con = sum of pipeline construction work area, ATWS, and temporary access roads; Op = sum of pipeline permanent right-of-way, primary access roads, pump stations, and MLVs

Notes:

Values in table may not sum to subtotals and totals due to rounding.

NA = not applicable

Construction through or on wetlands would result in impacts on wetland vegetation, soils, hydrology, and wildlife habitats. Construction activities may result in reduction of a wetland's ability to trap and slowly release surface water, rain, snowmelt, groundwater, and flood waters. Wetland soils would be disturbed by trenching and backfilling during pipeline construction. Impacts to wetlands outside the construction work area are not expected because sediment containment barriers would be used until construction is complete and vegetation cover has reestablished. Over time, provided that original contours are restored and hydrology is maintained, most affected wetland vegetation would regenerate and wetland function would return. In general, wetland pipeline construction impacts do not result in the placement of fill and wetlands would be returned to preconstruction contours and wetland conditions.

Up to 440 acres of woody wetlands (scrub/shrub and forested) would be cleared within the entire construction work area during construction, after which woody wetlands would be allowed to reestablish within construction work areas outside of the permanent right-of-way. Woody vegetation and all other wetland vegetation would be permanently removed from the areas where aboveground facilities (pump stations and MLVs) and access roads would be constructed.

Until woody vegetation is reestablished, scrub/shrub and forested wetlands would be converted to emergent vegetation, resulting in major changes both to vegetation structure and wetland functions. Wetland habitats containing large mature woody growth would reestablish in temporary construction work areas within 3 to 50 years, depending on the vegetation community and vegetation structure (Jacobson 2006, Wenzel et al. 2012). Forested wetlands may require from 35 to 50 years to achieve vegetation and wildlife habitat similar to mature forested wetlands (Wenzel et al. 2012). Clearing of forested wetlands in construction work areas may require compensatory mitigation, as these wetland types would be converted to other wetland types on a long-term or permanent basis. Compensatory wetland mitigation for impacts on forested wetlands could offset these changes.

Construction of the route would affect up to 178.2 acres of emergent wetlands (Table 5.2.1.3-1). Emergent wetland vegetation would reestablish within 3 years as a community functionally similar to that of the wetland prior to construction (Jacobson 2006, Wenzel et al. 2012), provided that disturbance to vegetation is minimized, root structures are retained to the extent practicable, and preconstruction wetland contours and wetland hydrology are maintained. In areas where the disturbance to vegetation is minimal and the root structures, preconstruction wetland contours, and wetland hydrology are maintained, the impacts would be short-term and minor. In areas where trenching occurs directly through a wetland, the impacts would be short- to long-term and minor to major. Where emergent wetlands are cleared for construction of aboveground facilities and access roads (approximately 18.9 acres), the impacts on these wetlands would be permanent and minor to major; however, the impacts could be offset by compensatory wetland mitigation.

Approximately 19.4 acres of wetlands could be affected by use as ATWS and pipe storage yards for pipeline construction, resulting in short-term to long-term minor impacts, as these areas would be restored to wetlands after construction.

Crossings by HDD for selected waterbodies and associated wetlands generally would avoid direct impacts on wetland resources. Each crossing selected for HDD would be identified, and permitting would be carried out (including identification of BMPs) at each location. Fluid (water, bentonite clay, and possible additives) is used during drilling to lubricate the drill bit, remove drill cuttings, and stabilize the open hole. The potential exists for an inadvertent release or “frac-out” of this drilling fluid when pressurization of the drill hole is beyond the containment capability of the overburden soil material, which would allow the drilling fluid to flow to the ground. If a frac-out occurred within a wetland, the vegetation and soil would be compromised. During drilling, construction personnel would monitor the crossing to detect releases of drilling mud and would implement containment, response, and clean-up procedures as outlined in the Applicant’s Environmental Protection Plan (Appendix E) to limit the potential for drilling mud to reach surface water. If a frac-out occurred and went undetected or was not quickly contained, impacts to wetlands could be long-term and major. However, with implementation of the Applicant-proposed measures to respond to a drilling mud release during HDD construction, the impact of a release could be short-term and minor. Successful construction of wetland crossings using HDD (i.e., the crossing is completed without a frac-out) would not affect wetlands.

Specially Designated Wetlands

Impacts on Minnesota Public Waters Wetlands. Public Waters Wetlands crossed by the Applicant’s proposed project include 2.8 acres of wetland Types 3 and 4 (Table 5.2.1.3-2) for construction. Because of their overall size and associated environmental and socioeconomic functions, Public Waters Wetlands are afforded legal protection in Minnesota.

Table 5.2.1.3-2. Estimated Acreages of Public Waters Wetlands Crossed by the Applicant’s Proposed Project in Minnesota

Wetland Type	Con ROW[a]	Op ROW[a]	ATWS	Access Roads	Pump Stations	MLVs	Total[b]	
							Con	Op
Type 3 – Inland shallow fresh marshes	2.1	1.7	0.0	0.0	0.0	0.0	2.1	1.7
Type 4 – Inland deep fresh marshes	0.6	0.2	0.1	0.0	0.0	0.0	0.7	0.2
TOTAL	**2.7**	**1.9**	**0.1**	**0.0**	**0.0**	**0.0**	**2.8**	**1.9**

Source: Minnesota DNR 2014.

[a] Con = Enbridge-provided footprint for construction work area; Op = Enbridge-provided footprint for permanent right-of-way

[b] Con = sum of pipeline construction work area, additional temporary workspaces (ATWS), and temporary access roads; Op = sum of pipeline permanent right-of-way, primary access roads, pump stations, and mainline valves.

The Applicant's proposed project would affect 2.8 acres of Public Waters Wetlands during construction, primarily between the North Dakota border and Carlton in Minnesota (Table 5.2.1.3-2). Impacts on Minnesota Public Waters Wetlands during construction would result from alteration of wetland vegetation, soils, and hydrology; however, these areas would be restored as wetlands after construction.

Minnesota DNR would be consulted regarding Public Waters Wetland crossings as part of the License to Cross Public Waters permitting process that would occur prior to construction. All impacts, BMPs, and proposed avoidance related to Public Waters Wetlands would be subject to conditions contained in a License to Cross Public Waters. Any dewatering of the trench that would be required for construction across Public Waters Wetlands would require a Water Appropriation Permit. Implementation of the measures identified in the license would limit potential impacts on Public Waters Wetlands.

As part of permit requirements, the Applicant would identify and prepare site-specific crossing plans, avoid and minimize impacts on Public Waters Wetlands to the extent possible, and restore affected Public Waters Wetlands onsite. Restoration to the existing level of wetland function would likely take several years. As a result, the impacts on Public Waters Wetlands from construction of the Applicant's proposed project would be short-term and minor.

Impacts on Minnesota Calcareous Fen Wetlands. One northwestern calcareous fen would be crossed by the Applicant's proposed project, and four others are near the route (Table 5.2.1.3-3). All northwestern calcareous fens near the Applicant's proposed project are located on the portion of the route between the North Dakota border and Clearbrook, Minnesota. The fen near MP 122.0 named Gully 30 is approximately 63 feet from the route centerline. Calcareous fen surveys completed in 2010 identified the presence of Gully 30 during development of the Alberta Clipper pipeline. As part of the environmental review for the Alberta Clipper pipeline, a Gully 30 Fen Management Plan was developed in coordination with Minnesota DNR (Natural Resource Group 2009). As proposed, portions of the Applicant's proposed project would be co-located with the Alberta Clipper pipeline where Gully 30 and other nearby fens occur (Table 5.2.1.3-3). If it is determined that impacts on this fen could not be practicably avoided by Project construction, construction would be subject to a Fen Management Plan approved by the Commissioner of Natural Resources of Minnesota DNR.

Table 5.2.1.3-3. Calcareous Fen Wetlands near the Applicant's Proposed Project in Minnesota

Approximate Milepost	Distance from Route	Name – Elemental Occurrence Identifier	MBS Native Plant Community Code	State Rank[a]	County
72.0	796 feet	Viking 18 – 14377	OPp93a	S2	Marshall
73.5	2,042 feet	Viking 20 – 15297	OPp93a	S2	Marshall
81.0	525 feet	Norden 18 – 34586	OPp93a	S2	Pennington
120.5	2,011 feet	Chester 24 – 35384	OPp93a	S2	Polk
122.0	63 feet	Gully 30 – 35382	OPp93a	S2	Polk

Sources: Minnesota DNR 2008, 2016, Enbridge 2016.

[a] State Rank: S1 = critically imperiled; S2 = imperiled; S3 = vulnerable to extirpation; S4 = apparently secure; S5 = secure, common, widespread, and abundant

MBS = Minnesota Biological Survey

Impacts on other nearby fens would be avoided. The Applicant's proposed project diverges from the Mainline corridor to avoid crossing Chester 24, Viking 18, and Norden 18 calcareous fens. Potential impacts on Gully 30 include alteration of hydrology, introduction of contaminants, loss of rare or unique plants, introduction of invasive species, and altered peat formation—all of which could be detrimental to calcareous fen wetland functions. Prior to construction, the Minnesota DNR would be consulted to aid in the identification of potential impacts on and major mitigation measures for calcareous fens. Where calcareous fens are identified, the Minnesota DNR would request preparation of a Fen Management Plan, which would identify impacts and BMPs specific to the affected fen. These BMPs would include the general BMPs identified to avoid major impacts to wetlands discussed above. Overall, it is expected that the Applicant's proposed project would result in a short-term to long-term minor impact on one calcareous fen wetland.

Impacts on Wetland Reserves. No NRCS Wetland Reserves or state wetland reserves would be crossed by the Applicant's proposed project or associated facilities. A state wetland reserve is located between the North Dakota border and Clearbrook, Minnesota. Impacts on this reserve are not expected as the reserve is not near the pipeline route. No mitigation bank wetlands would be crossed by the Applicant's proposed project, and no impacts are expected to occur.

<u>Operations Impacts</u>

General Wetlands

The estimated acreages of wetlands potentially affected by the operation of the Applicant's proposed project are presented in Table 5.2.1.3-1 (Appendix A). Operation of the Project would potentially affect up to 313.3 acres of wetlands within the permanent right-of-way and associated facilities. Approximately 18.9 acres of wetlands would be permanently converted to developed land for aboveground facilities (pump stations and MLVs) and access roads (Appendix A). The impacts on these wetlands would be permanent and minor to major; however, the impacts could be offset by compensatory wetland mitigation.

Impacts on wetlands could result from maintenance activities, including vegetation management and pipeline inspections that would occur for the life of the Project. Woody vegetation within the permanent right-of-way would be managed (cut every 3 to 5 years) to prevent large shrubs and trees from reestablishing over the pipeline to allow for visual inspection of the right-of-way. Because trees and shrubs would not be allowed to reestablish within the permanent right-of-way, vegetation management would represent a permanent major impact through converting forested and scrub/shrub wetlands to emergent or early-stage scrub/shrub wetlands. A total of 209.6 acres of previously forested and scrub/shrub wetlands converted during construction would be maintained as emergent wetlands within the pipeline permanent right-of-way for the life of the Project (Table 5.2.1.3-1).

Emergent wetland vegetation in the permanent right-of-way generally would not be mowed or otherwise maintained and would not be affected by mowing or vegetation management activities. Routine vegetation management would use a rubber-tracked skid-steer vehicle, or similar, with specialized cutting equipment to minimize disturbance to low-growing herbaceous cover and compaction and rutting of wetland soils. However, this loss of woody vegetation communities would result in permanent and major impacts on wetland structure and functions that could require compensatory mitigation.

During operation, the Applicant would implement its Integrity Management Program, which has the potential to require excavation and repair or replacement of sections of the pipeline. If excavation is required within a wetland, impacts would likely be short-term and minor but could occur periodically over the life of the Project.

Operation of the Applicant’s proposed project may increase the potential for the introduction and spread of noxious weeds and invasive plants for the life of the Project and beyond. The Environmental Protection Plan (Appendix E) and wetland permitting documents would describe measures to prevent the spread of noxious and invasive weeds in wetlands during wetland vegetation management and during pipeline maintenance activities. The presence of noxious weeds and potential for spread of infestations within the Project area are addressed in Section 5.2.3.

Specially Designated Wetlands

Impacts on Minnesota Public Waters Wetlands. Public Waters Wetlands impacted by the Applicant’s proposed project include 1.9 acres of wetland Types 3 and 4 (Table 5.2.1.3-2) for operation. Because of their overall size and associated environmental and socioeconomic functions, Public Waters Wetlands are afforded legal protection in Minnesota.

Short-term minor impacts could occur on these 1.9 acres of Public Waters Wetlands within the permanent right-of-way for the Applicant’s proposed project from maintenance activities. Impacts would result from vegetation management, however, it is unlikely that the shallow fresh marsh crossed would require vegetation management as shrubs are unlikely to grow as long as the marsh hydrology is maintained (Table 5.2.1.3-2). In addition, pipeline maintenance activities could spread noxious weeds and invasive plants. The potential impact is expected to be short- to long-term and minor to major after each maintenance activity, but would occur periodically over the life of the Project.

During operation, the Applicant would implement its Integrity Management Program, which has the potential to require excavation and repair or replacement of sections of the pipeline. Impacts on Public Wetland Waters would be limited to the pipeline segment through the 2 acres of these wetlands, and repeated repairs or replacement at those locations are unlikely. Impacts on the Public Waters Wetlands from integrity digs likely would be short-term and minor to major.

Impacts on Minnesota Calcareous Fen Wetlands. One northwestern calcareous fen would be crossed by the Applicant’s proposed project, and four others are near the route (Table 5.2.1.3-3). All northwestern calcareous fens near the Applicant’s proposed project are located on the portion of the route between the North Dakota border and Clearbrook, Minnesota. The fen near MP 122 named Gully 30 is approximately 63 feet from the route centerline. Calcareous fen surveys completed in 2010 identified the presence of Gully 30 during development of the Alberta Clipper pipeline. As part of the environmental review for the Alberta Clipper pipeline, a Gully 30 Fen Management Plan was developed in coordination with Minnesota DNR (Natural Resource Group 2009). As proposed, portions of the Applicant’s proposed project would be co-located with the Alberta Clipper pipeline where Gully 30 and other nearby fens occur (Table 5.2.1.3-3).

Although the Applicant’s proposed project would cross the Gully 30 calcareous fen, it has been routed to avoid the Chester 24 and Viking 18 calcareous fens that are crossed by the existing Line 3. All activities occurring near calcareous fens would be subject to BMPs identified in a Fen Management Plan, if one needed to be developed for the Project.

During operation, the Applicant would implement its Integrity Management Program, which has the potential to require excavation and repair or replacement of sections of the pipeline. Impacts on calcareous fens would be limited to the pipeline segment through the Gully 30 fen, and repeated repairs or replacement at this location are unlikely. Impacts on calcareous fens as a result of pipeline maintenance activities during normal operation of the Project would be short- to long-term and minor but could occur periodically over the life of the Project.

Impacts on Wetland Reserves. Impacts on wetland reserves would not occur during operation of the pipeline because no wetland reserves or mitigation bank easements are located within the permanent right-of-way.

Potential impacts to wetlands due to an unanticipated crude oil release are discussed in Chapter 10.

Continued Use of Existing Line 3

<u>Construction Impacts</u>

No construction impacts to wetlands are associated with continued use of the existing Line 3 pipeline because it is already in place and operating.

<u>Operations Impacts</u>

General Wetlands

Existing Line 3 crosses 86 miles of wetlands that originally were 60 percent forested wetlands, 25 percent scrub/shrub wetlands, and 15 percent emergent wetlands (DOS 2009). These wetland areas have been maintained primarily as emergent wetlands through removal of woody vegetation over the permanent pipeline right-of-way. Previous HDD crossings of forested and scrub/shrub wetlands would not have been altered.

Operations activities for the existing Line 3 pipeline include continued vegetation management to remove trees and large shrubs from the permanent right-of-way, and continuing potential for the spread of noxious weeds and invasive plants along the right-of-way and at aboveground facilities. These activities would occur within the pipeline corridor whether or not Line 3 remains in use.

The Applicant's ongoing Integrity Management Program for Line 3 would require excavation and repair or replacement of sections of the pipeline that could occur within wetlands. Because of the age of the existing Line 3, excavation and repair or replacement of the pipeline would occur at a higher rate than for new pipelines, with an estimated 466 excavations per year over the next 15 years. Potential impacts to wetlands associated with these maintenance activities could be short- to long-term and minor to major, depending on the frequency of occurrence within wetlands and the lengths of the pipeline segments requiring replacement.

Specially Designated Wetlands

The existing Line 3 pipeline corridor crosses through one Minnesota Public Waters Wetland. This Type 3 – inland shallow marsh is located between the North Dakota border and Clearbrook. Three Minnesota northwestern calcareous fens are crossed by the existing Line 3: Viking 18, Chester 24, and Gully 30. No wetlands enrolled in the NRCS Wetland Reserve Program are present near the existing Line 3 pipeline in Minnesota. No Minnesota BWSR Mitigation Banking Program wetlands are crossed by the existing Line 3 pipeline.

The Public Waters Wetland crossed by Line 3 could be affected by integrity management actions if excavation is required at this location. No vegetation maintenance would be required at this location because it is an emergent marsh. Line 3 crosses three calcareous fen wetlands (Chester 24, Viking 18, and Gully 30). Potential impacts on calcareous fens during operations could occur if excavation is required at these locations; however, repeated pipeline repairs or replacement are unlikely at these locations. The resultant impacts would be similar to those for initial construction of the pipeline through the fens (i.e., the impact is expected to be short- to long-term and minor).

Impacts on wetland reserves would not be associated with operation of the pipeline because no wetland reserves or mitigation bank easements occur within the permanent right-of-way for the existing Line 3.

System Alternative SA-04

Construction and operation activities that would result in potential wetlands impacts for SA-04 are the same as those described for the Applicant's proposed project. Most impacts would be similar and are summarized in this section, along with information on impacts that would be different.

Construction Impacts

General Wetlands

The estimated acreages of wetlands potentially affected by construction and operation of SA-04 are presented in Table 5.2.1.3-4. SA-04 would potentially affect 286.5 acres of wetlands during construction. Construction-related wetland impacts would potentially affect 17.8 acres of forested wetlands that are difficult to restore and mitigate. In addition, 16.4 acres of scrub/shrub wetlands would potentially be impacted during construction.

After construction, woody vegetation would be allowed to reestablish within construction work areas outside of the permanent right-of-way. Until woody vegetation is reestablished, scrub/shrub and forested wetlands would be converted to emergent vegetation resulting in long-term to permanent major impacts on both vegetation structure and wetland functions.

Approximately 252.4 acres of emergent wetlands would be affected by construction. The wetlands along the route would be reclaimed after construction (Table 5.2.1.3-4), but would require several years for vegetation to become fully reestablished. As a result, the impact of construction on emergent wetlands within the construction impact area would be short-term and minor.

While footprints are not available for aboveground facilities for system alternative SA-04 at this time, impacts during construction would be permanent and major if placement of facilities within wetlands was unavoidable. However, the impact could be offset with compensatory mitigation.

Table 5.2.1.3-4. Estimated Acreage of Wetlands Crossed by System Alternative SA-04

Wetland Classification	Construction[a]	Operations[b]
North Dakota		
Forested wetland	1.1	0.5
Scrub/shrub wetland	8.6	3.6
Emergent wetland	145.0	53.6

Table 5.2.1.3-4. Estimated Acreage of Wetlands Crossed by System Alternative SA-04

Wetland Classification	Construction[a]	Operations[b]
Wetland subtotal	***154.8***	***57.7***
Minnesota		
Forested wetland	10.3	4.2
Scrub/shrub wetland	7.5	3.4
Emergent wetland	77.9	32.7
Wetland subtotal	***95.7***	***40.3***
Iowa		
Forested wetland	3.7	1.5
Scrub/shrub wetland	0.3	0.2
Emergent wetland	22.7	9.7
Wetland subtotal	***26.8***	***11.3***
Illinois		
Forested wetland	2.6	0.9
Scrub/shrub wetland	0.0	0.0
Emergent wetland	6.7	2.9
Wetland subtotal	***9.3***	***3.8***
All States		
Forested wetland	17.8	7.1
Scrub/shrub wetland	16.4	7.2
Emergent wetland	252.4	98.8
WETLAND TOTAL	**286.5**	**113.1**

Source: USFWS 2016.

[a] Construction = estimated construction impact area in acres based on 120-foot-wide construction work area centered on the pipeline route, including the 50-foot-wide permanent right-of-way

Specially Designated Wetlands

Impacts on Minnesota Public Waters Wetlands. SA-04 would cross near one Public Waters Wetland. This Type 3 – inland shallow fresh marsh would be encroached on through an agricultural field that surrounds the marsh. Construction of system alternative SA-04 would result in short-term minor impacts on up to 0.1 acre of inland shallow fresh marsh Public Waters Wetlands during construction. Impacts on Public Waters Wetlands would be subject to state-specific permitting requirements, and implementation of BMPs would be required for Project approval.

Impacts on Minnesota Calcareous Fen Wetlands. One southwestern calcareous fen (Kasota 7) is located 2,359 feet from SA-04 in Le Sueur County, Minnesota. Impacts would not occur on calcareous fens under this alternative because the nearest calcareous fen (Kasota 7) is located 2,359 feet from system alternative SA-04 in Le Sueur County, Minnesota, within the Kasota Prairie Scientific and Natural Area (SNA) (Minnesota DNR 2008).

Impacts on Wetland Reserves. Four state-managed wetland reserves (wetlands under a Wetland Reserve Program) would be crossed by SA-04 (Table 5.2.1.3-5). No Minnesota BWSR Mitigation Banking Program wetlands are crossed by the existing Line 3 pipeline. Short-term, minor impacts on up to 8.3 acres of these wetland reserves would potentially occur during construction. The entirety of these wetland reserves occur within the construction work area and not permanent right-of-way and therefore would be reclaimed and restored.

Table 5.2.1.3-5. Estimated Acreages and Number of Wetland Reserves Crossed by System Alternative SA-04

State Wetland Reserves	Construction[a]	Operations[b]
North Dakota		
Wetlands Reserve Program	5.8 acres (two reserves)	2.4 acres (two reserves)
Minnesota		
Wetlands Reserve Program	2.5 acres (two reserves)	1.0 acre (one reserve)
Iowa		
Wetlands Reserve Program	0.0	0.0
TOTAL	**8.3 acres (four reserves)**	**3.5 acres (three reserves)**

Source: USGS 2016.

[a] Construction = estimated construction impact area in acres based on 120-foot-wide construction work area centered on the pipeline route, including the 50-foot-wide permanent right-of-way

[b] Operations = estimated operations impact area in acres based on 50-foot-wide permanent right-of-way centered on the pipeline route

<u>Operations Impacts</u>

General Wetlands

SA-04 would potentially affect 113.1 acres of wetlands during operations (Table 5.2.1.3-4). Operation of system alternative SA-04 pipeline would be as described for the Applicant's proposed project above. The impacts would result from maintenance activities, including vegetation management that would occur for the life of the Project. Approximately 14.3 acres of forested and scrub/shrub wetlands would be managed to prevent trees and shrubs from reestablishing within the permanent right-of-way. Vegetation management would represent a permanent minor to major impact through conversion of forested and scrub/shrub wetlands to emergent or early-stage scrub/shrub wetlands. This loss of woody vegetation would result in permanent and major impacts on wetland structure and functions that could be offset with compensatory mitigation.

Emergent wetland vegetation in the permanent right-of-way generally would not be mowed or otherwise managed and would not be affected by vegetation management activities. If emergent vegetation is affected by vegetation management, the impact is expected to be short-term and minor.

During operation, the Applicant would implement its Integrity Management Program, which has the potential to require excavation and repair or replacement of sections of the pipeline. Impacts on emergent wetlands as a result of these activities would likely be short-term and minor, but would occur periodically over the life of the Project.

While footprints are not available for aboveground facilities for system alternative SA-04 at this time, impacts during construction would be permanent and major if placement of facilities within wetlands was unavoidable. However, the impact could be offset with compensatory mitigation.

Operation of SA-04 may increase the potential for the introduction and spread of noxious weeds and invasive plants for the life of the Project. The Applicant would implement the procedures in the Environmental Protection Plan (Appendix E) prepared for the Project, and wetland permitting documents would describe measures to prevent the spread of noxious and invasive weeds in wetlands. With implementation of those procedures, the impact of the introduction and spread of noxious weeds and invasive plants would be short-term and minor.

Potential impacts to wetlands due to an unanticipated crude oil release are discussed in Chapter 10.

Specially Designated Wetlands

Impacts on Minnesota Public Waters Wetlands. No Public Waters Wetlands would be affected during operation as they do not occur within the permanent right-of-way of SA-04.

Impacts on Minnesota Calcareous Fen Wetlands. No calcareous fens would be affected during operation as they do not occur within the permanent right-of-way of SA-04.

Impacts on Wetland Reserves. Four state-managed wetland reserves (wetlands under a Wetland Reserve Program) would be crossed by SA-04 (Table 5.2.1.3-5). No Minnesota BWSR Mitigation Banking Program wetlands are crossed by the existing Line 3 pipeline.

Three NRCS Wetland Reserves are located within the permanent right-of-way of SA-04, which would result in permanent minor impacts on up to 3.5 acres of wetland reserves (Table 5.2.1.3-5). All wetlands within the permanent right-of-way would become ineligible as conservation easements, as the wetlands would no longer be protected from future disturbance due to routine maintenance, pipeline monitoring, and integrity management activities. However, in-kind compensatory mitigation could be used to offset wetland impacts.

Transportation by Rail

The rail alternative would require an area of approximately 100 to 200 acres for construction and operation of a rail loading facility, and an additional 84 acres to construct and operate a new 14-mile-long rail connection near Gretna, Canada. The rail access and loading facilities would be located in Canada and as such are not addressed as part of this MEPA EIS.

<u>Construction Impacts</u>

General Wetlands

The rail offloading facility near Clearbrook would require between 100 and 200 acres of land that is identified as agricultural lands and wetlands, including emergent, scrub/shrub, and forested wetlands. Wetlands located in this area would likely be affected, since potential construction locations near the Clearbrook terminal include emergent, scrub/shrub, and forested wetlands. However, the acreage of wetlands that would be affected by construction of the facilities has not been determined since the facility footprint has not been identified. Construction of rail facilities near Superior, Wisconsin, would likely affect wetlands. Construction of the Superior offloading facility could affect up to 100 acres. The undeveloped area near the Superior terminal is entirely wetlands, primarily forested and scrub/shrub wetlands, which would be permanently converted to developed use. Redevelopment of 10 miles of rail access would require approximately 60 acres between Clearbrook and Gully, Minnesota, that would cross through several small emergent wetlands. Compensatory mitigation could be used to offset these permanent impacts.

New facilities constructed under the rail alternative would undergo permitting, would be sited to avoid wetland resources to the extent practicable, and would require avoidance, minimization, and may require compensatory mitigation for unavoidable impacts to wetlands per state and federal regulations. During construction, direct impacts to wetlands would occur from clearing and grading for site preparation, and placement of fill for construction of offloading facilities and new rail connections for operation of the rail alternative. Some wetlands would likely be lost by construction of offloading facilities at Clearbrook and Superior, which would result in permanent major wetland impacts. Compensatory mitigation similar to that applied for the Applicant's proposed project could be used to offset wetland impacts.

Specially Designated Wetlands

Impacts on Minnesota Public Waters Wetlands. Three Public Waters Wetlands occur near the Clearbrook terminal, although it is unlikely that these wetlands would be directly affected by construction of the facility, as it is likely that siting the new facility on these wetlands would be avoidable. Temporary to short-term minor impacts could occur as these wetlands may be indirectly affected through an increase in impervious surface and potential changes in runoff water quality within the watersheds that support these wetlands.

Impacts on Minnesota Calcareous Fen Wetlands. Calcareous fens would not be affected since these do not occur in the area.

Impacts on Wetland Reserves. Wetland Reserve Program wetlands would not be affected since these do not occur in the area.

Operations Impacts

General Wetlands

Up to about 100 acres of forested and scrub/shrub wetlands could be permanently converted to industrial/developed use for the rail facilities, which would result in permanent major wetland impacts. In addition, redevelopment of 10 miles of rail access would require approximately 60 acres between Clearbrook and Gully, Minnesota, that would cross through several small emergent wetlands. However, compensatory mitigation similar to that applied for the Applicant's proposed project could be used to offset impacts would reduce the impact.

During operation there may be small leaks of petrochemicals from rail cars; the materials leaked would reach the rail bed and be susceptible to movement with runoff. However, due to the small amounts anticipated and the area over which the leaks would occur, the impacts would likely be short-term and negligible to minor. Unanticipated releases of crude oil from rail transport are addressed in Chapter 10. The transfer facilities would be constructed to include primary and secondary containment structures in accordance with applicable regulatory requirements. Small spills and leaks at the transfer facilities would be retained within the facility and there would not be an impact outside of the facility.

Specially Designated Wetlands

Impacts on Minnesota Public Waters Wetlands. Three Public Waters Wetlands occur near the Clearbrook terminal. These wetlands could be indirectly affected due to increased runoff resulting from the increase in impervious surfaces and the potential of the runoff containing contaminants. However, the changes in total runoff reaching the wetlands would likely be small, and the resultant impacts on the wetlands would be short-term and negligible to minor, but would occur for the life of the Project.

Impacts on Minnesota Calcareous Fen Wetlands. Calcareous fens would not be affected since these do not occur in the area.

Impacts on Wetland Reserves. Wetland Reserve Program wetlands would not be affected since these do not occur in the area.

Transportation by Truck

The truck alternative would require an area of approximately 140 acres for construction and operation of a truck loading facility, and an additional acreage to construct and operate a new access road connection near Gretna, Canada. The truck access road and loading facilities would be located in Canada and as such are not addressed as part of this MEPA EIS.

<u>Construction Impacts</u>

General Wetlands

Construction of a new truck offloading facility near Clearbrook would require approximately 50 acres; and an additional 5 acres for a new access road. Potential construction locations near the Clearbrook terminal include agricultural lands and emergent, scrub/shrub, and forested wetlands. Although the site for the facilities has not been selected, due to the number of wetlands in the general area, it is likely that some wetland impacts may be unavoidable. However, the acreage of wetlands that would be affected by construction of the facilities has not been determined since the facility footprint has not been identified. Construction of new truck offloading facilities near the terminal in Superior, Wisconsin would require approximately 50 acres and an additional 34 acres to establish a truck route to the facilities. The undeveloped area near the Superior terminal is entirely wetlands, primarily forested and scrub/shrub wetlands, which would be permanently converted to developed use. Up to 50 acres of primarily scrub/shrub and forested wetlands could be permanently converted to industrial/developed use for the truck facilities, which would result in permanent major wetland impacts. Compensatory mitigation could be used to offset these permanent impacts.

New facilities would undergo permitting, would be sited to avoid wetland resources to the extent practicable, and where avoidance is not possible would likely require minimization and may require compensatory mitigation for unavoidable impacts to wetlands as required by per state and federal regulations. During construction, direct impacts to wetlands would occur from clearing and grading for site preparation, and placement of fill for construction of offloading facilities and new highway connections for operation of the truck alternative.

Specially Designated Wetlands

Impacts on Minnesota Public Waters Wetlands. Three Public Waters Wetlands occur near the Clearbrook terminal, but are not likely to be directly affected by construction of an offloading facility, as direct clearing and fill impacts would likely be avoidable. These wetlands could be indirectly affected due to increased runoff resulting from the increase in impervious surfaces and the potential of the runoff containing contaminants. However, the changes in total runoff reaching the wetlands would likely be small, and the resultant impacts on the wetlands would be short-term and negligible to minor, but would occur for the life of the Project.

Impacts on Minnesota Calcareous Fen Wetlands. No calcareous fens would be affected by construction of these facilities and access roads since none are located in the vicinity.

Impacts on Wetland Reserves. No federal or state Wetland Reserve Program wetlands would be affected by construction of these facilities and access roads since none are located in the vicinity.

<u>Operations Impacts</u>

General Wetlands

Up to 50 acres of forested and scrub/shrub wetlands could be permanently converted to industrial/developed use for the truck facilities, which could result in permanent major wetland impacts (Appendix A). However, compensatory mitigation could be used to offset and reduce these impacts.

During truck transit, there may be minor leaks of petrochemicals from some vehicles. However, due to the small amounts anticipated and the area over which the leaks would occur, any impacts to wetlands would likely be short-term and negligible to minor. Unanticipated releases of crude oil from truck transport are addressed in Chapter 10.

The offloading facilities would be constructed to include primary and secondary containment structures in accordance with applicable regulatory requirements. Small spills and leaks at the transfer facilities would be retained within the facility and there would not be an impact outside of the facility.

Specially Designated Wetlands

Impacts on Minnesota Public Waters Wetlands. Three Public Waters Wetlands occur near the Clearbrook terminal, but are not likely to be directly affected by construction or operation of an offloading facility.

Impacts on Minnesota Calcareous Fen Wetlands. Calcareous fens would not be affected since these do not occur in the area of the truck offloading facilities.

Impacts on Wetland Reserves. Wetland Reserve Program wetlands would not be affected since these do not occur in the area of the truck offloading facilities.

Existing Line 3 Supplemented by Rail

Wetland impacts associated with the combined use of the existing Line 3 pipeline and the rail alternative would be the same as those identified for the continued operation of the existing Line 3 pipeline in addition to those of the rail alternative identified above.

Existing Line 3 Supplemented by Truck

Wetland impacts associated with the combined use of the existing Line 3 pipeline and the truck alternative would be the same as those identified for the continued operation of the existing Line 3 pipeline in addition to those of the truck alternative identified above.

5.2.1.3.4 Summary and Mitigation

Summary

Construction and operation of the Applicant's proposed project or reliance on any of the CN Alternatives could result in impacts to wetlands, ranging from no impact to permanent major impacts (see Table 5.2.1.3-6). Measurable impacts would likely occur on forested, scrub/shrub, and emergent wetlands from the Applicant's proposed project and each of the CN Alternatives although to a different degree.

No impacts or negligible or minor impacts would likely occur on specially designated wetlands, including Minnesota Public Waters Wetlands, Minnesota calcareous fen wetlands, federal and state wetland reserves, and Minnesota BWSR wetland mitigation bank easements. This occurs because either the Applicant's proposed route or the CN Alternatives do not intersect any of the specially designated wetlands or the area affected would be very small.

Avoidance and minimization measures include Applicant-proposed measures and measures stipulated in pending state and federal permits. All wetland changes would be reviewed and approved by the appropriate authorizing agency prior to any construction being allowed. The Applicant has committed to provide compensatory wetland mitigation for permanent impacts on forested, scrub/shrub, and emergent wetlands as required in the federal and state-specific permits. Many of the avoidance and minimization measures and the standard BMPs described for the Applicant's proposed project also would be applicable to the CN Alternatives.

Beyond the general findings given above a more detailed comparison of the Applicant's proposed project and the CN Alternatives shows that the effects on wetlands would vary primarily between the Applicant's proposed project and SA-04.

<u>Construction Impacts</u>

General Wetlands

For the CN Alternatives, the largest area of potential permanent fill impacts on forested and scrub/shrub wetlands is associated with the rail alternative, followed by the truck alternative. The largest area of long-term to permanent changes to wetlands is associated with tree and shrub clearing of forested wetland and scrub/shrubs within the Applicant's proposed project (Table 5.2.1.3-6). The Applicant's proposed project has the largest total wetland impact from construction and operation of all CN Alternatives.

Table 5.2.1.3-6. Summary of Potential Impacts to Wetlands for the Applicant's Proposed Project and the Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[e,g]
Construction Impacts							
Changes to forested and scrub/shrub wetland characteristics and functions	Long-term to permanent/major impacts • 440.0 acres	No impact	Long-term to permanent/major impacts • 34.2 acres	Permanent/ major impacts • ~260–360 acres total, with potential fill of up to ~100 acres of wetlands	Permanent/ major impacts • ~140 acres total, with potential fill of up to ~50 acres of wetlands	Permanent/ major impacts • ~260–360 acres total, with potential fill of up to 100 acres of wetlands	Permanent/major impacts • ~140 acres total, with potential fill of up to ~50 acres of wetlands
Changes to emergent wetland characteristics and functions	Short-term/minor impacts • 178.2 acres	No impact	Short-term/minor impacts • 252.4 acres	Permanent/ major impacts • ~260–360 acres total – with potential fill of some wetlands	Permanent/ major impacts • ~140 acres total – with potential fill of some wetlands	Permanent/ major impacts • ~260–360 acres total – with potential fill of some wetlands	Permanent/major impacts • ~140 acres total – with potential fill of some wetlands
Changes to Minnesota Public Waters Wetlands characteristics and functions	Short-term/minor impacts • 2.8 acres	No impact	Short-term/minor impacts • 0.1 acre	Short-term/ negligible to minor indirect impacts	Short-term/ negligible to minor indirect impacts	Short-term/ negligible to minor indirect impacts	Short-term/ negligible to minor indirect impacts
Changes to Minnesota calcareous fen characteristics and functions	Short-term to long-term/minor impacts • Gully 30	No impact	No impact	No impact	No impact	No impact	No impact

Table 5.2.1.3-6. Summary of Potential Impacts to Wetlands for the Applicant's Proposed Project and the Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[e,g]
Changes to Wetland Reserve Program wetland characteristics and functions	No impact	No impact	Short-term/minor impacts • 8.3 acres	No impact	No impact	No impact	No impact
Changes to wetland mitigation bank easements characteristics and functions	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Operations Impacts							
Forested and scrub/shrub wetlands permanently converted to emergent wetlands or filled	Permanent/major impacts • 210.2 acres	Short-term to long-term/minor to major impacts	Permanent/major impacts • 14.3 acres	Permanent/ major impacts • Potential fill of up to ~100 acres of wetlands	Permanent/ major impacts • Potential fill of up to ~50 acres of wetlands	Permanent/ major impacts • Potential fill of up to ~100 acres of wetlands	Permanent/major impacts • Potential fill of up to ~50 acres of wetlands
Potential changes to emergent wetland characteristics and functions	Short-term/minor impacts • 93.1 acres	Short-term to long-term/minor to major impacts	Short-term/minor impacts • 98.8 acres	Permanent/ major impacts • Potential fill of some acres of wetlands	Permanent/ major impacts • Potential fill of some acres of wetlands	Permanent/ major impacts Potential fill of some wetlands	Permanent/ major impacts Potential fill of some wetlands
Potential changes to Minnesota Public Waters Wetlands characteristics and functions	Short-term/minor impacts • 1.9 acres	Short-term/minor impacts	No impact	Short-term/ negligible to minor indirect impacts	Short-term/ negligible to minor indirect impacts	Short-term/ negligible to minor indirect impacts	Short-term/ negligible to minor indirect impacts

Table 5.2.1.3-6. Summary of Potential Impacts to Wetlands for the Applicant's Proposed Project and the Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[e,g]
Changes to Minnesota calcareous fen characteristics and functions	Short-term to long-term/minor impacts • Gully 30	Short-term to long-term/minor impacts • Chester 24 • Viking 18 • Gully 30	No impact	No impact	No impact	No impact	No impact
Changes to Wetland Reserve Program wetland characteristics and functions	No impact	No impact	Permanent/minor impacts • 3.5 acres	No impact	No impact	No impact	No impact
Wetland mitigation banks within the permanent right-of-way that would become ineligible as conservation easement	No impact	No impact	No impact	No impact	No impact	No impact	No impact

[a] No single dataset in this summary table provides a complete indication of all relevant impacts to wetlands. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, evaluating the acreage of NWI wetland acres impacted does not consider the unique sensitivities of certain wetland communities. However, considering this data in concert with information from the calcareous fen database can aid the reader in understanding the extent of potential impacts on these unique and highly sensitive areas. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-116 through 5-134. This table, for example, provides the acreage of wetlands within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to different types of wetlands is contained in the text of this section.

[c] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-120 to 5-126. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on pages 5-126 through 5-127. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] **SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-127 to 5-130. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[f] **The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-130 to 5-132. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[g] **The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-132 to 5-133. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

Emergent wetlands generally reestablish more quickly. While fill impacts would result in a permanent loss of emergent wetlands, vegetation cover and functions would be restored within several years after pipeline construction through emergent wetlands. For the CN Alternatives, the largest area of potential permanent fill impacts on emergent wetlands is associated with the rail and truck alternatives.

Specially Designated Wetlands

Construction of the Applicant's proposed project and SA-04 would directly affect Minnesota Public Waters Wetlands, while the rail and truck alternatives would result in indirect impacts (Table 5.2.1.3-6). Because few, if any, Minnesota Public Waters Wetlands would be affected by construction of the Applicant's proposed project or the CN Alternatives, impacts would be short-term and negligible to minor for all options.

Minnesota's calcareous fens represent a rare habitat that supports several plants protected as threatened or endangered. Only the Applicant's proposed project has the potential to affect a calcareous fen during construction. Wetland Reserve Program wetlands and mitigation bank easement wetlands represent conservation programs to protect and enhance wetlands. Only SA-04 has the potential to affect Wetland Reserve Program wetlands during construction. Neither the Applicant's proposed project nor the CN Alternatives have the potential to alter Minnesota BWSR wetland mitigation bank wetlands during construction (Table 5.2.1.3-6).

<u>Operations Impacts</u>

General Wetlands

Fill placed for aboveground facilities for pipelines and rail and truck infrastructure would result in permanent loss of wetlands. Pipeline operation would continue to disturb wetlands through vegetation maintenance that prevents trees and large shrubs from reestablishing within the pipeline permanent right-of-way. In addition, activities required by the Applicant's Integrity Management Program may require excavation to repair or replace sections of pipe that may be located within wetlands. Permanent fill impacts would be greatest for the rail alternative, followed by the truck alternative. The largest area of previously forested and scrub/shrub wetlands that would be permanently maintained as emergent wetland is associated with the Applicant's proposed project. The largest area of emergent vegetation potentially affected by excavation for pipeline maintenance is associated with SA-04.

Specially Designated Wetlands

Fill of Minnesota Public Waters Wetlands would not be required for the Applicant's proposed project or any of the CN Alternatives. Potential impacts associated with the rail and truck alternatives would be indirect through an increase in impermeable surface at offloading facilities and potential increased runoff from these facilities. Pipeline operation could continue to disturb specially designated wetlands because the Integrity Management Program may require excavation to repair or replace sections of pipe that may be located within wetlands. Both the Applicant's proposed project and continued use of the existing Line 3 could contribute to short-term minor impacts on Public Waters Wetlands from pipeline maintenance that could require excavation. The rail and truck alternatives could result in short-term and negligible to minor indirect effects on Public Waters Wetlands if these wetlands are near offloading facilities. Similarly, calcareous fens could be disturbed by pipeline maintenance that required excavation in the vicinity of the fen. Continued use of the existing Line 3 has the greatest potential to affect calcareous fens because the existing Line 3 crosses three fens, followed by the Applicant's proposed project which crosses one fen. For Wetland Reserve Program wetlands, only SA-04 has the potential to result in operations impacts. Neither the Applicant's proposed project nor any of the CN Alternatives could affect wetland mitigation bank wetlands during operation.

Mitigation

All alternatives could result in permanent major impacts to wetlands associated with conversion of forested and scrub/shrub wetlands, with the potential exception of continued use of the existing Line 3. For the Applicant's proposed project and SA-04, this conversion primarily would consist of converting forested scrub/shrub wetlands to emergent wetlands (about 210 acres for the Applicant's proposed project and 14 acres for SA-04). New infrastructure for the rail alternative would require filling up to 100 acres, and new infrastructure for the truck alternative would require filling up to 50 acres of forested and scrub/shrub wetlands (Table 5.2.1.3-6). The Applicant has committed to provide compensatory wetland mitigation for permanent impacts on forested, scrub/shrub, and emergent wetlands associated with the Applicant's proposed project, as required in federal and state-specific permits. It is anticipated that any permanent wetland conversion for rail and truck alternatives also would require compensatory mitigation by the authorizing agencies. No additional mitigation measures have been identified.

5.2.1.3.5 References

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5.2.1.4 Floodplains

Periodically, rivers, streams, and lakes will overflow their banks and inundate adjacent low-lying floodplains. Functioning of a floodplain can affect stormwater runoff, water quality, vegetative diversity, wildlife habitat, and aesthetic qualities of waterbodies (Minnesota DNR 2017). Because of their proximity to waterbodies, intermittent flooding, rich soils, and wetland complexes, floodplains form diverse and high-quality habitats under natural conditions. In addition, their naturally flat topography has resulted in historical development within these areas. Construction of facilities such as a pipeline in a floodplain may affect the ability of the floodplain to store excess water or may raise flood elevations upstream. Flood damage can occur when natural flooding processes are disturbed by altering a watercourse or building inappropriately in the floodplain itself (FEMA 2009). The analysis of impacts on floodplains during construction and operation of the Applicant's proposed project and CN Alternatives considered the following:

- Altering floodplain topography;
- Changing flow patterns of flood waters, thereby increasing flooding;
- Blocking or restricting flows;
- Reducing the area within a floodplain that carries floodwaters; and
- Increasing flood elevations upstream.

The analysis of impacts on facilities located within a floodplain and subjected to flooding for the Applicant's proposed project and CN Alternatives considered:

- Disruption of construction activities and loss of materials;
- Damage to equipment and facilities from inundation by floodwaters or flood scour; and
- Interruption of operations.

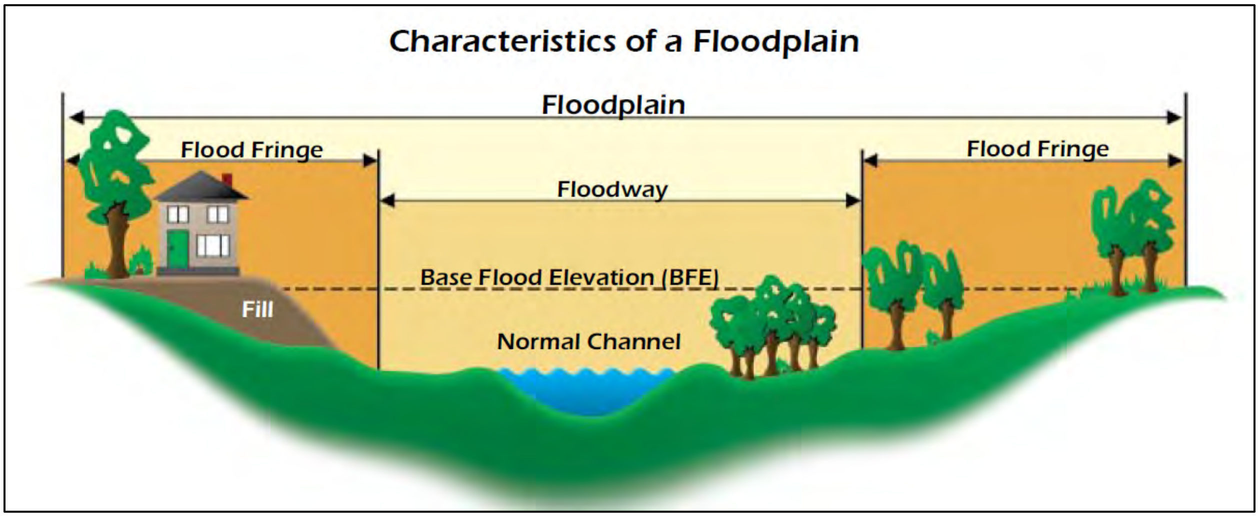
This section describes the existing conditions for floodplains along the Applicant's proposed project and CN Alternatives that could be affected by construction and operation of the Project. The potential impacts on floodplains or on the pipeline and associated facilities from flood events are compared for the Applicant's proposed project and CN Alternatives. Flood-related spill hazards and potential impacts on floodplains from crude oil releases are discussed in Chapter 10.

5.2.1.4.1 Regulatory Context and Methodology

Regulatory Context

Under Minnesota state law, a "floodplain" is the land adjoining lakes and rivers that would be inundated by a 100-year flood (flood event expected to occur only once every 100 years). Flood Insurance Rate Maps (FIRMs) produced by the FEMA define the boundaries of floodplains and floodways. These maps indicate areas of the floodplain that are critical for conveying floodwaters (the floodway), the extent of the 100-year flood or special flood hazard areas (SFHAs) (areas subject to a 1-percent annual chance of a flood event), and areas subject to the 500-year flood (areas subject to a 0.2-percent annual chance of a flood). FEMA has not developed flood maps for some counties. The cross-section diagram in Figure 5.2.1.4-1 depicts the general relationship of the normal waterway channel to flood elevations and the area that may be inundated in the flood fringe. Development in floodplains typically is regulated by local building, floodplain development, and shoreline permit regulations and ordinances and FEMA's National Flood Insurance Program (NFIP).[11] In Minnesota, development within a floodplain can be permitted with implementation of proper floodplain management measures to minimize risk from potential flood hazards (Minn. R. Ch. 6120).

For the portion of the Applicant's proposed project or the CN Alternative constructed within a floodplain, a local building, floodplain development, or shoreline permit for construction or staging within a FEMA-designated SFHA or designated shoreline would be required from each local jurisdiction participating in the NFIP. Aboveground facilities located within the SFHA also would require a floodplain permit and may require an engineering certification demonstrating that the proposed facility complies with the local regulations. All required permits would need to be obtained through the North Dakota Floodplain Administrator, Minnesota DNR, Iowa DNR, Illinois DNR, or Wisconsin DNR prior to construction in the respective state.



Source: FEMA 2009.

Figure 5.2.1.4-1. Characteristics of a Floodplain

Methodology

Impacts on floodplains were assessed by:

- Using GIS to overlay onto FEMA 100-year flood maps the construction and operations footprints for the Applicant's proposed project from Neche, North Dakota, to Superior, Wisconsin, and the footprints for each CN Alternative.
- Calculating the number of waterbody crossings where full coverage of FEMA flood maps are not available (i.e., not developed by FEMA) to approximate potential floodplains. Because not all waterbodies have designated floodplains (even where floodplains have been

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11 The general purposes of the NFIP are to offer primary flood insurance to properties with significant flood risk and to reduce flood risk through adoption of floodplain management standards. Generally, communities volunteer to participate in the NFIP in order to have access to flood insurance; in return, they are required to adopt minimum standards for construction within floodplains. To participate in the NFIP, local jurisdictions (typically cities or counties) must develop local floodplain regulations that meet the NFIP standards.

mapped), the number of waterbody crossings was considered only as an approximation of potential floodplain impacts for comparison purposes.

- Identifying any Project features that would be located within a FEMA-designated floodplain.

Neither one of the datasets listed above provides a complete indication of all relevant impacts to floodplains. Together, though, these datasets provide a reasonably comprehensive indication of the potential impacts. Specifically, FEMA 100-year flood maps do not provide complete coverage. However, data on number of waterbody crossings can aid the reader in understanding the potential for impacts where FEMA 100-year flood information is missing.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with the qualitative descriptions of impacts that are contained in the text. Tables in this section provide counts, for example, of acres of floodplain within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to floodplains is contained in the text of this section.

For the Applicant's proposed project and system alternative SA-04, the footprints included the right-of-way, construction work area, facilities, and access roads (where available) to determine whether any of the Project features would be located within a FEMA-designated floodplain. FEMA flood maps also were overlain in GIS with footprints for the assumed rail and truck routes. FEMA flood maps were available for portions of the Applicant's proposed project, existing Line 3, SA-04, and the general area for rail or truck offloading facilities. These mapped areas were designated as the ROI for the floodplains analysis.

5.2.1.4.2 Existing Conditions

Along large rivers, like the Mississippi River or Red River of the North, floodplains typically are flooded during spring after a heavy winter snow season. On these and other floodplains, flooding also can result from intense rains. In areas with small streams or ponds, flooding can occur within hours of intense rain. Floods of 100-year magnitude most recently occurred in 2001 (Minnesota DNR 2006, 2017).

Applicant's Proposed Project

Approximately 31 miles (432 acres) of the construction work area along the Applicant's proposed project would be located within FEMA-mapped 100-year floodplains in the counties for which FEMA mapping has been conducted (46 percent of the route has been mapped). The Applicant's proposed project would require 227 waterbody crossings. (See Section 5.2.1.2.2 and Appendix G for details on waterbody crossings.) Approximately 30 acres of ATWS also would be located within mapped SFHAs. One construction access road (totaling approximately 4 acres) would be located in the 100-year floodplain. No pump stations would be located in a 100-year floodplain, but portions of three MLVs, including an associated access road, would be located in a designated 100-year floodplain (Table 5.2.1.4-1).

Table 5.2.1.4-1. Permanent Aboveground Facilities and Access Roads within FEMA-Designated Special Flood Hazard Areas for the Applicant's Proposed Project in Minnesota

Feature	Acres[a]
Mainline valve access road	0.5
Mainline valve sites	0.5
TOTAL	**1.0**

[a] Acreage reflects counties for which Federal Emergency Management Agency (FEMA) maps are published.

Notes:

Special flood hazard areas represent the 100-year floodplain.

Continued Use of Existing Line 3

Approximately 30 miles of the existing Line 3 pipeline are located within SFHAs (57 percent of the route has been mapped). None of the existing pump stations that are part of existing Line 3 are located within designated floodplains.

System Alternative SA-04

For system alternative SA-04, 95 percent of the route has been mapped by FEMA to designate SFHAs. Approximately 2,187 acres of SA-04 construction work area within these counties would be located within SFHAs, and the route would require 636 waterbody crossings. Once constructed, approximately 151 miles of SA-04 would be located within mapped SFHAs.

Information regarding the location of permanent aboveground facilities and associated access roads has not been determined for SA-04, but some of these facilities may be sited in FEMA-designated floodplains.

Transportation by Rail

As described in Section 4.2, transportation of crude oil by rail would require development of rail loading and offloading facilities (two 100- to 200-acre facilities), upgrade of approximately 35 miles of existing rail line, and reestablishing approximately 10 miles of rail on an existing rail embankment (see Chapter 4 and Table 4.2-5). Construction of offloading facilities in Clearbrook, Minnesota and in Superior, Wisconsin would occur outside of FEMA-designated floodplains.

The assumed rail transportation routes occur within FEMA-designated floodplains. All rail line upgrades and replacement would occur on existing rail embankments that, if located in or near floodplains, are typically established above the flood elevation.

Transportation by Truck

The assumed truck transportation routes occur within FEMA-designated floodplains. As described in Section 4.2, transportation of crude oil by truck would require development of loading and offloading facilities (potentially three 50-acre facilities) and approximately 38 acres for new or reconfigured local road access to these facilities (see Chapter 4 and Table 4.2-6). The exact locations and configurations of the proposed facilities and local access are not known, but they may occur near flood channels and could be constructed within floodplain areas. No new highway construction would be required for truck transportation, although some highway upgrades may be necessary that likely would be constructed on existing highway embankments.

Existing Line 3 Supplemented by Rail

The existing conditions for the existing Line 3 supplemented by rail alternative are those described above for continued use of the existing Line 3 pipeline and the rail alternative. With the combined use of the existing Line 3 pipeline and rail transportation, some FEMA-mapped floodplains would be crossed during operations.

Existing Line 3 Supplemented by Truck

The existing conditions for the existing Line 3 supplemented by truck alternative are those described above for continued use of the existing Line 3 pipeline and the truck alternative. With the combined use of the existing Line 3 pipeline and truck transportation, some FEMA-mapped floodplains would be crossed during operations.

5.2.1.4.3 Impact Assessment

The floodplain analysis considers the potential impacts of the Applicant's proposed project and CN Alternatives on FEMA-mapped 100-year floodplains and the potential impacts of flooding on Project facilities located in the floodplain. Potential operations impacts on floodplains due to a crude oil release are discussed in Chapter 10.

Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

Construction activities, including land clearing, grading, trenching, and excavating, within the 31 miles (432 acres) of the construction work area along the Applicant's proposed project, would occur within a FEMA-mapped 100-year floodplain. One construction access road (totaling approximately 4 acres) also would be located in the 100-year floodplain. These activities would temporarily alter floodplain topography, resulting in minor alterations to water flows in the event of a flood in the area. Construction activities are unlikely to block or restrict flows, reduce the area within a floodplain that carries floodwaters, or increase flood elevations upstream. The Applicant would restore temporary roadways built within the floodplain to original ground conditions to avoid permanent impacts on floodplain flow pathways, connectivity, and function. Construction impacts on floodplains generally would be temporary to short term and minor, persisting only until construction is completed and the natural land elevations and groundcover are restored. Construction and restoration would follow the plans contained in the Environmental Protection Plan (Appendix E), which would reduce potential impacts.

Impacts on Project elements from flooding could occur during pipeline construction in floodplains and at river crossings. Although the chance of a severe flood event occurring during the relatively short construction period would be low (because severe flood events occur infrequently), storm events could cause minor to major flooding and erosion at the construction site. Applicant-proposed measures to reduce flooding impacts include limiting the amount of time the trench is open at a location to 3 days, which would limit the amount of open trench and soil storage subject to flooding and storm events. Following construction through smaller waterbodies (less than 100 feet wide), the trench would be filled and recontoured within 24 to 48 hours of construction. Larger rivers would be crossed using site-specific methods, including HDD, which may involve placing more equipment in the floodplain (or immediately adjacent) during construction but would not result in temporary or permanent disturbance of the floodplain for the length of the drill. (See Appendix G for details on HDD crossings.) Impacts on construction activities and equipment in a flood event would generally be temporary and negligible to minor from disruption of construction activities and damage to equipment and structures from inundation by floodwaters.

Operations Impacts

Permanent facilities such as pump stations and MLVs would be constructed aboveground and operate for the duration of the Project. No pump stations would be located in a designated floodplain; where feasible, permanent facilities would be constructed outside of the 100-year floodplain. The siting of three MLVs within designated floodplains (1 acre total for the Applicant's proposed project) would not create a measurable impact because of their relatively small footprints. Aboveground facilities in floodplains would require floodplain development permitting, which likely would require measures to reduce impacts on floodwater conveyance (e.g., berm construction, raising the ground elevation above the floodplain) associated with permanent structures.

The pipeline would be constructed below the ground surface, typically with a minimum of 48 inches of ground cover. For waterbody crossings greater than 100 feet wide, the minimum burial depth is 48 inches below the channel bottom. Major river crossings (see Section 6.3.1.2 for details) would use HDD methods, generally resulting in pipeline placement 30 feet or more below the stream channel. The below-ground pipeline would not affect floodplain function once construction and restoration activities have been completed. Impacts on operations activities and equipment from inundation by floodwaters in a flood event generally would be temporary and negligible to minor.

Continued Use of Existing Line 3

Construction Impacts

No new construction would occur with continued use of the existing Line 3 pipeline. Periodic excavation of segments of the pipeline would occur as a maintenance activity (maintenance digs); these are addressed under operations impacts.

Operations Impacts

Continued use of Line 3 at its present capacity is expected to require high levels of maintenance, with an estimated 267 procedures per year in the form of integrity digs (Enbridge 2015). Some of these digs could occur within FEMA-designated floodplains; associated impacts would be temporary to short term and minor (similar to those discussed above for new pipeline construction). Continued use of existing Line 3 would not change the number of permanent aboveground facilities within designated floodplains, and maintenance digs are already occurring. Therefore, continued use of the existing Line 3 would result in no change in the degree of impacts on floodplains or the likelihood of flood-related damage to Line 3 facilities beyond those associated with existing conditions. Impacts on operations activities and equipment from inundation by floodwaters in a flood event generally would be temporary and negligible to minor.

Potential impacts on floodplains due to an unanticipated crude oil release are discussed in Chapter 10.

System Alternative SA-04

Construction Impacts

Approximately 2,187 acres of construction activities, including land clearing, grading, trenching, and excavating activities, would occur within designated SFHAs. Impacts from these activities would be similar to those described above for the Applicant's proposed project: they would be temporary to short-term and minor, persisting only until construction is completed and the natural land elevations and groundcover are restored. Construction of SA-04 would require 409 more water crossings than the Applicant's proposed project. Information regarding the specific crossing method for each waterbody has not been determined for SA-04; however, the design and construction methods for waterbody crossings are expected to be comparable to those for the Applicant's proposed project. Construction activities also could be affected by flood events, including disruption of construction activities and damage to equipment and structures from inundation by floodwaters. These impacts would be temporary and negligible to minor.

Operations Impacts

The types of impacts during operation of SA-04 would be the same as those discussed for the Applicant's proposed project. Impacts on floodplain function and impacts from flood events would be temporary and minor to negligible if they did occur during the life of the Project.

SA-04 would cross a significantly larger number of designated floodplains and rivers than the Applicant's proposed project. The greater length of this alternative increases the number of locations with the potential for impacts on floodplain function and impacts on facilities from flood events. SA-04 would require approximately twice as many pump stations, MLVs, and access roads as the Applicant's proposed project; and some of these facilities would be located in designated floodplains. Siting aboveground facilities in floodplain areas would require floodplain development permitting, which likely would require measures to reduce impacts on floodwater conveyance (e.g., berm construction, raising the ground elevation above the floodplain) associated with permanent structures. The impacts would be expected to be negligible to minor and last for the life of the Project.

The type of permanent aboveground facilities and associated access roads has not been determined for SA-04. As with the Applicant's proposed project, it is expected that these features would be located outside of FEMA-designated floodplains to the extent practicable, and the design and construction methods are expected to be comparable to those for the Applicant's proposed project. As a result, the overall impact of operation of SA-04 related to floodplains would be negligible to minor and permanent. Impacts on operations activities and equipment from inundation by floodwaters in a flood event generally would be temporary and negligible to minor.

Potential impacts on floodplains due to an unanticipated crude oil release are discussed in Chapter 10.

Transportation by Rail

Construction Impacts

Rail offloading facilities required at Clearbrook and Superior would not be located in FEMA-designated floodplains; therefore, no impact on floodplain function would occur. Rail line upgrades/replacement that would be required to provide rail service to Clearbrook and are located in or near floodplains would occur on existing rail embankments; therefore, they would not likely change flood flows or floodplain function.

Operations Impacts

Depending on the route to Superior, approximately 10 to 20 miles of the rail line would occurs within designated SFHAs. Operations impacts on floodplains from unit train transport of the oil would be negligible because the rail lines are located on existing embankments. Flood impacts on rail operations resulting from maintenance repairs and operational delays would be temporary and minor to negligible when they did occur, but they may occur over the life of the Project. To the extent that flood flows in flood-prone areas overtop rail lines used for transport of crude oil, rail operations may be temporarily suspended. The likelihood of such events is low because flood height and probability are considered when establishing rail line embankment height.

Transportation by Truck

Construction Impacts

Truck offloading facilities required at Clearbrook and Superior would not be located in FEMA-designated floodplains; therefore, no impacts on floodplain function would occur.

Because truck transport would occur over existing highways, no new road construction would occur except in the immediate vicinity of the Clearbrook and Superior terminals. Some portions of two-lane county roads may require upgrading near the Clearbrook and Superior terminals. The configuration of the offloading facilities and access is not known. Although impacts associated with these facilities cannot be assessed, they were assumed to be minimal because any construction would be in compliance with floodplain permitting requirements.

Operations Impacts

Approximately 83 miles of the truck route from Gretna to the Superior Terminal occurs within designated SFHAs, and the majority of the route has been mapped by FEMA. Operations impacts on floodplains from truck transportation would be negligible. During operations, trucks transporting crude oil would operate over existing highways; therefore, no change to floodplain function would be expected to occur. Flood impacts on truck operations would be negligible to minor and temporary if they did occur, but could occur over the life of the Project. To the extent that flood flows in flood-prone areas overtop highways used for transport of crude oil, highway operations may be temporarily suspended. However, the likelihood of such events is low because flood height and probability are considered when establishing major state and interstate highway embankment height.

Existing Line 3 Supplemented by Rail

Construction Impacts

No new construction would occur with continued use of the existing Line 3 pipeline. Impacts on floodplains from construction of rail facilities would be the same as those described above for the rail alternative.

Operations Impacts

No change in the degree of impacts on floodplains or the likelihood of flood-related damage to existing Line 3 facilities would occur beyond those associated with existing conditions (including maintenance digs). The impacts associated with supplemental transport by rail would be similar to those described above for operation of the rail alternative, although fewer crude oil trains per day would be exposed to flood-related hazards.

Existing Line 3 Supplemented By Truck

Construction Impacts

No new construction would occur with continued use of the existing Line 3 pipeline. Impacts on floodplains from construction of truck facilities would be the same as those described above for the truck alternative.

Operations Impacts

No change in impacts on floodplains or the likelihood of flood-related damage to existing Line 3 facilities would occur beyond those associated with existing conditions (including maintenance digs). The impacts associated with supplemental transport by truck would be similar to those described above for operation of the truck alternative, although fewer crude oil trucks per day would be exposed to flood-related hazards.

5.2.1.4.4 Summary and Mitigation

Summary

Overall, potential impacts on FEMA-designated floodplains for the Applicant's proposed project and CN Alternatives range from no impact to minor and temporary to permanent impacts. Differences in effects among alternatives were apparent, especially between the Applicant's proposed project and SA-04, which both require significant construction, and the existing Line 3, transportation by rail, and transportation by truck, which require no or very little construction. These impacts are summarized in Table 5.2.1.4-2.

Construction Impacts

Construction-related impacts on floodplains for the Applicant's proposed project and SA-04, including temporary alterations of topography that could change flow patterns of flood waters and increase flooding, would be temporary to short term and minor, lasting until the disturbed areas are recontoured and vegetation is reestablished. A greater amount of construction in designated SFHAs and more water crossings would be required for construction of SA-04 compared to construction of the Applicant's proposed project. However, the types of potential impacts on floodplains would be similar to those for the Applicant's proposed project: temporary to short term and minor. No impacts on floodplains from construction activities are expected to occur from continued use of existing Line 3, transportation by rail or truck, or continued use of existing Line 3 supplemented by rail or truck transport.

Operations Impacts

The Applicant's proposed project in Minnesota includes about 1 acre of permanent facilities that would be located within a FEMA-designated 100-year floodplain in areas for which FEMA mapping is available; these facilities would be allowed under state and local floodplain regulations if the appropriate permits are obtained. The location, number, and type of permanent aboveground facilities and the number and location of access roads have not been determined for SA-04; therefore, a comparison of specific impacts on floodplains from permanent facilities between these alternatives is not possible. With continued use of the existing Line 3, some ongoing maintenance digs could occur within FEMA-designated floodplains; associated impacts would be temporary to short term and minor. No impacts on floodplains from operations would be expected from transportation by rail or truck or continued use of existing Line 3 supplemented by rail or truck beyond the maintenance digging along existing Line 3 that already occurs.

Mitigation

Identified mitigation measures for the Applicant's proposed project and SA-04 include:

- In areas without available FEMA-designated floodplains, require Enbridge to site all pump stations and MLVs outside of potential floodplains.

Table 5.2.1.4-2. Summary of Potential Impacts on Floodplains for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

<table>
<tr><th>Impact</th><th>Applicant's Proposed Project[c]</th><th>Continued Use of Existing Line 3[d]</th><th>System Alternative SA-04[e]</th><th>Transportation by Rail[f]</th><th>Transportation by Truck[g]</th><th>Existing Line 3 Supplemented by Rail[d,f]</th><th>Existing Line 3 Supplemented by Truck[e,g]</th></tr>
<tr><td colspan="8">Construction Impacts</td></tr>
<tr><td>Construction activities and equipment altering floodplain function and water flow patterns</td><td>Temporary to short-term/minor impacts
• 432 acres within SFHAs
• 30 acres of ATWS within SFHAs
• 4 acres of access roads within SFHAs
• 227 waterbody crossings</td><td>No impact</td><td>Temporary to short-term/minor impacts
• 2,187 acres within SFHAs
• 636 waterbody crossings</td><td colspan="2">Locations of facilities and access not known but could be constructed within floodplain areas</td><td colspan="2">No impact for existing Line 3
Exact locations of facilities not known but would be expected to be constructed within floodplain areas</td></tr>
<tr><td>Disruption of construction activities and loss of materials during a flood event</td><td>Temporary/ negligible to minor impacts</td><td>No impact</td><td>Temporary/ negligible to minor impacts</td><td>No impact</td><td>No impact</td><td>No impact</td><td>No impact</td></tr>
<tr><td>Damage to construction equipment and facilities from inundation by floodwaters or flood scour</td><td>Temporary/ negligible to minor impacts</td><td>No impact</td><td>Temporary/ negligible to minor impacts</td><td>No impact</td><td>No impact</td><td>No impact</td><td>No impact</td></tr>
</table>

Table 5.2.1.4-2. Summary of Potential Impacts on Floodplains for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[e,g]
Operations Impacts							
Operation and permanent facilities altering floodplain function	No impact	Temporary to short-term/minor impacts over the life of the Project • 267 annual maintenance procedures	Permanent/ negligible to minor impacts	No impact	No impact	Temporary to short-term/minor impacts over the life of the Project • 267 annual maintenance procedures	Temporary to short-term/minor impacts over the life of the Project • 267 annual maintenance procedures
Interruption of operations caused by flooding	Temporary/ negligible to minor impacts • 31 miles within SFHAs	Temporary/minor impacts • 30 miles within SFHAs	Temporary/ negligible to minor impacts • 151 miles within SFHAs	Temporary/ negligible to minor impacts • 10 to 20 miles within SFHAs	Temporary/ negligible to minor impacts • 83 miles within SFHAs	Temporary/ negligible to minor impacts • 40 to 50 miles within SFHAs	Temporary/ negligible to minor impacts • 113 miles within SFHAs
Damage to operations equipment and facilities from inundation by floodwaters or flood scour	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	No impact	No impact	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts

Table 5.2.1.4-2. Summary of Potential Impacts on Floodplains for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[e,g]

ATWS = additional temporary workspaces, SFHA = special flood hazard area

[a] No single dataset in this summary table provides a complete indication of all relevant impacts to floodplains. Each dataset contains useful information, but also has limitations. However, together the different datasets provide a reasonably comprehensive indication of the potential impacts. For example, FEMA 100-year flood maps do not provide complete coverage. However, data on number of waterbody crossings can aid the reader in understanding the potential for impacts where FEMA 100-year flood information is missing. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-146 through 5-150. The table above, for example provides counts of acres of floodplain within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to floodplains is contained in the text of this section.

[c] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-146 to 5-147. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on page 5-147. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on page 5-148. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-148 to 5-149. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-149 to 5-150. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

5.2.1.4.5 References

Enbridge Energy, Limited Partnership (Enbridge). 2015. Certificate of Need Application to the Minnesota Public Utilities Commission for the Line 3 Replacement Project. April 24. (Docket No. PL 9/CN-14-916.)

Federal Emergency Management Agency (FEMA). 2009. NFIP Floodplain Management Guidebook. Region 10. 5th Edition. March. https://www.fema.gov/media-library-data/20130726-1647-20490-1041/nfipguidebook_5edition_web.pdf. Accessed on February 21, 2017.

Minnesota Department of Natural Resources (Minnesota DNR). 2006. Floodplains and Floodplain Management. http://files.dnr.state.mn.us/publications/waters/floodplain_basics.pdf. Accessed on February 21, 2017.

_____. 2017. Floodplain Regulations. http://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/regulations.html. Accessed on February 21, 2017.

5.2.2 Geology and Soils

Activities that disturb sensitive soils, alter topography, or introduce geologic hazards can negatively affect geology and soil resources, and the people and industries that rely on them. In addition, geologic hazards such as landslides and subsidence and sinkholes can affect the integrity of infrastructure like pipelines, roads, and railways.

The construction-related geology and soils issues to be addressed include the following:

- Soil erosion;
- Soil compaction;
- Soil mixing;
- Soil contamination;
- Presence of shallow bedrock that may require blasting;
- Impacts on paleontological resources;
- Changes to topography; and
- Subsidence and sinkhole hazards.

The operations-related geology and soils impacts addressed in this section include:

- Permanent loss of soil cover;
- Soil erosion and compaction;
- Landslide hazards; and
- Subsidence and sinkhole hazards.

This section describes the existing conditions for the geology and soils within an area along the Applicant's proposed project and CN Alternatives where these resources could be affected by construction and operation of the Project. Potential impacts on geology and soils are discussed and compared for the Applicant's proposed project and the CN Alternatives (continued use of the existing Line 3, system alternative SA-04, transportation by rail, transportation by truck, and continued use of the existing Line 3 supplemented by rail or truck). Potential impacts on geology and soils from an accidental release of crude oil are discussed in Chapter 10.

5.2.2.1 Regulatory Context and Methodology

5.2.2.1.1 Regulatory Context

The NPDES General Construction Stormwater Coverage Permit requires that permittees use approved protection measures to manage soil erosion and minimize soil compaction. The Applicant would be required to obtain NPDES permits from North Dakota DH's Division of Water Quality, Minnesota PCA, Iowa DNR, Wisconsin DNR, and Illinois EPA prior to construction in each respective state. In addition, Minnesota Statutes Chapter 103F Soil Erosion Law prohibits activities that allow for excessive soil loss, as defined by NRCS guidelines. 29 CFR Part 1926, Subpart U regulates the storage and use of explosives for blasting of bedrock. Minnesota Administrative Rules Chapter 7500 also regulates the storage and use of explosives, and designates municipal supervision of compliance with federal blasting regulations. Other geologic resource guidance and regulations include design and engineering protocols for dealing with site-specific geologic hazards (such as burial or reinforcement of pipelines to protect from landslides). Federal design and engineering specifications in 49 CFR Parts 192 and 193 ensure that pipeline facilities are protected from potential landslides and unstable slopes. Because no significant seismic hazard is present in the Project area, pipeline engineering requirements to address the seismic stability of the pipeline are not applicable to the Project (USGS 2016).

5.2.2.1.2 Methodology

To assess potential construction and operations impacts on geology and soils, and to assess potential impacts of geologic hazards on Project elements, relevant geologic resources present along the Applicant's proposed project and the CN Alternatives were reviewed and inventoried. These resources included soils, shallow bedrock, paleontological resources, and topography. Soil characteristics that may be sensitive to disturbance, including prime farmland, soils highly erodible by water or wind, hydric soils, compaction-prone soils, stony/rocky soils and coarse-textured soils, were identified from NRCS soil data, including both U.S. Department of Agriculture. Soil Survey Geographic (SSURGO) and STATSGO2 data (NRCS 2016). Other data sources included maps and publications from USGS, the Minnesota Geological Survey (MGS), and the Paleontology Portal. Potential geologic hazards, including landslide hazards and subsidence/sinkhole-prone areas, were also identified and inventoried using maps and publications from USGS and MGS.

Data for the relevant geologic resources and geologic hazards were overlain in GIS with maps of the estimated construction and operations footprints for the Applicant's proposed project and CN Alternatives to determine the locations and extent of potential impacts. Potential impacts on geologic resources for the Applicant's proposed project and the CN Alternatives were considered where construction or operation of the Applicant's proposed project or a CN Alternative could cause disturbance, loss, or modification of the resource—and where estimated footprints for these actions intersected potential geologic hazards that could cause damage or injury.

No single one of the datasets discussed above provides a complete indication of all relevant impacts related to geology and soils, but together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, NRCS data does not provide complete coverage. However, overall data on soil types and characteristics can aid the reader in understanding the potential for erodibility or potential for soil compaction impacts where soil data is missing.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with the qualitative descriptions of impacts that are contained in the text. Tables in this section provide counts, for example, of miles of the route that cross soils prone to soil erosion by water or wind within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to highly erodible soils is contained in the text of this section.

The ROI for the geology and soils impact analysis consists of areas where soils, topography, or potentially bedrock would be disturbed during construction or operation of the Applicant's proposed project or a CN Alternative. For the Applicant's proposed project, this includes temporary construction work areas; permanent rights-of-way; temporary and permanent access roads; and the locations of associated facilities outside the permanent rights-of-way, such as pump stations. For the existing Line 3, this was considered to be within the permanent right-of-way for the Mainline corridor. For SA-04, this includes a 120-foot-wide construction work area and a 50-foot-wide permanent right-of-way centered on the SA-04 alignment. For the rail and truck alternatives, the potential locations of offloading facilities and new or expanded rail lines or roads were included. No additional impacts on soils or geologic resources would be expected along existing rail lines or roads as no new footprint from construction or operation is anticipated along existing rail lines or roads for these alternatives.

5.2.2.2 Existing Conditions

The general geology and soil characteristics that may be affected by the various alternatives are described below, followed by additional detail on those resources associated with the Applicant's proposed project and specific CN Alternatives.

Soils

Soil types and characteristics are diverse, dependent on parent material, climate, topography, age of the soils, and potential modification by human activity. Throughout the ROI for the Applicant's proposed project and CN Alternatives, most soils tend to be deep, high-quality agricultural soils, with high organic matter content. Wetland (hydric) soils also are common throughout the ROI. Any soil type has the potential to be affected by pipeline development, but some soils found in the ROI are more susceptible than others to impacts such as erosion, compaction, and contamination. Soils that may be sensitive to disturbance include prime farmland, highly erodible soils (by water or wind), hydric soils, compaction-prone soils, stony/rocky soils, and coarse-textured soils. These sensitive soils are described as follows:

- Prime farmland soils – These include soils with the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if they are treated and managed according to acceptable farming methods—whether or not they are used for agriculture. "Prime farmlands" as defined herein include those soils that are prime farmlands with no limiting factor, as well as those soils that are considered prime farmlands when drained of excessive moisture. Such high-quality soils are critical to domestic crop production and the agricultural economy; and disturbance, contamination, or loss of these soils can reduce crop yields.
- Highly erodible soils – These soils are prone to high rates of erosion when exposed to wind or water after removal of vegetation. A soil's susceptibility to erosion is dependent on texture, moisture, slope, and soil management practices. Loss of soil from erosion, especially topsoil, can reduce the soil's ability to support plant growth. Highly erodible soils may require protective measures during soil disturbance to minimize soil loss.
- Hydric soils – These soils are sufficiently wet near the surface to develop anaerobic conditions during the growing season and are often found in association with wetlands. Hydric soils are particularly susceptible to compaction and rutting from operation of heavy equipment on the soil surface. Compaction of soils can create difficult conditions for plant growth, delaying or reducing plant reestablishment following disturbance. In agricultural areas, artificial drainage systems (i.e., drainage tiles) have been installed in many soils that are classified as hydric soils; these systems allow excess moisture to drain out of the soil. Where hydric soils are drained, they are less likely to be susceptible to compaction. (Drainage of otherwise water-logged agricultural land is common practice throughout the Upper Midwest; this is discussed further in Section 6.5.1.3.1.) Hydric soils may require modified construction methods to minimize potential compaction by heavy machinery.

- Compaction-prone soils – These include soils with clay loam or finer textures in somewhat poor, poor, and very poor drainage classes. When wet, these fine soils are susceptible to compaction and rutting from operation of heavy equipment on the soil surface. Compaction of soils can create difficult conditions for plant growth, delaying or reducing plant reestablishment following disturbance. Compaction-prone soils may require modified construction methods to minimize potential compaction by heavy machinery.
- Coarse-textured soils — Sandy loams and coarser soils, including gravels, allow for rapid infiltration of potential contaminants downward toward the water table. Additionally, HDD techniques may not be feasible through coarse-textured soils because of borehole instability during drilling. Coarse-textured soils are somewhat abundant in the Upper Midwest.
- Stony/rocky soils – These include soils with a cobbly, stony, bouldery, gravelly, or shaly modifier to the textural class. During soil disturbance activities, removal and replacement of stony/rocky soils may introduce more stones into the topsoil, which can reduce crop yields and lead to problems with operation of farm equipment. Rocks present in the soil also can damage a pipeline during backfilling, if the pipeline is not properly padded, and can prohibit the use of HDD water crossings. Stony/rocky soils occur only in minor, isolated areas throughout the region. Because of their very limited occurrence across the routes, stony/rocky soils are not anticipated to exacerbate the impact of soil disturbance, or impede pipeline installation or construction of other facilities, and therefore are not addressed further herein.

Subsurface Substrate

Subsurface substrate consists of the soils and sediments deeper than the surficial soils discussed above. The substrate may consist of soil, rock, glacial deposits, sand, and gravel. Some of these subsurface substrates outcrop at the surface, while others are present at shallow depths.

Shallow Bedrock

Shallow bedrock is considered bedrock within approximately 6 feet or less of the ground surface. Bedrock is the hard, solid rock beneath the soil or subsurface substrate.

Paleontology

Paleontological resources include the fossilized remains, traces, or imprints of organisms preserved in rock or sediments that are of scientific interest and that provide information about the history of life on earth. Young glacial sediments that make up most of the region’s surficial geology rarely contain remains of Pleistocene megafauna, such as wooly mammoths or mastodon, but such remains are considered scientifically important when discovered (Paleontology Portal 2016). Sedimentary rock formations present at or near the surface in some areas throughout the ROI may contain common marine invertebrate fossils. These fossil remains are globally abundant and are not considered scientifically significant.

Topography

The distribution of abundant glacial sediments across the Upper Midwest has created relatively flat terrain.

Landslide Hazards

Landslide hazard potential is generally low across the ROI, including the Applicant's proposed project, SA-04, the existing Line 3, and potential locations for the rail and truck facilities. The rail and truck routes were not analyzed for landslide hazards.

Karst Conditions

Chemical weathering and dissolution of subsurface bedrock from the slight acidity of groundwater can result in the formation of caves, cavities, and void spaces in the rock, known as "karst topography." Overlying rock and sediment may sink downward into large void spaces, causing subsidence of the overlying land surface. In extreme cases, where large bedrock cavities are shallow, rocks and soils at the surface may collapse downward into a cavity, creating a sinkhole. Karst topography features are the source of abundant springs and seeps found throughout southeastern Minnesota and parts of northern Iowa. Rock types most susceptible to subsidence and sinkhole formation include limestone, dolostone, and some sandstones. Some limestones and sandstones found in southeastern Minnesota and northeast Iowa are susceptible to subsidence and sinkhole formation. Because of the very permeable nature of karst topography, potential contaminants can travel rapidly downward through the formations to the water table. Karst regions therefore have increased susceptibility to potential groundwater pollution (addressed in Section 5.2.1.1).

5.2.2.2.1 Applicant's Proposed Project

Soils

Table 5.2.2-1 provides information on the sensitive soils along the Applicant's proposed project by miles and percentages of the total route.

Table 5.2.2-1. Sensitive Soils along the Applicant's Proposed Project

Soil Type	Miles	Percentage of Total Route
Length	380.4	
Prime farmland	158.7	42
Highly erodible soils (by wind) [a]	12.6	4
Highly erodible soils (by water)[a]	63.8	20
Hydric soils	154.2	41
Compaction-prone soils	38.4	10
Coarse-textured soils	42.5	11
Stony/rocky soils	1.5	<1

Sources: NRCS 2016; Minnesota DNR 2016a.

[a] The SSURGO dataset had unpopulated values for 37% of wind erosion and 42% of the water erosion for the map units crossed

As indicated by Table 5.2.2-1, prime farmland, hydric soils, and highly erodible soils (by wind) are within the ROI for the Applicant's proposed project. Highly erodible soils (by water) and stony/rocky soils are rare. Sites with existing soil contamination are addressed in Section 5.2.1.1.

Subsurface Substrate

The characteristics of the subsurface substrate (soils and sediments deeper than the surficial soils discussed above) are important in determining the method of pipeline installation, particularly regarding the use of HDD methods for pipeline installation. Some subsurface sand and gravel layers are not conducive to HDD techniques, as the unconsolidated sediments are prone to collapse during drilling. Some of these deposits have been well mapped and serve as aquifers, as discussed in Section 5.2.1.1. Geotechnical drilling is required to determine the site-specific characteristics of these deposits in order to determine the feasibility of using HDD to install the pipeline.

Shallow Bedrock

The depth to bedrock along the Applicant's proposed project ranges from 0 to over 450 feet, with depths averaging approximately 200 feet (MGS 2016). Where bedrock is present at or near the surface within the pipeline corridor, blasting of the rock with explosives would be required for installation of buried pipeline. Surface bedrock along a 0.25 mile section of the Applicant's proposed project near milepost D1128.4 may require blasting.

Paleontology

The ROI for the Applicant's proposed project has isolated sections of sedimentary rock formations that are likely to contain common marine invertebrate fossils. These layers generally are found at depths greater than 30 feet, with very few outcrops occurring at or near the surface (MGS 2016). Along the eastern end of the route in Carlton County, bedrock may be at the surface or near the surface, and common marine invertebrate fossils could be present in shallow bedrock. Rare Pleistocene megafauna remains may also be present in the sediments overlying the bedrock.

Topography

Topographical variation is modest across the ROI, punctuated in some areas by isolated ridges and hills, with some steep slopes occurring along streambanks (Appendix A). Elevations range from approximately 903 to 1,681 feet above sea level across the Applicant's proposed project (NED DEM 2016).

Landslide Hazards

Landslide hazard potential is generally low for the ROI. However, near the eastern end of the Applicant's proposed project between Carlton and the Wisconsin border, 8 miles of the route intersect areas with a high susceptibility to landslides, mostly in isolated sections at stream crossings. Between Clearbrook and Carlton is an additional 0.4 mile of high landslide hazard (NPMS LSHR 2016; Enbridge 2016a).

Karst Conditions

Karst conditions, which could lead to subsidence and sinkhole formation, are not believed to be present along the Applicant's proposed project (Minnesota DNR 2016b; USGS 2016).

5.2.2.2.2 Continued Use of Existing Line 3

Soils

Table 5.2.2-2 provides information on the sensitive soils along the existing Line 3 by miles and percentages of the total route.

Table 5.2.2-2. Sensitive Soils along Existing Line 3

Soil Type	Miles	Percentage of Total Route
Length	326.3	
Prime farmland	129.9	40%
Highly erodible soils (by wind) [a]	46.2	14%
Highly erodible soils (by water)[a]	5.9	2%
Hydric soils	147.9	45%
Compaction-prone soils	40.8	13%
Coarse-textured soils	40.3	12%
Stony/rocky soils	2.9	<1%

Sources: NRCS 2016; Minnesota DNR 2016a.

[a] The SSURGO dataset had unpopulated values for 37% of wind erosion and 43% of the water erosion for the map units crossed

As indicated in Table 5.2.2-2, prime farmland and hydric soils are prevalent along the ROI for existing Line 3. Soils highly erodible by water are rare, while those highly erodible by wind are somewhat common. Compaction-prone and coarse-textured soils are not common, and stony/rocky soils are relatively rare along the existing Line 3.

Bedrock may be present at or near the surface in isolated segments along the eastern portion of Line 3, including isolated segments near Carlton. Some of the bedrock is likely to contain common marine invertebrate fossils. Rare Pleistocene megafauna remains also may be present in the glacial sediments overlying the bedrock.

The existing Line 3 passes through 8.4 miles of high landslide susceptibility, and does not intersect any known karst topography.

5.2.2.2.3 System Alternative SA-04

Soils

Soil characteristics along SA-04 were analyzed from NRCS soil data, including both SSURGO and STATSGO2 data (NRCS 2016). Table 5.2.2-3 provides the miles and percentages of the occurrence of sensitive soils across SA-04.

Table 5.2.2-3. Sensitive Soils along System Alternative SA-04

Soil Type	Miles	Percentage of Total Route
Length	795.4	
Prime farmland	675.5	85%
Highly erodible soils (by wind) [a]	13.5	2%
Highly erodible soils (by water)[a]	103.0	13%
Hydric soils	361.8	45%
Compaction-prone soils	216.0	27%

Table 5.2.2-3. Sensitive Soils along System Alternative SA-04

Soil Type	Miles	Percentage of Total Route
Coarse-textured soils	12.3	2%
Stony/rocky soils	0.1	<1%

Sources: NRCS 2016; Minnesota DNR 2016a.

a) The SSURGO dataset had unpopulated values for 6% of wind erosion and 9% of the water erosion for the map units crossed

As indicated in Table 5.2.2-3, prime farmland and hydric soils are prevalent along the ROI for SA-04. Highly erodible soils, coarse-textured soils, and stony-rocky soils are relatively rare.

Subsurface Substrate

Similar to the Applicant's proposed project, SA-04 crosses a variety of shallow sand and gravel layers; some of these outcrop at the surface, while others are present at shallow depths. Geotechnical drilling would be required to determine the site-specific characteristics of these deposits in order to determine appropriate methods of pipeline installation.

Shallow Bedrock

Shallow bedrock also is not common along SA-04, with depths in North Dakota and Minnesota averaging approximately 300 to 400 feet (Bluemle 1986; MGS 2016). Where SA-04 crosses southernmost Minnesota and northeastern Iowa, the average depth to bedrock is approximately 100 feet, with shallow bedrock present in isolated sections. Shallow and exposed bedrock is present where SA-04 crosses the Minnesota River at MP 406.6, between Nicollet and Blue Earth Counties, Minnesota. Shallow bedrock also may be encountered within an 8-mile segment in Mower County, Minnesota, near the Iowa border (MGS 2016). Where SA-04 crosses northeastern Iowa, bedrock outcrops are at or near the surface in several isolated sections (Iowa DNR 2017). Within northern Illinois, bedrock depths are generally several hundred feet deep, but SA-04 likely crosses isolated sections of bedrock at or near the surface (Hansel and McKay 2010). Geotechnical field investigations would be necessary to determine locations of shallow bedrock and the specific requirements for any blasting along SA-04.

Paleontology

Similar to the Applicant's proposed project, SA-04 would cross isolated sections of sedimentary rock formations that are known to contain common marine invertebrate fossils. These layers generally are found at depths greater than 30 feet, with very few outcrops occurring at or near the surface. Where rocks potentially containing fossils outcrop at or near the surface, the blasting necessary for buried pipeline installation likely would destroy or damage fossils. Rare Pleistocene megafauna remains also may be present in the glacial sediments overlying bedrock.

Topography

Topographical variation is modest across the ROI, punctuated in some areas by isolated ridges and hills, with some steep slopes occurring along streambanks (Appendix A). Elevations along SA-04 range from 493 to 1,367 feet above sea level (NED DEM 2016).

Landslide Hazards

SA-04 would pass through 3 miles of land considered at high risk for landslides (NPMS LSHR 2016).

Karst Conditions

Along SA-04, relatively shallow carbonate bedrock with potential for subsidence and sinkholes would intersect approximately 76 miles of the route across Minnesota, Iowa, and Illinois (none is present in North Dakota). A total of 8 miles of SA-04 in Mower County, Minnesota, has known karst conditions and thus a higher potential for subsidence and sinkholes where shallow carbonate bedrock is present (Minnesota DNR 2016c). Known and potential karst conditions also are present along approximately 63 miles of the route in Iowa, and 5 miles in Illinois (Weary and Doctor 2014).

5.2.2.2.4 Transportation by Rail

Soil and geology conditions for the rail alternative are similar to those of the other alternatives. While specific locations for these facilities have not been identified, the general areas likely to be designated for temporary storage and rail offloading facilities in Clearbrook and Superior contain substantial soils designated as prime farmland, and substantial hydric (wetland) soils. No soils in these areas are designated as highly erodible by water, but some soils are highly erodible by wind. Coarse-textured soils and stony/rocky soils are not common in these areas.

The presence of shallow bedrock and paleontological resources are not relevant for development of these facilities and access as they would not involve construction at depths that would require blasting or significant excavation. The relief is low across the ROI for the rail offloading facilities and associated access.

Areas likely to be designated for temporary storage and rail offloading facilities in Clearbrook and Superior do not intersect areas of elevated landslide hazard or known karst conditions.

5.2.2.2.5 Transportation by Truck

Soil and geology conditions for the truck alternative would be similar to those of the other alternatives. Areas likely to be designated for temporary storage and truck offloading facilities in Clearbrook and Superior contain substantial soils designated as prime farmland and substantial hydric (wetland) soils. No soils in these areas are designated as highly erodible by water, but some soils are highly erodible by wind. Coarse-textured soils and stony/rocky soils are not common in these areas.

The presence of shallow bedrock and paleontological resources are not relevant because development of offloading facilities and associated access for this alternative would not involve construction at depths that would require blasting or significant excavation. The relief is low across the ROI for truck offloading facilities and access.

Areas likely to be designated for temporary storage and truck offloading facilities in Clearbrook and Superior do not intersect areas of elevated landslide hazard or known karst conditions.

5.2.2.2.6 Existing Line 3 Supplemented by Rail

The existing conditions presented for the existing Line 3 and the rail alternatives are representative of existing soil and geology conditions for this combined alternative.

5.2.2.2.7 Existing Line 3 Supplemented by Truck

The existing conditions presented for the existing Line 3 and the truck alternative are representative of existing soil and geology conditions for this combined alternative.

5.2.2.3 Impact Assessment

5.2.2.3.1 Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

In general, construction activities that can affect geology and soils include trenching and backfilling, blasting, grading, installation of permanent roads and facilities, and the use of fuels and other hazardous materials. Construction would cause disturbance to soils and topography. Where present, shallow bedrock and potential fossil remains could be destroyed through excavation or blasting. Impacts from pipeline construction would mostly occur within the construction work areas along the length of the route and at aboveground facilities, staging areas, and access roads.

Soil disturbance along the Applicant's proposed project during construction would total approximately 5,147 acres. Of the amount disturbed during construction, 2,304 acres would be maintained as permanent right-of-way and dedicated to aboveground facilities during operations. Approximately 84 percent of the route would be co-located with existing infrastructure where prior disturbance to soils likely has occurred. Much of the remaining greenfield portion of the route has been disturbed by human activities, especially activities related to agriculture and timber harvesting. Additional detail on potential construction-related impacts for the Applicant's proposed project is provided below.

<u>Soil Erosion</u>

Removal of crops, sod, and other vegetation during construction would leave soil exposed to erosion by wind and water. Heavy equipment operation on the exposed soil loosens soil and breaks up soil peds (i.e., aggregations of soil particles that make the soil surface more stable), making the soil more susceptible to erosion, especially during periods of heavy rainfall or windy conditions. Erosion could continue to be a minor impact for several years after construction is complete while plant communities stabilize in the disturbed ground. Any exposed soil would be subject to erosion by water or wind.

As discussed in Section 5.2.2.2, the potential for soil erosion from exposure to water would be highest in areas with water erosion-prone soils, which occur along only approximately 4 miles of the Applicant's proposed project. Soils prone to erosion from exposure to wind are more common along the Applicant's proposed project (approximately 107 miles). Applicant-proposed measures to reduce the potential for soil erosion include using slope breakers (e.g., earthen berms) and erosion control blankets (straw mats, jute mats, coconut or biodegradable synthetic blankets) on sloped terrain and at stream crossings during construction. Erosion control blankets would be placed across the entire construction work area where the base of slopes greater than 5 percent are less than 50 feet from wetlands, waterbodies, drainage tile inlets, or drainageways until the area is revegetated and there is no longer an increased potential for erosion. Trench breakers would reduce or control erosion within the trench during pipe installation.

Erosion control BMPs would be implemented to reduce the potential for long-term erosion effects, including the use of mulch and revegetation in disturbed areas, and permanent earthen berms or installation of biodegradable erosion control blankets on slopes during final grading. Other erosion control BMPs are outlined in Enbridge's Environmental Protection Plan (Appendix E). Potential sedimentation resulting from soil erosion also would be reduced or controlled through stormwater diversions and sediment barriers (sedimentation is addressed in Section 5.2.1.2). Erosion and sedimentation control measures would be inspected and maintained according to Enbridge's Environmental Protection Plan (Appendix E). These Applicant-proposed measures would minimize the potential for soil erosion of all soils, including erosion-prone soils, such that soil erosion due to construction likely would be a temporary to short term, localized, and minor impact.

Soil Compaction

Heavy equipment passage and transport of pipe sections may compact soils, particularly during grading of the right-of-way. Compacted soils impede penetration of plant roots, which affects reestablishment of plant communities after construction activities are completed. Soil compaction also reduces pore space and infiltration within the soil, leading to increased runoff that can further promote erosion. Hydric soils and compaction-prone soils, particularly when wet, would be most susceptible to these impacts.

As indicated in Section 5.2.2.2.1, hydric soils occur across 41 percent of the Applicant's proposed project, and compaction-prone soils occur along approximately 10 percent of the route. Applicant-proposed measures to alleviate soil compaction include deep tillage operations prior to topsoil replacement and during clean-up activities, as necessary. In wetland areas with hydric soils, timber mats and/or low-ground-pressure equipment (which distributes a machine's weight over a larger area) would be used to reduce compaction from heavy machinery (Appendix E). In addition, when soil conditions are wet, such as after periods of heavy rainfall, certain heavy equipment operation activities would be avoided until soils dry out. If these measures are followed, soil compaction from proposed Project construction likely would be temporary, localized, and negligible to minor.

Soil Mixing

Topsoil and subsoil removal during excavation may cause some mixing of these soil layers. If soil is mixed during backfilling, some biological and chemical properties of the soil may be altered, which may affect reestablishment of plant communities in the short term (several years) after reclamation. In addition, rocks from the subsoil or from potential blasting operations may become mixed into the topsoil, further reducing its productivity.

The Applicant has proposed measures to reduce the potential for soil mixing (Appendix E). Soil mixing would be reduced by removal (stripping), segregation, stockpiling, and replacement of topsoil and subsoil—particularly in areas where soil productivity is an important consideration (e.g., in croplands, hay fields, pastures, residential areas, and other areas as requested by the landowner or as specified in Project plans and/or permits). In wetland environments where there is no standing water, up to 1 foot of topsoil may be stripped and stockpiled. If standing water is present, attempts would be made to segregate the topsoil/organic layer, but it may not be practical. An Environmental Inspector (EI) would perform audits of the topsoil and subsoil removal and segregation. Efforts would be made to remove excess rock (stone equal to or larger than 4 inches in diameter) from the upper 8 inches of subsoil or as specified by permits, contracts, or landowner agreements. If these measures are followed, soil mixing from Project construction likely would be short term and negligible to minor.

Soil Contamination

Soils may become contaminated from minor spills of industrial chemicals or hazardous materials (e.g., lubricants, gasoline, oil, other fuels, coolants, and transmission fluid) during construction activities such as fuel storage, equipment refueling, and equipment maintenance. This is a particular concern in areas of agricultural production, especially prime farmland soils, where contaminated soils can affect the quality and yield of crops. Contamination within soils also can migrate into surface waters or groundwater aquifers; therefore, soil contamination above or adjacent to sensitive water resources, and in areas where the water table is high, would be of particular concern.

Applicant-proposed measures to reduce the potential for minor spills include proper fuel storage practices, fuel dispensing operations, and other hazardous materials handling processes. In the event of a spill of hazardous material, clean-up measures would be in place to reduce the extent of soil contamination. Such measures include immediate assessment and notifications; mobilization of response personnel, equipment, and materials for containment and/or cleanup, such as spill kits with adsorbents; and proper storage and disposal of contaminated material. These spills would be managed according to SPCC Plans. All employees who handle fuels and other regulated substances would be trained by the contractor in these and other BMPs, as outlined in Enbridge's Environmental Protection Plan (Appendix E). The Applicant also would employ a Spill Coordinator, designated by the contractor, to report spills and mobilize spill response in the event of a spill. If Applicant-proposed measures are followed, potential impacts from minor spills likely would be localized, temporary, and negligible to minor.

Presence of Shallow Bedrock

The Applicant has identified one 0.3-mile segment of the Applicant's proposed project in Carlton County, Minnesota, where bedrock outcrops at the surface for approximately 1,500 feet. Blasting with explosives would be required to break up and remove the bedrock in order to install the pipeline in this segment. The Applicant anticipates that four blasting events would be required, each event breaking up approximately 400 feet of the rock outcrop (Enbridge 2016b).

The Applicant would develop a Blasting Plan prior to construction, which would comply with all federal, state, and local regulations, including those related to the safety, use, storage, and transportation of explosives (Enbridge 2016a). After blasting and pipe installation, the pipe would be surrounded with padding material, such as sand, and the fragments of blasted rock would be used to infill the trench. Large fragments of rock (larger than those in surrounding undisturbed areas) would be removed from the construction work area. Removal of bedrock by blasting would be a permanent impact; however, unless the rock is a source of rare or unique fossils or mineral resources, the impact on geology and soils would be considered minor.

Impacts on Paleontological Resources

Potential impacts on paleontological resources during construction include damage to or destruction of fossils from excavation and blasting operations, if conducted; erosion of fossil beds from grading; and unauthorized collection of fossils by construction personnel or the public. Where blasting is required, it likely would disturb and fracture any fossils potentially found in shallow bedrock. Fossils most likely to be present in shallow bedrock are common marine invertebrate fossils that are globally abundant and not considered scientifically significant. Damage to or destruction of common marine invertebrate fossils from blasting or ripping of bedrock would be a permanent minor impact.

Pleistocene-age mammal fossils are rare but may be unearthed from glacial sediments overlying bedrock during excavation activities for the Project; these fossils are considered scientifically important. The Applicant has developed a state-specific Unanticipated Discovery Plan (Appendix O) that requires work to stop in the event that important paleontological resources are discovered during construction activities. With adherence to the Plan, impacts on rare or unique paleontological resources could be negligible to minor. However, if a rare or unique paleontological resource was damaged or destroyed prior to being discovered, the impact could be permanent and major to the individual resource. The likelihood of such an occurrence, however, is low.

Changes to Topography

Temporary, localized, and minor modifications to topography would take place during grading, trench excavation, and backfilling of the right-of-way. During construction in areas with slopes greater than 30 percent, slope stabilization blankets would be used (e.g., straw mats, jute mats, or coconut or biodegradable synthetic erosion blankets) (Appendix E). At the close of construction, the Applicant would restore the natural contour of any slopes and drainage patterns, which would stabilize the slopes. After pipe installation is complete, backfilling and regrading of the right-of-way would return the disturbed surface to pre-Project conditions.

Minor, localized, and temporary modifications to topography may take place during construction of temporary material storage yards, contractor yards, and temporary access roads. Disturbed areas would be re-graded at the close of construction, and surfaces would be returned to their pre-Project elevations, in accordance with BMPs. Differential settling of the land surface may occur in the months following regrading, but impacts would be negligible.

Minor permanent modifications to topography (e.g., excavations for foundations, permanent road grading) may be required for some new or expanded pipeline-associated facilities (e.g., pump stations, MLVs, cathodic protection systems, and permanent access roads).

Subsidence and Sinkhole Hazards

Subsidence or sinkhole formation is not anticipated within the Applicant's proposed project, as no known shallow carbonate rocks intersect the route.

Operations Impacts

During standard operations, impacts on soil and geologic resources would be limited to permanent loss of soil cover where soils/surface sediments would be converted to impervious surfaces on new roads and aboveground facilities; and potential erosion and compaction during permanent right-of-way maintenance and use of permanent unpaved access roads.

Permanent Loss of Soil Cover

Construction of permanent access roads and associated facilities would require permanent removal of soil, to be replaced with materials such as cement and gravel. Loss of soil cover would total 3.4 acres for permanent access roads and 61.4 acres for other permanent facilities along the Applicant's proposed project in Minnesota. Additional acreage for permanent facilities in Wisconsin and North Dakota are unknown at this time. This loss of soil resources would be a permanent and minor impact. In addition, replacement of natural soil cover with less permeable cement and other materials could increase runoff and potential erosion and sedimentation. Runoff and sedimentation are addressed in Section 5.2.1.2.

Soil Erosion and Compaction

Approximately 2,304 acres that encompasses the permanent right-of-way would be subject to permanent, minor soil compaction from maintenance operations (i.e., vehicles traversing the area). New permanent access roads that are unpaved would be subject to minor, localized, and permanent erosion and sedimentation (sedimentation is addressed in Section 5.2.1.2). The locations of new permanent access roads that are unpaved also would experience negligible to minor, localized, permanent soil compaction.

Landslide Hazards

Landslide potential is low across most of the Applicant's proposed project. There is increased potential for landslide activity in isolated sections of the Applicant's proposed project, mostly at stream crossings between Carlton and the Minnesota-Wisconsin border. Areas along the Applicant's proposed project known to have high susceptibility to landslides are limited to 0.4 mile between Clearbrook and Carlton and 8 miles between Carlton and the Minnesota-Wisconsin border. The Project would follow existing design and engineering specifications (in accordance with 49 CFR Parts 192 and 193) to ensure that pipeline facilities are protected from potential landslides. Due to the low landslide potential across most of the route, the likelihood of a landslide affecting the pipeline or associated facilities would be low. The severity of impact on pipeline facilities for an individual landslide event would depend on the nature of the slope, the geologic materials present, and the design of the facilities; such a determination is beyond the scope of this analysis. It should be noted that, although the potential is low, a landslide could occur at any time throughout the life of the Project.

Subsidence and Sinkhole Hazards

Subsidence or sinkhole formation is not anticipated within the Applicant's proposed project because no known shallow carbonate rocks intersect the route.

5.2.2.3.2 Continued Use of Existing Line 3

Construction Impacts

There would be no construction impacts on geology and soils from continued use of the existing Line 3 pipeline because it is already built.

Operations Impacts

Operations impacts on geology and soils from continued use of the existing Line 3 would occur during maintenance, with an estimated 267 repair procedures per year in the form of integrity digs (see Section 4.2.3 for more detail). Soil disturbance from integrity digs and subsequent pipeline repairs (if required) could cause soil erosion. If BMPs to reduce soil erosion are implemented, this impact would be localized, temporary to short term, and negligible to minor. Other impacts from operation of the existing Line 3 would be part of the existing conditions and are not included in the analysis.

5.2.2.3.3 System Alternative SA-04

Construction Impacts

Impacts from pipeline construction for SA-04 primarily would occur within construction work areas along the length of the route, as well as at aboveground facilities, staging areas, and access roads. Soil disturbance along the route during construction would total approximately 11,568 acres. Of the amount disturbed during construction, 4,820 acres would be maintained as permanent right-of-way and dedicated to aboveground facilities during operations. Over 99 percent of SA-04 would be co-located with existing infrastructure, where prior disturbance to soils likely has occurred. Co-location of the route is discussed in Section 6.7.

Geologic resource impacts for SA-04 are expected to be similar to those described for the Applicant's proposed project, except for the greater extent of the impacts because SA-04 is significantly longer. Geology impacts that vary from the Applicant's proposed project include an increased occurrence of shallow bedrock and karst terrain on SA-04. If constructed, it was assumed that measures similar to the Applicant-proposed measures would be implemented along SA-04 to reduce the impacts on geologic resources and soils that were identified for the Applicant's proposed project, but additional measures would have to be developed to address the potential for localized subsidence from the karst terrain.

Soil Erosion

Highly erodible soils of concern are not common along SA-04. As detailed in Table 5.2.2-3, the route intersects less than 1 mile of soils that are highly susceptible to water erosion, and approximately 20 miles of soils highly susceptible to wind erosion. It is assumed that measures similar to the Applicant-proposed measures described above would be implemented to minimize the potential for soil erosion. As a result, minor, localized, and temporary to short-term soil erosion would be likely due to construction and restoration activities.

Soil Compaction

Operation of heavy equipment during construction and restoration can compact soils, especially hydric soils and fine-grained soils prone to compaction. As detailed in Table 5.2.2-3, hydric soils are found along approximately 362 miles (45 percent) of SA-04, and compaction-prone soils are encountered along 216 miles (27 percent) of the route. It was assumed that the Applicant-proposed measures described for the Applicant's proposed project would be implemented to minimize the potential impacts of compaction. With implementation of these, or similar measures, impacts from soil compaction likely would be localized, temporary, and negligible to minor.

Soil Mixing

The potential for soil mixing along SA-04 would be the same as for the Applicant's proposed project. With adherence to measures similar to the Applicant-proposed measures for soil removal and segregation described above, impacts from soil mixing should be short term and negligible to minor.

Soil Contamination

The types of soil contamination that could occur along SA-04 from minor spills during construction are the same as discussed for the Applicant's proposed project, although the potential for a minor spill to occur is greater because SA-04 is over twice as long as the Applicant's proposed project. With implementation of measures similar to the Applicant-proposed measures described above, impacts from soil contamination likely would be localized, temporary, and negligible to minor.

Presence of Shallow Bedrock

Shallow bedrock is not common for most of the length of SA-04; however, in a variety of isolated segments in southern Minnesota, Iowa, and Illinois, shallow bedrock is likely to be present. Blasting likely would be required at multiple locations along this route. Geotechnical field investigation ultimately would be required to determine the specific need for blasting of shallow bedrock since bedrock blasting sites have not yet been identified for SA-04. Removal of bedrock by blasting would be a permanent impact; however, unless the rock is a source of rare or unique fossils or mineral resources, the impact on geology and soils would be considered minor.

Impacts on Paleontological Resources

Potential impacts on fossil resources for SA-04 would be essentially the same as those described above for the Applicant's proposed project, except for a greater potential because of the greater length of SA-04. In addition, SA-04 is likely to have more outcrops of shallow bedrock that may contain common marine invertebrate fossils and thus more potential for construction to affect fossils. Damage to or destruction of common marine invertebrate fossils from blasting or ripping of bedrock would be a permanent minor impact.

The likelihood of impacts on rare or unique paleontological resources (such as Pleistocene mammals found in glacial sediments overlying bedrock) is low because of the rarity of these significant remains. With implementation of the Unanticipated Discovery Plan (Appendix O), work would stop if a discovery was made; and impacts on the fossil resource could be negligible to minor. If a rare or unique paleontological resource was damaged or destroyed prior to being discovered, the impact could be permanent and major for the individual resource.

Changes to Topography

Impacts on topography along SA-04 would be essentially the same as those described for the Applicant's proposed project—including both temporary, negligible to minor modifications to the ground surface elevation within the construction work area and permanent minor impacts from installation of some aboveground facilities. Applicant-proposed measures to minimize impacts on topography include backfilling and regrading surfaces at the close of construction to restore the natural contour of the land, when possible.

Subsidence and Sinkhole Hazards

Relatively shallow carbonate bedrock with potential for subsidence and sinkholes intersects approximately 76 miles of SA-04 across Minnesota, Iowa, and Illinois (none is present in North Dakota). Known karst conditions are present along approximately 8 miles of SA-04 in Mower County, Minnesota, with the possibility of cavities at depth. Known and potential karst conditions also are present along approximately 63 miles of the route in Iowa and 5 miles of the route in Illinois. Thus, the potential exists for subsidence and sinkhole formation across SA-04 (Minnesota DNR 2016c; Weary and Doctor 2014).

Karst topography can pose increased risks to the successful installation of pipelines by HDD, including difficulties arising from very loose unstable soils and open voids along the drill path. Potential impacts include loss of drilling fluid into open conduits and inadvertent drilling fluid returns, leading to potential contamination and turbidity in nearby wells, springs, and rivers (addressed in Section 5.2.1.1 and 5.2.1.2); and ground subsidence and possible sinkhole formation due to excavating zones of loose unstable soils. The probability and severity of subsidence or sinkhole formation impacts on pipeline installation or construction of associated facilities depend on the nature of the bedrock, the groundwater conditions, the timing of the occurrence, and the design of the facilities. Such a determination is beyond the scope of this analysis.

Operations Impacts

Permanent Loss of Soil Cover

The types of operations impacts along SA-04 would be similar to those described for the Applicant's proposed project, except for the extent of those impacts given that SA-04 would be significantly longer. Consequently, the permanent, minor loss of soil cover at aboveground facilities along the 795-mile SA-04 route would generally be more than twice that for the 380-mile Applicant's proposed project.

Soil Erosion and Compaction

The extent of soil erosion and compaction impacts associated with right-of-way maintenance along the 795-mile SA-04 route generally would be more than twice that for the 380-mile Applicant's proposed project. Soil erosion and compaction impacts from SA-04 operations would be permanent, localized, and negligible to minor.

Landslide Hazards

Landslide hazards are generally low for SA-04. SA-04 passes through 2.8 miles of land considered to be at high risk for landslides (NPMS LSHR 2016). Due to the low landslide potential across most of the route, the likelihood of a landslide affecting the pipeline or associated facilities is low. The severity of the impact of a landslide on pipeline facilities depends on the nature of the slope, the geologic materials, and the design of the facilities; such a determination is beyond the scope of this analysis. It should be noted that, although the potential is low, a landslide could occur at any time throughout the life of the Project.

Subsidence and Sinkhole Hazards

The potential exists for subsidence and sinkhole formation due to karst conditions across SA-04 (Minnesota DNR 2016c; Weary and Doctor 2014). The probability and severity of an impact on the pipeline or associated facilities related to subsidence or sinkhole formation during Project operations depend on the nature of the bedrock, the groundwater conditions, the timing of the occurrence, and the design of the facilities. Such a determination is beyond the scope of this analysis.

5.2.2.3.4 Transportation by Rail

Construction Impacts

Transportation of crude oil by rail would require development of temporary storage and offloading facilities, new rail access, and upgrade of existing rail access. Development of new rail facilities, as well as installation of a new interconnection between existing rail lines, would require clearing and grading adjacent to the Clearbrook and Superior terminals. During construction, clearing and grading would include a temporary to short-term increase in soil erosion and compaction. With implementation of measures and BMPs similar to those described in the Environmental Protection Plan (Appendix E), these impacts on soils would be temporary to short term, localized, and negligible to minor. Modifications to topography from grading would be minor and permanent. It was assumed that all of the surface soils at the offloading facilities at the Clearbrook and Superior terminals would be permanently converted to impervious substrate (e.g., concrete, pavement) as discussed below.

Contamination of soil could occur from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities. These spills would be managed according to SPCC Plans. With implementation of BMPs and measures similar to the Applicant-proposed measures described above, impacts on soil contamination likely would be temporary and negligible to minor.

Because no known karst conditions are present within the ROI for the rail alternative, no subsidence and sinkhole impacts are anticipated to occur.

Operations Impacts

Development and operation of temporary storage and offloading facilities in Clearbrook and Superior and new or expanded rail lines would permanently convert soil cover to impervious surfaces, resulting in a loss of up to about 360 acres of soil cover including 260 acres associated with the Clearbrook terminal and about 100 acres associated with the Superior terminal. This is considered a minor permanent impact on soils.

In addition, minor spills and leaks of crude oil, fuel, and lubricants from train transit could cause minor and localized soil contamination along the rail corridor and adjacent right-of-way. Regular inspection of rail cars for leaks would minimize the potential for such contamination; impacts likely would be minor and localized, and generally would remain on the rail line bed.

5.2.2.3.5 Transportation by Truck

Construction Impacts

Transportation of crude oil by truck would require development of temporary storage and offloading facilities at Clearbrook and Superior, and new or upgraded road access near Neche, Clearbrook, and Superior. During construction, clearing and grading for offloading facilities or rail access would cause a temporary to short-term increase in soil erosion and compaction. With implementation of measures and BMPs similar to those described in the Environmental Protection Plan (Appendix E), these impacts on soils would be temporary to short term, localized, and negligible to minor.

Construction of the offloading facilities would result in conversion of approximately 100 acres of soil cover to an impervious surface (up to 50 acres adjacent to both the Clearbrook and Superior terminals). It was assumed that new and ungraded roads also would convert existing soil cover to impervious surfaces, including approximately 4 acres at Clearbrook and 34 acres at Superior (it is not expected that upgrades near Neche would increase the impervious surface of the existing roadway). Modifications to topography from grading would be minor and permanent.

Soil contamination could occur from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities. These spills would be managed according to SPCC Plans that would be developed for each facility. With implementation of BMPs and measures similar to the Applicant-proposed measures described for the Applicant’s proposed project, impacts on soil contamination would be temporary and negligible to minor.

Operations Impacts

Operation of temporary storage and offloading facilities in Clearbrook and Superior would permanently convert pervious soils to impervious surfaces, resulting in a loss of approximately 138 acres of soil cover. This is considered a permanent and minor impact on soils. Operations of the truck alternative would result in no other impacts on geology and soils.

5.2.2.3.6 Existing Line 3 Supplemented by Rail

Construction Impacts

Construction impacts would be the same as those described above for the transportation by rail alternative.

Operations Impacts

Operations impacts would be the same as those described above for continued use of the existing Line 3 and transportation by rail. The only anticipated difference would be a reduction in rail traffic for this alternative compared to the rail alternative, which could reduce the potential for localized soil contamination from minor leaks in the vicinity of the offloading facilities and along the existing rail routes.

5.2.2.3.7 Existing Line 3 Supplemented by Truck

Construction Impacts

Construction impacts would be the same as those described above for the transportation by truck alternative.

Operations Impacts

Operations impacts would be the same as those described for continued use of the existing Line 3 and transportation by truck. The only anticipated difference would be a reduction in truck traffic for this alternative compared to the truck alternative, which could reduce the potential for localized soil contamination from minor leaks in the vicinity of the offloading facilities and along the existing truck routes.

5.2.2.4 Summary and Mitigation

5.2.2.4.1 Summary

Construction and operation of the Applicant's proposed project and all CN Alternatives would affect geologic and soil resources. Table 5.2.2-4 provides a summary of the occurrence and extent of potential impacts on geology and soils associated with the Applicant's proposed project and CN Alternatives. If the protective measures outlined in the Applicant's Environmental Protection Plan (Appendix E) or similar measures are implemented, most construction impacts on geology and soils would be negligible to minor and temporary to short term.

During construction, soil erosion by wind and water likely would be a minor, temporary to short-term impact. Hydric and compaction-prone soils occur to some extent along the Applicant's proposed project and the CN Alternatives (except that continued use of the existing Line 3 does not involve construction). If Applicant-proposed measures or similar measures and BMPs to reduce compaction are followed, compaction of soils likely would be temporary and minor for the Applicant's proposed project and the CN Alternatives.

Shallow bedrock is not prevalent along the Applicant's proposed project or in affected areas for any of the CN Alternatives. One instance of shallow bedrock along the Applicant's proposed project would require blasting. Shallow bedrock is not common along SA-04, but in limited sections within Minnesota, Iowa, and Illinois blasting could be required. Geotechnical field investigations would be necessary to determine the specific requirements for blasting along SA-04. No blasting of bedrock would be expected for rail or truck transport, as construction of those alternatives would require no significant excavation. The potential for encountering fossil-bearing rock or sediments is similarly low for all potential routes, although SA-04 is likely to require more excavation and blasting, with the resulting higher potential for damage or destruction of fossils. As noted, continued use of the existing Line 3 does not involve construction. Except for integrity digs required for maintenance, other impacts from operation of the existing Line 3 would be part of the existing conditions and are not included in the analysis.

Impacts on Project elements from geologic hazards are not likely for the Applicant's proposed project or any CN Alternative because the overall landslide potential is low. The potential exists for subsidence or sinkhole formation on SA-04 but not for the Applicant's proposed project, existing Line 3, or the rail or truck facilities.

The greatest impact during operations would the loss of soil cover associated with aboveground facilities; these permanent losses would be minor for the Applicant's proposed project and all CN Alternatives. The extent of permanent soil conversion to an impervious surface would be up to 140 acres for the truck alternative, up to 360 acres for the rail alternative, 63.8 acres for the Applicant's proposed project, and about 130 acres for SA-04.

5.2.2.4.2 Mitigation

Beyond the potential for an unanticipated discovery of and damage to a rare paleontological resource, no major impacts are expected on geologic or soil resources for the Applicant's proposed project or any CN Alternative. Beyond the Applicant-proposed measures described above, no mitigation measures have been identified to further avoid and minimize impacts on geology and soils.

Table 5.2.2-4. Summary of Potential Impacts on Geology and Soils for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Preferred Route[c]	System Alternative SA-04[d]	Continued Use of Existing Line 3[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[e,f]	Existing Line 3 Supplemented by Truck[e,g]
Construction Impacts							
Prone to soil erosion by water or wind (miles)	Temporary to short-term/minor localized impacts • 110.6 miles	Temporary to short-term/minor localized impacts • 21.2 miles	No impact	Temporary to short-term/minor impacts • *Sensitive soils are present but are not quantifiable because the specific locations of activities and facilities are not known.*			
Prone to soil compaction, hydric, or other sensitive soils (miles)	Temporary/ negligible to minor localized impacts • 192.6 miles	Temporary/ negligible to minor localized impacts • 578.6 miles	No impact	Temporary to short-term/negligible to minor impacts • *Sensitive soils are present but are not quantifiable because the specific locations of activities and facilities are not known.*			
Increase in soil mixing	Short-term/ negligible to minor impacts	Short-term/ negligible to minor impacts	No impact	No impact	No impact	No impact	No impact
Potential for soil contamination from minor spills	Temporary/ negligible to minor localized impacts	Temporary/ negligible to minor localized impacts	No impact	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts	Temporary/ negligible to minor impacts
Potential for shallow bedrock blasting (miles)	Permanent/minor impacts • 0.3 mile	Permanent/minor impacts[h]	No impact	No impact	No impact	No impact	No impact
Potential paleontological disturbance from excavation or blasting (miles)	Permanent/ negligible to major impacts • 0.3 mile	Permanent/ negligible to major impacts[h]	No impact	No impact	No impact	No impact	No impact

Table 5.2.2-4. Summary of Potential Impacts on Geology and Soils for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Preferred Route[c]	System Alternative SA-04[d]	Continued Use of Existing Line 3[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[e,f]	Existing Line 3 Supplemented by Truck[e,g]
Potential for modifications to topography	Temporary/ negligible to minor impacts[i] Permanent/ minor impacts from installation of aboveground facilities[j]	Temporary/ negligible to minor impacts[i] Permanent/ minor impacts from installation of aboveground facilities[j]	No impact	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts
Subsidence or sinkhole hazard?	No	Yes	No	No	No	No	No
Operations Impacts							
Permanent loss of soil cover	Permanent/ minor impacts • 64.8 acres in MN • Additional acreage in ND and WI unknown	Permanent/ minor impacts • Acreage unknown, but likely twice that of the Applicant's proposed project	No impact	Permanent/minor impacts • Up to 360 acres	Permanent/minor impacts • Up to 140 acres	Permanent/minor impacts • Up to 360 acres	Permanent/minor impacts • Up to 140 acres
Potential for soil erosion and compaction	Permanent/ negligible to minor localized impacts	Permanent/ negligible to minor localized impacts	Temporary to short-term/ negligible to minor localized impacts from erosion No impact from compaction	No impact	No impact	Temporary to short-term/negligible to minor localized impacts from erosion No impact from compaction	Temporary to short-term/negligible to minor localized impacts from erosion No impact from compaction

Table 5.2.2-4. Summary of Potential Impacts on Geology and Soils for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Preferred Route[c]	System Alternative SA-04[d]	Continued Use of Existing Line 3[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[e,f]	Existing Line 3 Supplemented by Truck[e,g]
Landslide hazard?	Yes	Yes	Yes	No impact for storage areas and facilities; entire route not analyzed	No impact for storage areas and facilities; entire route not analyzed	Yes	Yes
Subsidence or sinkhole hazard?	No	Yes	No	No	No	No	No

[a] No single dataset in this summary table provides a complete indication of all relevant impacts related to geology and soils. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, NRCS data does not provide complete coverage. However, overall data on soils types and characteristics can aid the reader in understanding the potential for erodibility or potential for soil compaction impacts where soil data is missing. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in the tables should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-165 through 5-174. The table above provides counts, for example, of miles of the route that cross soils prone to soil erosion by water or wind within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to highly erodible soils is contained in the text of this section.

[c] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-165 to 5-169. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on page 5-169. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-169 to 5-172. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-172 to 5-173. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-173 to 5-174. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

Table 5.2.2-4. Summary of Potential Impacts on Geology and Soils for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Preferred Route[c]	System Alternative SA-04[d]	Continued Use of Existing Line 3[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[e,f]	Existing Line 3 Supplemented by Truck[e,g]

[h] Shallow bedrock is not common along SA-04, but in sections within Minnesota, Iowa, and Illinois, blasting likely would be required. Geotechnical field investigations would be necessary to determine the specific requirements for blasting along SA-04. Because the longer SA-04 route is likely to require more blasting, the potential for encountering fossil-bearing rock is higher, with the resulting higher potential for damage or destruction of fossils.

[i] Minor, localized, and temporary modifications to topography may take place during (1) grading, trench excavation, and backfilling of the right-of-way; and (2) construction of temporary material storage yards, contractor yards, and temporary access roads.

[j] Minor permanent modifications to topography (e.g., excavations for foundations, permanent road grading) may be required for some new or expanded pipeline-associated facilities (e.g., pump stations, mainline valves, cathodic protection systems, and permanent access roads).

5.2.2.5 References

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5.2.3 Vegetation

Vegetation is a critical component of ecosystem sustainability, as it supports and regulates biological and biochemical cycles, influences water quality, replenishes and stabilizes soils, provides habitat for wildlife, and contributes directly and indirectly to socioeconomic benefits. Plant species and associations themselves comprise a large portion of regional ecological richness, uniqueness, and diversity values as well as provide numerous specific habitat requirements that support the same values for wildlife.

Vegetation can be described by land cover types—predictable assemblages of plant species that grow together in similar habitat. In addition to existing land cover types, other vegetation parameters used to estimate potential Project impacts include the location and classification of native plant communities, old-growth forests, high conservation value forests (HCVFs), and distribution of noxious weed and invasive plant populations.

Potential impacts on types of vegetation that fall under specific regulatory jurisdiction are found in other sections, as detailed below:

- Wild Rice Waterbodies, *in* Surface Water, Section 5.2.1.2;
- Wetlands, including calcarious fens, *in* Wetlands, Section 5.2.1.3; and
- Special Status Plant Species and Communities, *in* Unique Natural Resources, Section 5.2.5. (Note: this included federal- and state-listed threatened and endangered species; Species of Greatest Conservation Need (SGCN); Minnesota Biological Survey Sites of Biodiversity Significance; and Scientific and Natural Areas); and
- Potential impacts on vegetation due to an unanticipated release of crude oil are addressed in Chapter 10.

After providing information on applicable regulations and the regulatory context for management of vegetation resources, this section describes the impact analysis methodology. Existing vegetation conditions within an area along the Applicant's proposed project and each of the CN Alternatives is discussed. Potential Project-related impacts of construction and operation on vegetation parameters are discussed for the Applicant's proposed project and each of the CN Alternatives. Detailed supporting analyses are cited and provided in Appendix K. A summary and comparison of the impacts are included at the end of the section.

5.2.3.1 Regulatory Context and Methodology

5.2.3.1.1 Regulatory Context

Regulations pertaining to the conservation, protection, and management of vegetation are established at various levels of federal, state, and local government. Conservation and protection activities regarding special status plant resources are managed by federal and state agencies. As noted above, regulatory protection for wetlands, including calcareous fens are addressed *in* Wetlands, Section 5.2.1.3. Regulatory measures protect federally and state-listed endangered or threatened plants, and other vegetation communities are discussed *in* Unique Natural Resources, Section 5.2.5.

Native plant communities (defined under methodology) are naturally occurring vegetation with considerable resource value. These are identified by the North Dakota Parks and Recreation Department, Minnesota DNR, Iowa DNR, Illinois DNR, and Wisconsin DNR. Data collected by these departments typically are used to identify native plant community types, evaluate quality and quantity, assign rarity, and provide recommendations for land management practices to avoid and minimize disturbance of rare resources. Few regulations provide protection for native plant communities, although resource agencies devote considerable expense to their conservation for ecological and public values.

A “noxious weed” is “any plant or plant product that can directly or indirectly injure or cause damage to crops, livestock, poultry, or other interests of agriculture, irrigation, navigation, natural resources of the United States, public health, or the environment” as defined in the U.S. Plant Protection Act of 2000 (7 U.S. Code 7701–7772). Invasive plants are non-native plants also identified as a potential threat to the natural environment because of their tendency to dominate and exclude other vegetation. Weed and invasive plant classifications and rules vary between regulating agencies.

Each state is responsible for managing noxious weeds in accordance with the rules and regulations identified under the U.S. Plant Protection Act of 2000 (7 U.S. Code 7701–7772). Noxious weed management is regulated by the departments in each state listed in Table 5.2.3-1. In Minnesota, the Minnesota DNR is responsible for state-prohibited and state-regulated invasive aquatic plants, and the Department of Agriculture is responsible for state-prohibited and state-regulated terrestrial plants classified as noxious weeds.

Table 5.2.3-1. State Regulations Concerning Noxious Weed Management

State	Administering Agency	Regulation
North Dakota	North Dakota Department of Agriculture	Noxious Weed Control (ND Law Ch. 4.1-47-02)
Minnesota	Minnesota Department of Agriculture	Minnesota Noxious Weed Law (Minn Stat. § 18.75 to 18.91;)
Iowa	Iowa Weed Commissioners’ Association	Iowa Noxious Weeds and the Iowa Weed Law (IA Code Ch. 317)
Illinois	Illinois Department of Agriculture	Illinois Noxious Weed Law (Illinois Administrative Code, Title 8, Ch. I, Subchapter f, Part 220)
Wisconsin	Wisconsin Department of Natural Resources	Invasive Species Rule (WI Code Ch. NR 40)

5.2.3.1.2 Methodology

The ROI for this evaluation encompassed the area within 0.5 mile of the Applicant’s proposed project and CN Alternatives in North Dakota, Minnesota, Iowa, Illinois, and Wisconsin. Existing conditions, in terms of vegetation cover, noxious weeds and invasive plant locations, were identified within 0.5 mile from pipeline route centerlines or other facilities.

Existing vegetation resources were identified and analyzed using multiple information sources, starting at a broad scale and narrowing to a more localized scale. These data provided classification and nomenclature of vegetation that allowed comparison of the impacts of the Applicant’s proposed project and CN Alternatives on specific vegetation resources at different levels.

The following data are used to describe existing conditions and perform analysis:

- EPA Ecoregions, Levels III and IV (describe existing conditions only, not integrated into the impact analysis) (EPA 2016);
- National Land Cover Database (NLCD) (Homer et al. 2015);
- Minnesota Biological Survey Sites of Biodiversity Significance (MBS Sites) (Minnesota DNR 2016d);
- Minnesota Native Plant Community Hierarchy (Minnesota DNR 2016a);
- Minnesota DNR Old Growth and HCVF (Minnesota DNR 2016f); and
- State-listed noxious weeds

No single one of the datasets listed above provides a complete indication of all relevant impacts to vegetation. Together, though, these datasets provide a reasonably comprehensive indication of the potential impacts. For example, acreage counts for different NLCD land cover types crossed do not consider how unique or sensitive certain areas might be within the broad NLCD cover type classes. However, data from the MBS database can aid the reader in understanding the extent of potential impacts on unique and highly sensitive areas.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with the qualitative descriptions of impacts that are contained in the text. Tables in this section provide counts, for example, of acres of the ROI containing rare native plant communities and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to native plant communities is contained in the text of this section.

Ecoregions are areas where ecosystems (and the type, quality, and quantity of associated environmental resources) are generally similar. They denote areas of similarity in the mosaic of biotic and abiotic components, including geology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology (EPA 2016). Level III and IV Ecoregions data (EPA 2016) were used to identify broad-scale patterns of existing vegetation within the general vicinity of the proposed project.

The NLCD (Homer et al. 2015) describes and delineates broad-scale land classes of vegetation cover. NLCD uses a combination of satellite imagery, national vegetation survey data, and local vegetation survey data to provide a spatial reference and descriptive data for characteristics of the land surface by grouping similar types of land cover into a variety of classifications (e.g., developed, forested, and cultivated).

Not all of the NLCD cover classifications are appropriate for use in this analysis. For example, because the category of developed lands (residential, commercial, and industrial lands) primarily include artificially created landscapes with minimal naturally-occurring vegetation, these lands were not included in the vegetation impact summaries.

The NLCD vegetation cover classes that are within the ROI for the Applicant's proposed project and CN Alternatives are defined in Table 5.2.3-2 below and illustrated in Figure 5.2.3-1 under Existing Conditions.

MBS Sites are extensive landscape areas mapped and assessed by Minnesota DNR staff for context and ecological influence of the landscape; size, condition, and quality of native plant communities, and quality and rarity of individual plant species. These values are combined to assign a biodiversity significance rank for each site ranging from Outstanding, High, Moderate, or Below. Outstanding and High-ranked sites are of most concern for conservation, as they contain rare species, native plant communities, and intact landscapes. Delineation of MBS Sites is an on-going effort. These data are therefore incomplete and are considered to be preliminary. What are available for intersection with the Applicant's proposed project and CN Alternatives are illustrated in Figure 5.2.3-2.

Native vegetation in Minnesota is classified by a six-level hierarchy. This analysis references two of these levels – the ecological system and the native plant community. Ecological systems, the second highest level, are groups of native plant communities unified by strong influence from a major ecological process such as fire and hydrology. Minnesota native plant communities are groups of native plants that associate with each other, and with their environment, in ways not greatly altered by modern human activity or by introduced organisms. These groups of native plant species form recognizable plant communities that re-occur in similar ecological conditions. Native plant community mapping continues across the state; all completed MBS Sites have native plant community mapping done within outstanding and high-ranked units only. Native plant communities are also mapped outside of MBS Sites. Native plant communities are ranked by state conservation status, which reflects the level of rarity across the state. The conservation status ranks range from S1 – critically imperiled to S5 – secure, common, widespread, and abundant; native plant communities ranked as S1 – critically imperiled, S2 – imperiled, and S3 – vulnerable to extirpation or extinction are considered to be "rare."

Table 5.2.3-2. National Land Cover Database Classifications

Classification	Definition
Barren Land (Rock/Sand/Clay)	Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Deciduous Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
Evergreen Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.
Mixed Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
Shrub/Scrub	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
Grassland/Herbaceous	Areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Pasture/Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
Cultivated Crops	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
Woody Wetlands	Areas where forest or shrub land vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Table 5.2.3-2. National Land Cover Database Classifications

Classification	Definition
Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Old-growth forests, identified in Minnesota DNR's Forest Stand Inventory, are designated forests in Minnesota that have not experienced severe, stand-replacing disturbance over the last 120 years. Old-growth forests are recognized as valuable resources in Minnesota and are protected from harvesting operations. They provide unique wildlife habitat, rare plant refugia, genetic reservoirs, and research opportunities.

Minnesota DNR requires designation of HCVFs as part of the Forest Stewardship Council's® forest certification (Minnesota DNR 2016f). HCVFs are forest areas that contain concentrations of rare, threatened, or endangered species; natural communities; and other biodiversity values that occur in numbers, frequency, quality, and/or density that are sufficiently outstanding to be considered unique or highly important in comparison with other forest areas within the ecoregion. HCVF lands are managed for a broad set of objectives and forest resources in a manner that will maintain or enhance these values across the landscape.

Mapped locations of state-listed noxious weeds and invasive plant species populations within 0.5 mile of the Applicants's proposed Project, and System Alternative SA-04 route, were obtained as state- and county-level data from three sources (University of Georgia 2016; Minnesota DA 2016; Minnesota DNR 2016b) for Minnesota, Wisconsin, and North Dakota. These populations are listed by route, species, state-specific control status, and state of observation, in Table 5.2.3-3.

Potential impacts on vegetation resources are estimated for activities associated both with construction and operation of the Applicant's proposed project, as well as the CN Alternatives. Direct impacts on vegetation include disruption or removal of rooted vegetation resulting in a reduction in areas of existing vegetation communities, reduction of total numbers of plant species (species richness) within an area, and/or reduction or loss of total area, diversity, structure, or function of wildlife habitat. Therefore, the potential for negative impacts on vegetation is assumed to be proportional to the estimated area of surface disturbance under each alternative. The larger the area, the greater the potential for direct and indirect impacts.

A number of indirect impacts on vegetation resources are possible as a result of construction and operation activities. Potential indirect impacts include loss of habitat suitable for colonization due to surface disturbance; introduction or spread of noxious weeds and invasive plant species by various vectors or conditions; and inability to achieve full expression of natural tree and shrub growth due to vegetation management. Failed reclamation or mitigation may also cause indirect impacts on these resources. Most indirect impacts are assumed to result from direct impacts in proportion to the relative amount of surface disturbance.

The following impact analysis integrates the assumption that for alternatives requiring new pipeline construction, the entire subject right-of-way would be subject to revegetation and reclamation commitments in the Applicant's Environmental Protection Plan (Appendix E). The plan includes BMPs to preserve and protect local soils from compaction or erosion, application of soil amendments, revegetation with site-specific seed mixes, and monitoring to document vegetation re-establishment and site stability as a part of the post-construction monitoring. Further discussion regarding impacts on soils and measures to reduce the extent and duration of impacts on soils is found in Section 5.2.2.

Construction impacts for the Applicant's proposed project were estimated using a surface disturbance that comprises estimated construction work areas, ATWS, access roads, pipe yards, pipeline permanent right-of-way, valve pads and driveways, and pump stations. This footprint was overlaid on vegetation resources parameter data, as described above.

Construction impacts for system alternative SA-04 were estimated by overlaying a standardized 120-foot-wide construction work area centered on SA-04. This footprint was overlaid on vegetation resources parameter data, as described above. Although the precise routes and facility locations for the rail and truck alternatives are not known, potential construction-related impacts for these alternatives were qualitatively estimated based on the descriptions of potential locations for new facilities, the descriptions of potential transportation routes, and available vegetation information for these areas.

Construction impacts for continued use of the existing Line 3 pipeline are qualitatively addressed for integrity digs and subsequent pipeline repair and address the potential for these actions to occur in areas of vegetation resources, as described above.

Operations impacts for the Applicant's proposed project were estimated based on the permanent right-of-way footprints provided by the Applicant. Operations impacts for SA-04 were estimated by overlaying a standardized 50-foot-wide permanent right-of-way centered on the route. Operations impacts for continued use of the existing Line 3 pipeline were evaluated based on the existing permanent right-of-way for that pipeline. Although the precise routes and facility locations of the rail and truck alternatives are not known, operations impacts for these alternatives were qualitatively evaluated using broad-scale spatial analysis and assumptions about the potential routes for train and truck transport.

5.2.3.2 Existing Conditions

A number of Level III and IV ecoregions occur within the general vicinity of the Applicant's proposed project and CN Alternatives. These ecoregions are listed, and described in Tables 5.2.3-4 and 5.2.3-5.

NLCD vegetation cover classes that occur within the ROI for the Applicant's proposed project and CN Alternatives are shown in Figure 5.2.3-1, and discussed under the impact analysis for the Applicant's proposed project and each of the CN Alternatives.

MBS Sites are shown in Figure 5.2.3-2 and discussed under the impact analysis for the Applicant's proposed project and each of the CN Alternatives.

Noxious weed and invasive plant populations mapped within 0.5 mile of the Applicant's proposed project, and system alternative SA-04, in Minnesota, Wisconsin, Illinois, and North Dakota are listed in Table 5.2.3-3

Applicant's Proposed Project

Most of the Applicant's proposed project (53 percent) would fall within the Northern Lakes and Forest Level III ecoregion, followed by the Lake Agassiz Plain ecoregion (35 percent) (Table 5.2.3-4). These ecoregions largely represent prairies, forests, wetlands, and agricultural vegetation communities. The

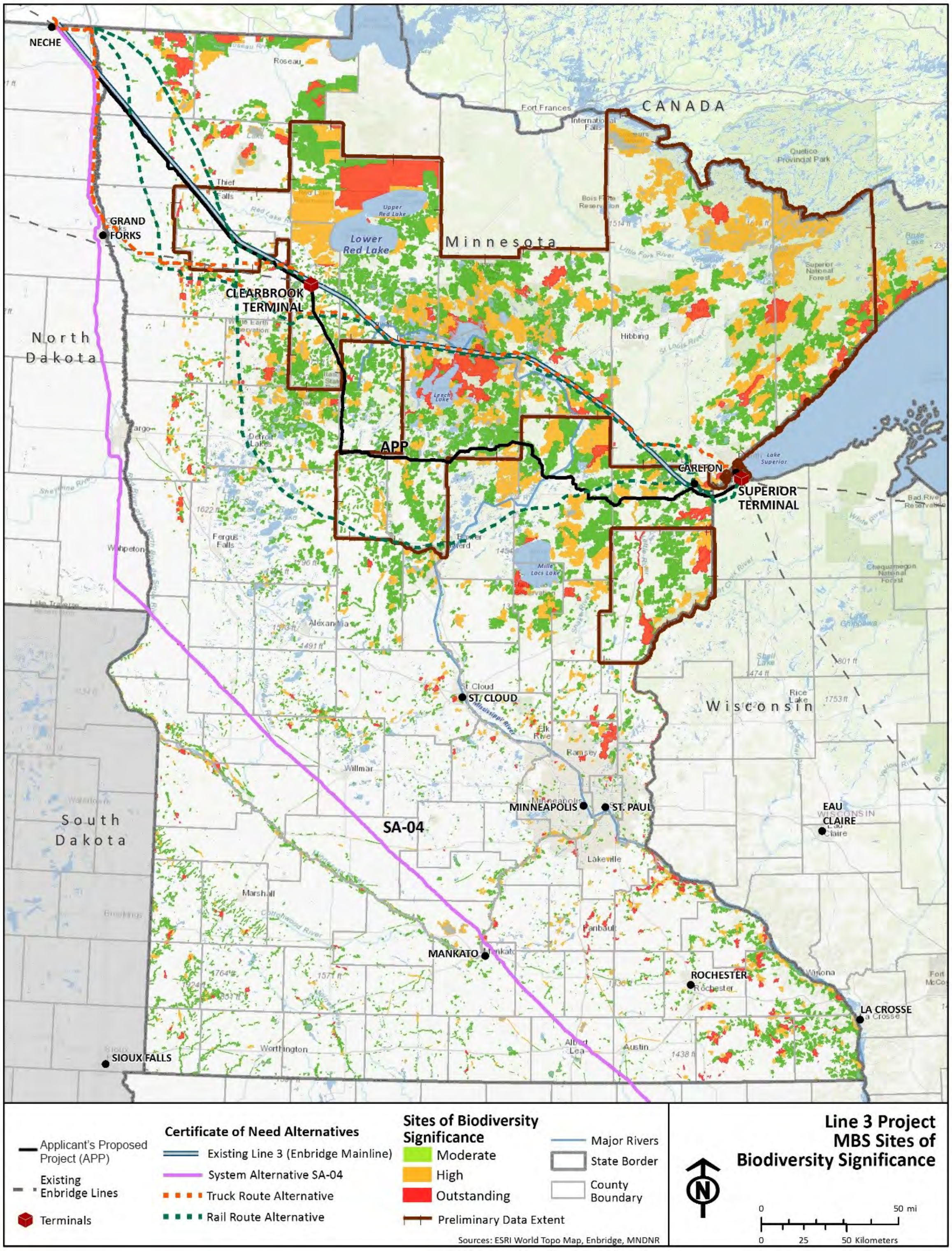
Applicant's proposed project occurs within an area of the Midwest dominated by rolling hills, plains, and rich soils suitable for agricultural development. The route is located within ecoregions that support forested uplands, forested wetlands, and agricultural areas. The topography ranges from flat river terrace croplands to forested ridges and plains.

The Applicant's proposed project crosses 10 broad-scale vegetation cover classes, listed and described in Table 5.2.3-2, include evergreen forest, deciduous forest, mixed forest, scrub/shrub, grassland/herbaceous, hay/pasture, cultivated crops, woody wetlands, emergent herbaceous wetlands, and barren land (Figure 5.2.3-1). Developed lands (residential, commercial, and industrial lands) primarily include artificially created landscapes with minimal naturally occurring vegetation and therefore were not included in the analysis. Broad-scale vegetation cover patterns demonstrate that the Applicant's proposed project occurs within areas dominated by the presence of forested vegetation cover classes (e.g., deciduous forest, woody wetland), followed by shorter-canopied vegetation communities such as cultivated crops and hay pasture cover classes.

Minnesota DNR native plant community systems that occur within 0.5 mile of the Applicant's proposed project include 11 sensitive prairie, wetland, and forest communities. These occur within Sites of Biodiversity Significance that are ranked as moderate to outstanding under the MBS Sites significance ranking (Figure 5.2.3-2). Specific locations for moderate to outstanding-ranked MBS Site and the imbedded native plant communities relative to the location of the Applicant's proposed project are shown in greater detail in Appendix A. Nineteen rare native plant communities (with S1, S2, or S3 conservation rank) were documented within 0.5 mile of the Applicant's proposed project.

Source: Homer et al. 2015.

Figure 5.2.3-1. National Land Cover Database Vegetation Cover in the Region of Interest for the Applicant's Proposed Project and Certificate of Need Alternatives



Source: Minnesota DNR 2016d, note that some data are preliminary.

Figure 5.2.3-2. Sites of Biodiversity Significance in the Region of Interest for the Applicant's Proposed Project and Certificate of Need Alternatives

Table 5.2.3-3. Noxious Weeds and Invasive Plants within 0.5 Mile of the Applicant's Proposed Project and System Alternative SA-04

Common Name	Scientific Name	State Observed[a]	Status[b]
Applicant Propose Route			
Hoary alyssum	*Berteroa incana*	MN	NA
Common buckthorn	*Rhamnus cathartica*	WI	R
Glossy buckthorn	*Frangula alnus*	WI	R
Oxeye daisy	*Leucanthemum vulgare*	MN	NA
Reed canary grass	*Phalaris arundinacea*	MN	NA
Smooth brome	*Bromus inermis*	MN	NA
Orange hawkweed	*Hieracium aurantiacum*	MN	NA
Honeysuckle	*Lonicera* spp.	MN	RNW
Spotted knapweed	*Centaurea stoebe*	MN	C
Lilac	*Syringa* spp.	WI	NA
Purple loosestrife	*Lythrum salicaria*	MN, WI	C (MN); R (WI)
Amur maple	*Acer ginnala*	WI	R
Siberian peashrub	*Caragana arborescens*	MN, WI	NA (MN); R (WI)
Queen of the prairie	*Filipendula ulmaria*	WI	R
Leafy spurge	*Euphorbia esula*	MN	C
White sweetclover	*Melilotus alba*	MN	NA
Yellow sweetclover	*Melilotus officinalis*	MN	NA
Tansy	*Tanacetum vulgare*	MN	C
Thistle spp.[c]	*Cirsium* spp.	MN	NA
Bull thistle	*Cirsium vulgare*	MN	NA
Canada thistle	*Cirsium arvense*	MN	C
Plumeless thistle	*Carduus acanthoides*	MN	C
Sow thistle	*Sonchus arvensis*	MN	NA
Birdsfoot trefoil	*Lotus corniculatus*	MN	NA
Common valerian	*Valeriana officinalis*	WI	R
White willow	*Salix alba*	MN	NA
Wild parsnip	*Pastinaca sativa*	MN	C
Clustered bur-reed	*Sparganium glomeratum*	MN	NA
Curly-leaved pondweed	*Potamogeton crispus*	MN	NA
Ladysthumb	*Persicaria maculosa*	MN	NA
Longleaf dock	*Rumex longifolius*	MN	NA
Redtop	*Agrostis gigantea*	MN	NA

Table 5.2.3-3. Noxious Weeds and Invasive Plants within 0.5 Mile of the Applicant's Proposed Project and System Alternative SA-04

Common Name	Scientific Name	State Observed[a]	Status[b]
System Alternative SA-04			
Birdsfoot trefoil	*Lotus corniculatus*	MN	NA
Bull thistle	*Cirsium vulgare*	ND	NA
Honeysuckle	*Lonicera* spp.	MN	RNW
Canada thistle	*Cirsium arvense*	MN, ND	C (MN); NW (ND)
Common reed	*Phragmites australis*	IL, MN	NA (IL); RNW (MN)
Cow vetch	*Vicia cracca* ssp. *tenuifolis*	MN	NA
Curly-leaved pondweed	*Potamogeton crispus*	MN	NA
Common buckthorn	*Rhamnus cathartica*	MN	RNW
Glossy buckthorn	*Frangula alnus*	MN	RNW
Greater celandine	*Chelidonium majus*	MN	NA
Purple loosestrife	*Lythrum salicaria*	MN	C
Purple crown-vetch	*Securigera varia*	MN	RNW
Reed canary grass	*Phalaris arundinacea*	IL,MN	NA (IL and MN)
Russian-olive	*Elaeagnus angustifolia*	MN	NA
Smooth brome	*Bromus inermis*	MN	NA
White sweetclover	*Melilotus alba*	MN	NA
Wild parsnip	*Pastinaca sativa*	MN	C
Yellow sweetclover	*Melilotus officinalis*	MN	NA

Sources: Minnesota DNR 2016b; Minnesota DA 2016; University of Georgia 2016.

[a] State Observed = Occurrences of infestations within 0.5 mile from the Applicant's proposed project and System Alternative SA-04.

[b] Status (MN): E = Eradicate List; C = Control List; RNW = Restricted Noxious Weed; SRP = Specially Regulated Plants (Minnesota DA 2016)
Status (WI): R = Restricted; P = Prohibited (Wisconsin DNR 2016b)
Status (ND): NW = Noxious Weed (North Dakota DA 2017)
Status (IL): NW – Noxious Weed (Illinois DA 2002)

[C] May include native, non-weed thistle species

NA = plant species with no legal status per Minnesota Noxious Weed List (Minnesota DA 2016); Wisconsin Invasive Species Rule (Wisconsin DNR 2016b), North Dakota Noxious Weed List (North Dakota DA 2017), or Illinois Noxious Weed Law (Illinois DA 2002.]

Table 5.2.3-4. Miles of Applicant's Proposed Project within Levels III and IV Ecoregions

Level III[a]	Level IV[a]	Description[a]	Miles within Ecoregion
48. Lake Agassiz Plain	Beach Ridges and Sand Deltas	Low ridges of gravel and sand with mix of row crops, small grains, woodland, and wetlands	35.5
	Glacial Lake Agassiz Basin	Flat former lake bed dominated by row crops and grains	56.1
	Lake Agassiz Plains	Flat land higher than 48a with row crops, small grains, and pasture	42.7
50. Northern Lakes and Forests	Chippewa Plains	Mostly level landscape with forest, crops, and pasture and many lakes	30.1
	Glacial Lakes Upham and Aitken	Flat former lake beds with peat and sandy soils covered with wetlands, forest, and some pasture	31.4
	Itasca and St. Louis Moraines	Mostly forested rolling landscape with some lakes, crops, and pasture	74.7
	Lake Superior Clay Plain	Clay-covered former lake bed strongly dissected with mixed land use	19.1
	Minnesota/Wisconsin Upland Till Plain	Rolling landscape of woods, wetlands, pasture, and crops	45.6
51. North Central Hardwood Forests	Alexandria Moraines and Detroit Lakes Outwash Plain	Elevated knob and kettle landscape with many lakes and mix of forest, row crops, and pasture	11.1
	Wadena/Todd Drumlins and Osakis Till Plain	Drumlins and rolling plains with row crops, pasture, and woodland	34.3
TOTAL			**380.5**

[a] Source: EPA 2016.

Notes:

Values in table may not sum to total due to rounding.

The Applicant's proposed project does not cross any old-growth forest stands or HCVF. Three old-growth forest stands were identified within 0.5 mile of the Applicant's proposed project; these include two ash and one Norway pine cover types. One HCVF was identified within 0.5 mile of the Applicant's proposed project (Kettle Lake Peatlands HCVF).

Continued Use of Existing Line 3

The existing Line 3 pipeline route extends through four Level III ecoregions, initiating in the Lake Agassiz Plain and terminating in the Northern Lakes and Forests ecoregion. The existing Line 3 pipeline crosses the same 10 NLCD vegetation classes as the Applicant's proposed project, as shown in Figure 5.2.3-1 and described in Table 5.2.3.-2. Vegetation within the existing Line 3 pipeline permanent right-of-way is managed to prevent the growth of trees and large shrubs to allow for visual inspection of the right-of-way. Trees and shrubs are cleared at regular intervals to promote shorter-growth vegetation cover classes, including emergent marsh, grassland/herbaceous, and hay/pasture. Forest and shrub covers is retained above HDD crossings.

Nine Minnesota native plant communities within seven native plant community systems ranked from moderate to outstanding for MBS Site rank (Figure 5.2.3-2) and one rare native prairie plant community (S2) occur within the existing Line 3 pipeline permanent right-of-way. These rare and native plant community sites may have each been avoided or previously disturbed during the original Line 3 construction.

One old-growth forest stand is adjacent to the existing Line 3 pipeline permanent right-of-way; no HCVFs are within 0.5 mile of the existing Line 3 pipeline permanent right-of-way.

System Alternative SA-04

SA-04 would initiate within the Lake Agassiz Plain EPA ecoregion and terminate in the Central Corn Belt Plains ecoregion of western Illinois. Table 5.2.3-5 describes the ecoregions crossed by SA-04. The route of SA-04 is within an area of the Midwest dominated by rolling hills, plains, and rich soils suitable for agricultural development. It is largely dominated (82 percent) by ecoregions that support croplands and other agricultural activities. The topography ranges from flat river terrace croplands to forested ridges and plains.

SA-04 crosses the same 10 NLCD cover classes as the Applicant's proposed project and the existing Line 3 pipeline right-of-way, including evergreen forest, deciduous forest, mixed forest, scrub/shrub, grassland/herbaceous, hay/pasture, cultivated crops, woody wetlands, emergent herbaceous wetlands, and barren land (Figure 5.2.3-1 and Table 5.2.3-2). Broad-scale vegetation cover patterns demonstrate that SA-04 occurs within areas dominated by the presence of cultivated crop cover classes.

Minnesota native plant community systems that occur within 0.5 mile of SA-04 include seven prairie, wetland, and forest communities; ranked as moderate to outstanding under the MBS Sites significance ranking (Figure 5.2.3-2). Specific locations for moderate to outstanding-ranked MBS Sites native plant communities relative to the location of SA-04 are shown in greater detail in Appendix A. Thirteen rare native plant communities (S1, S2, or S3 conservation rank) were documented within 0.5 mile of SA-04.

No old-growth forests and no HCVFs were identified within 0.5 mile of SA-04.

Table 5.2.3-5. Miles of System Alternative SA-04 within Levels III and IV Ecoregions

Level III[a]	Level IV[a]	Description[a]	Miles within Ecoregion
46. Northern Glaciated Plains	Tewaukon/Big Stone Stagnation Moraine	Gently undulating moraine field with mix of row crops, many small lakes, marshes, and potholes	39.0
47. Western Corn Belt Plains	Des Moines Lobe	Vast, fertile plain of deep soils dominated by row crops	140.5
	Eastern Iowa and Minnesota Drift Plains	Older till plain with mostly row crops and some pasture	177.2
	Rolling Loess Prairies	Loess-covered undulating plain with dissecting rivers and predominantly row crops	54.3
48. Lake Agassiz Plain	Beach Ridges and Sand Deltas	Low ridges of gravel and sand with mix of row crops, small grains, woodland, and wetlands	15.2
	Glacial Lake Agassiz Basin	Flat former lake bed dominated by row crops and grains	223.3

Table 5.2.3-5. Miles of System Alternative SA-04 within Levels III and IV Ecoregions

Level III[a]	Level IV[a]	Description[a]	Miles within Ecoregion
	Saline Area	Salt-affected soils from artesian groundwater flows. Areas of reduced crop productivity are used for range or wildlife habitat.	18.7
51. North Central Hardwood Forests	Big Woods	Rolling plain with some lakes, mostly row crops with pasture and suburban development; formerly extensive hardwood forest	3.9
54. Central Corn Belt Plains	Illinois/Indiana Prairies	Vast flat to rolling plains with fertile soils that developed under tallgrass prairies. Marshes and wet prairies naturally occurred in poorly drained areas, and forests grew on concentric moraines and floodplains.	71.3
	Rock River Hills	Agriculturally dominated, rolling hills, and undulating plains. Rugged areas are partly forested. Physiography is strongly influenced by the underlying limestone, dolomite, and sandstone.	1.4
	Sand Area	Disjunct, sandy outwash plains, sand plains, relict dunes; mix of natural vegetation, natural soil drainage properties, irrigation needs, and stream characteristics	31.7
72. Interior River Valleys and Hills	Upper Mississippi Alluvial Plain	Broad floodplains and low river terraces of the Mississippi River and its major tributaries above the Mississippi's confluence with the Missouri River, including much of the Illinois River	18.8
TOTAL			**795.4**

[a] Source: EPA 2016.

Notes:

Values in table may not sum to total due to rounding.

Transportation by Rail

New transport and loading facilities for the rail alternative would be located near Gretna, Canada, within the Lake Agassiz Plain ecoregion—in an area dominated by agricultural lands. Near Clearbrook, Minnesota, offloading facilities and a reactivated rail line would be located within the North Central Hardwoods ecoregion, in an area with a mix of developed land, forests, row crops, and pastures. Near Superior, Wisconsin, the offloading facilities would be located within the Northern Lakes and Forests ecoregion in an area with a mix of developed land, forests, and wetlands.

NLDC vegetation cover near the Clearbrook and Superior terminals where facilities likely would be developed includes a combination of primarily deciduous forest, evergreen forest, cultivated crops, and woody wetlands. Vegetation cover classes within the ROI for the rail alternative are as shown in Figure 5.2.3-1.

No Minnesota native plant communities occur near the potential locations for the offloading facility at the Clearbrook terminal. The new rail line between Clearbrook and Gully would cross just south of a forested area and a prairie ranked as moderate MBS Site native plant communities. No native plant communities were identified at the Superior terminal, although several Wisconsin threatened and endangered plants occur near this location (Wisconsin DNR 2016a) (see Section 5.2.5). No old-growth forest stands or HCVFs occur near the Clearbrook terminal or along the new rail line.

Railroad rights-of-way, established prior to the widespread conversion of native prairies to croplands in the Prairie Parkland and Eastern Broadleaf Forest provinces, contain some of the last native prairie remnants in the region (Merchant and Biederman 1999). Of the approximately 332 miles of railroad rights-of-way that would most likely be used under this alternative that were evaluated in the Merchant and Biederman (1999) study, approximately 59 miles (18 percent) contain prairie remnants (Table 5.2.3-6). Mesic prairie was the most abundant type, and for all prairie remnants along the proposed routes, 14.5 miles (25 percent) were rated very good. Approximately 1.1 miles of native plant communities (S2 and S3) are crossed by the rail transportation route, most of which are prairies (Table 5.2.3-7). One aspen old-growth forest stand occurs along the southern rail route; one HCVF, Kertsonville Wildlife Management Area (WMA), is crossed by the northern rail route.

Table 5.2.3-6. Miles of Likely Rail Transportation Routes Through Prairie Remnants of Differing Quality

Prairie Type	Quality Rating[a]			
	Fair	Good	Very Good	TOTAL
Wet prairie	2.6	4.9	1.0	8.6
Wet-brush prairie	--	--	2.5	2.5
Mesic prairie	13.1	23.5	10.8	47.4
Dry prairie	--	--	0.2	0.2
TOTAL	**15.8**	**28.5**	**14.5**	**58.7**

Sources: Minnesota DNR 2017; Merchant and Biederman 1999.

[a] Fair: greater than 25% native grass cover, greater than 5% native forb cover, and less than 50% woody cover
Good: greater than 55% native grass cover, greater than 9% native forb cover, and less than 25% woody cover
Very Good: greater than 70% native grass cover, greater than 15% native forb cover, and less than 10% woody cover

Notes:

Values in table may not sum to subtotals and totals due to rounding.

"--" = no occurrence

Table 5.2.3-7. Miles of Likely Rail Transportation Routes Through Native Plant Communities

Native Plant Community	MBS Site Significance Rank[a]	Conservation Rank[b]	Miles
Dry sand – gravel prairie (northern)	Moderate	S2	<0.1
Mesic prairie (northern)	Below	S2	0.1
	Moderate	S2	0.1
	High	S2	0.6
Rich black spruce swamp (basin)	High	S3	0.2
Wet prairie (northern)	Outstanding	S3	<0.1
White pine – white spruce – paper birch forest	High	S2	<0.1
TOTAL			**1.1**

Sources: Minnesota DNR 2016a, 2016d.

[a] Systems occurring within Minnesota Biological Survey Sites of Biodiversity Significance (MBS Sites) are given these ranks (Minnesota only):
Outstanding = Sites containing the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most intact functional landscapes.
High = Sites containing very good quality occurrences of the rarest species, high quality examples of rare native plant communities, and/or important functional landscapes.
Moderate = Sites containing occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery.
Below = Sites below minimum biodiversity threshold for statewide significance. These sites lack occurrences of rare species or natural features or do not meet Minnesota Biological Survey standards for outstanding, high, or moderate rank.
(blank) = no corresponding Biodiversity Significance Rank;

[b] S1 = critically imperiled, S2 = imperiled, S3 = vulnerable to extirpation

Notes:

Values in table may not sum to total due to rounding.

Transportation by Truck

Transport and loading facilities for the truck alternative would be located near Gretna, Canada, within the Lake Agassiz Plain ecoregion, in an area dominated by agricultural lands. Near Clearbrook, Minnesota, the offloading facilities would be located within the North Central Hardwoods ecoregion in an area with a mix of developed, forest, row crops, and pasture. Near Superior, Wisconsin, the offloading facilities would be located within the Northern Lakes and Forests ecoregion in an area with mixed developed land, forests, and wetlands.

Vegetation cover near the Clearbrook and Superior terminals where facilities likely would be developed includes a combination of primarily deciduous forest, evergreen forest, cultivated crops, and woody wetlands. Vegetation cover classes within the ROI for the rail alternative are shown in Figure 5.2.3-1.

No Minnesota native plant communities occur near the potential locations for the offloading facility at the Clearbrook terminal. No native plant communities were identified near the potential locations for the offloading facility at the Superior terminal, although several Wisconsin threatened and endangered plants occur near this location (Wisconsin DNR 2016a) (see Section 5.2.5). No old-growth forest stands or HCVFs occur near the Clearbrook terminal.

No native plant communities are crossed by the truck routes. Four rare native plant communities occur next to the routes, including Northern Dry Sand-Gravel Prairie (S2, Chester 25); seepage meadow/Carr

(S3, McIntosh Channel Delta); tamarack seepage swamp (S3, McIntosh Channel Delta); and northern wet prairie (S3, Marcoux Corners). No old-growth forest stands or HCVFs are crossed by the truck routes, although the route passes just north of the Floodwood Bog HCVF.

Existing Line 3 Supplemented by Rail

Existing conditions for the existing Line 3 supplemented by rail are similar to those described above for continued use of the existing Line 3 pipeline and the rail alternative.

Existing Line 3 Supplemented by Truck

Existing conditions for the existing Line 3 supplemented by truck are similar to those described above for continued use of the existing Line 3 pipeline and the truck alternative.

5.2.3.3 Impact Assessment

This section describes the potential for impacts on vegetation resources from Project-related construction and operation actions. The potential effects on vegetation of the Applicant's proposed project and CN Alternatives are described below in terms of the following three vegetation parameters:

- Loss or alteration of vegetation cover,
- Loss or alteration of native plant communities, and
- Spread of noxious weeds and invasive plants.

The impact assessment integrates, for all alternatives, revegetation and reclamation commitments in the Applicant's Environmental Protection Plan (Appendix E), during, and upon completion of, construction of the entire respective pipeline rights-of-way. The plan includes a full compliment of BMPs and mitigation measures to protect soil resources, and conduct revegetation and monitoring activities.

5.2.3.3.1 Applicant's Proposed Project

Vegetation resources would be temporarily or permanently altered by construction and operations within the affected ecoregions, native and rare plant communities, and in terms of spread of noxious weed and invasive plant species, as discussed in the sections below.

Construction Impacts

<u>Loss or Alteration of Vegetation Cover</u>

Construction of the Applicant's proposed project would result in loss or alteration of up to 5,617 acres of existing vegetation during construction in North Dakota, Minnesota, and Wisconsin (Table 5.2.3-8). Sixty-three (63) percent of these impacts would occur within the Deciduous Forest and Cultivated Crops cover types. Affected vegetation cover classes are presented, by state, in Table 5.2.3-9. Estimated Impacts on Minnesota Native Plant Community Systems and MBS Sites from Applicant's Proposed Project are summarized in Table 5.2.3-10.

Table 5.2.3-8. Estimated Impacts on National Land Cover Database Vegetation Cover for the Applicant's Proposed Project (acres)

Vegetation Cover Class	Con[a]	Op[b]	ATWS	Access Roads	Pump Stations	MLVs	Total Construction[c]		Total Operation[c]	
							Acres	% of Total	Acres	% of Total
Evergreen forest	177	71	18	19	1	1	199	4	87	4
Deciduous forest	1,416	622	97	103	2	2	1,544	28	698	29
Mixed forest	20	8	1	2	<0.1	<0.1	21	4	11	0
Scrub/shrub	239	117	15	13	2	<0.1	256	5	131	5
Grassland/herbaceous	131	63	32	9	4	0	165	3	73	3
Hay/pasture	585	262	121	45	16	1	706	13	323	13
Cultivated crops	1,699	726	327	22	20	2	2,028	36	768	31
Woody wetlands	419	204	18	13	3	1	438	8	219	9
Emergent herbaceous wetlands	229	122	19	7	3	0	249	4	132	5
Barren land	4	2	8	1	<0.1	<0.1	12	0	2	0
TOTAL	**4,917**	**2,197**	**656**	**234**	**50**	**6**	**5,617**	**100**	**2,444**	**100**

Source: Homer et al. 2015.

[a] Minnesota: Con = Enbridge-provided construction work area, which includes 50-foot-wide permanent right-of-way; North Dakota and Wisconsin: Con = estimated construction impact area in acres based on 120-foot-wide construction footprint centered on route, which includes the 50-foot-wide permanent right-of-way

[b] Minnesota: Op = Enbridge-provided footprint of permanent right-of-way; North Dakota and Wisconsin: Op = estimated operations impact area in acres based on 50-foot-wide permanent right-of-way centered on route

[c] Total Construction = sum of pipeline construction work area, ATWS (additional temporary workspaces), including pipe yards, and temporary access roads; Total Operations = sum of pipeline permanent right-of-way, primary access roads, pump stations, and MLVs (mainline valves), including valve pads and driveways

Notes:

Values in table may not sum to subtotals and totals due to rounding.

Table 5.2.3-9. Estimated Impacts on National Land Cover Database Vegetation Cover by State for the Applicant's Proposed Project (acres)

Vegetation Cover Class	Con[a]	Op[b]	ATWS	Access Roads	Pump Stations	MLVs	Total Construction[c]		Total Operation[c]	
							Acres	% of Total	Acres	% of Total
North Dakota[a]										
Evergreen forest	1	0	--	--	--	--	1	0	0	0
Deciduous forest	2	1	--	--	--	--	2	0	1	0
Mixed forest	<0.1	<0.1	--	--	--	--	<0.1	0	<0.1	0
Scrub/shrub	<0.1	<0.1	--	--	--	--	<0.1	0	<0.1	0
Grassland/herbaceous	0	0	--	--	--	--	0	0	0	0
Hay/pasture	5	2	--	--	--	--	5	1	2	1
Cultivated crops	363	151	--	--	--	--	363	97	151	97
Woody wetlands	3	1	--	--	--	--	3	1	1	1
Emergent herbaceous wetlands	<0.1	<0.1	--	--	--	--	<0.1	0	<0.1	0
Barren land	<0.1	<0.1	--	--	--	--	<0.1	0	<0.1	0
Subtotal	***374***	***156***	***0***	***0***	***0***	***0***	***374***	***100***	***156***	***100***
Minnesota[b]										
Evergreen forest	176	71	18	19	1	1	198	4	86	4
Deciduous forest	1,349	594	97	103	2	2	1,477	29	670	30
Mixed forest	18	8	1	2	<0.1	<0.1	20	0	10	0
Scrub/shrub	226	112	15	13	2	<0.1	243	5	125	6
Grassland/herbaceous	130	62	32	9	4	0	164	3	73	3
Hay/pasture	577	259	121	45	16	1	699	14	320	14
Cultivated crops	1,336	575	327	22	20	2	1,665	33	617	28
Woody wetlands	336	170	18	13	3	1	355	7	185	8

Table 5.2.3-9. Estimated Impacts on National Land Cover Database Vegetation Cover by State for the Applicant's Proposed Project (acres)

Vegetation Cover Class	Con[a]	Op[b]	ATWS	Access Roads	Pump Stations	MLVs	Total Construction[c]		Total Operation[c]	
							Acres	% of Total	Acres	% of Total
Emergent herbaceous wetlands	229	122	19	7	3	0	249	5	132	6
Barren land	4	2	8	1	<0.1	<0.1	12	0	2	0
Subtotal	***4,380***	***1,973***	***656***	***234***	***50***	***6***	***5,081***	***100***	***2,220***	***100***
Wisconsin[a]										
Evergreen forest	1	0	--	--	--	--	1	0	0	1
Deciduous forest	65	28	--	--	--	--	65	1	28	40
Mixed forest	1	1	--	--	--	--	1	0	1	1
Scrub/shrub	13	6	--	--	--	--	13	0	6	8
Grassland/herbaceous	1	0	--	--	--	--	1	0	0	0
Hay/pasture	3	1	--	--	--	--	3	0	1	2
Cultivated crops	0	0	--	--	--	--	0	0	0	0
Woody wetlands	79	33	--	--	--	--	79	1	33	48
Emergent herbaceous wetlands	<0.1	<0.1	--	--	--	--	<0.1	0	<0.1	0
Barren land	<0.1	<0.1	--	--	--	--	<0.1	0	<0.1	0
Subtotal	***163***	***69***	***--***	***--***	***--***	***--***	***163***	***3***	***69***	***100***
TOTAL	**4,917**	**2,197**	**656**	**234**	**50**	**7**	**5,617**	**100**	**2,444**	**100**

Source: Homer et al. 2015.

[a] Minnesota: Con = Enbridge-provided construction work area, which includes 50-foot-wide permanent right-of-way; North Dakota and Wisconsin: Con = estimated construction impact area in acres based on 120-foot-wide construction footprint centered on route, which includes the 50-foot-wide permanent right-of-way

[b] Minnesota: Op = Enbridge-provided footprint of permanent right-of-way; North Dakota and Wisconsin: Op = estimated operations impact area in acres based on 50-foot-wide permanent right-of-way centered on route

[c] Total Construction = sum of pipeline construction work area, ATWS (additional temporary workspaces), including pipe yards, and temporary access roads; Total Operations = sum of pipeline permanent right-of-way, primary access roads, pump stations, and MLVs (mainline valves), including valve pads and driveways

"--" = no occurrence

Table 5.2.3-10. Estimated Impacts on Minnesota Native Plant Community Systems and MBS Sites from Applicant's Proposed Project, in Acres of Disturbance and Number of Respective Communities of Each Type Affected

Native Plant Community System	MBS Site Significance Rank[a]	Construction[b]		Operations[c]		Facilities				Totals[d]				Within 0.5 Mile	
						Construction		Operations		Construction		Operations			
		Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.
Acid peatland system	High	2.4	3	1.2	3	--	--	--	--	2.4	3	1.2	3	340	23
Complex community	High	--	--	--	--	--	--	--	--	--	--	--	--	135	7
	Moderate	5.8	2	3.1	2	--	--	--	--	5.8	2	3.1	2	288	5
Fire-dependent forest/woodland system	Outstanding	--	--	--	--	--	--	1.5	2	<0.1	<0.1	1.5	2	267	32
	High	--	--	--	--	0.3	1	--	--	0.3	1	--	--	277	24
	Moderate	28.7	9	13.7	9	3.5	19	3.5	6	32.2	28	17.2	15	1,817	59
Forested rich peatland system	Outstanding	3.5	2	1.8	2	--	--	--	--	3.5	2	1.8	2	27	1
	High	17.6	6	9	6	--	--	1	2	18	6	10	8	650	32
	Moderate	4.9	5	4.6	5	0.1	1	--	--	5.0	6	4.6	5	442	19
Marsh system	Outstanding	--	--	--	--	--	--	--	--	--	--	--	--	197	29
	Moderate	--	--	--	--	--	--	--	--	--	--	--	--	<0.1	1
Mesic hardwood forest system	Outstanding	--	--	--	--	--	--	--	--	--	--	--	--	129	30
	High	9.0	7	4.0	7	0.2	2	--	--	9.2	9	4.0	7	566	30
	Moderate	42.7	7	19.0	7	12.0	37	2.1	5	54.7	44	21.1	12	1,394	28
Open rich peatland system	Outstanding	--	--	--	--	--	--	--	--	--	--	--	--	49.5	3
	High	--	--	--	--	--	--	--	--	--	--	--	--	7.1	1
	Moderate	5.5	7	4.3	7	<0.1	3	--	--	5.5	10	4.3	7	515	16
Upland prairie system	Outstanding	--	--	--	--	--	--	--	--	--	--	--	--	37	6
	High	--	--	--	--	--	--	--	--	--	--	--	--	93	3
	Moderate	1.7	1	0.7	1	0.3	1	--	--	2.0	2	0.7	1	44	1

Table 5.2.3-10. Estimated Impacts on Minnesota Native Plant Community Systems and MBS Sites from Applicant's Proposed Project, in Acres of Disturbance and Number of Respective Communities of Each Type Affected

Native Plant Community System	MBS Site Significance Rank[a]	Construction[b]		Operations[c]		Facilities				Totals[d]				Within 0.5 Mile	
						Construction		Operations		Construction		Operations			
		Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.
Wet forest system	Outstanding	--	--	--	--	--	--	--	--	--	--	--	--	52	11
	High	6.2	4	2.8	4	0.6	3	--	--	6.8	7	2.8	4	206	18
	Moderate	2.8	3	1.9	3	0.1	1	--	--	2.9	4	1.9	3	207	8
Wet meadow/Carr system	Outstanding	--	--	--	--	--	--	0	1	--	--	0	1	35	35
	High	0.5	1	0.3	1	10.5	11	--	--	11.0	12	0.3	1	177	19
	Moderate	4.7	16	4.1	11	--	--	--	--	4.7	16	4.1	11	765	106
Wetland prairie system	High	--	--	--	--	--	--	--	--	--	--	--	--	164	8
Total		**135.9**	**73**	**70.5**	**68**	**27.7**	**79**	**7.9**	**16**	**163.6**	**152**	**78.4**	**84**	**8,881**	**555**

Sources: Minnesota DNR 2016a, 2016d.

[a] Refer to Note [a] in Table 5.2.3-6

[b] Minnesota: Con = Enbridge-provided construction work area, which includes 50-foot-wide permanent right-of-way; North Dakota and Wisconsin: Con = estimated construction impact area in acres based on 120-foot-wide construction footprint centered on route, which includes the 50-foot-wide permanent right-of-way

[c] Minnesota: Op = Enbridge-provided footprint of permanent right-of-way; North Dakota and Wisconsin: Op = estimated operations impact area in acres based on 50-foot-wide permanent right-of-way centered on route

[d] Total: Construction = sum of pipeline construction work area, ATWS (additional temporary workspaces), including pipe yards, and temporary access roads; Operations = sum of pipeline permanent right-of-way, primary access roads, pump stations, and MLVs (mainline valves), including valve pads and driveways)

Notes:

Values in table may not sum to subtotals and totals due to rounding.

"--" = no occurrence

Direct impacts on vegetation resources in these cover classes would result from vegetation removal during grading, trenching, and backfilling during pipeline construction. Further discussion regarding impacts on soils and measures to reduce the extent and duration of impacts on soils is found in Section 5.2.2. Construction within existing vegetation communities also would result in a short-term reduction in wildlife habitat and forage productivity in and near the active construction areas, as discussed in Section 5.2.4.

Construction impacts on shrubs and grassland cover classes (scrub/shrub, grassland/herbaceous, and emergent herbaceous wetlands), approximately 8 percent of the total vegetation disturbance, would be short- to long-term and minor, as these vegetation cover types would regenerate over time with integration of measures specificed in Appendix E. Herbaceous cover would be seeded on disturbed areas following completion of pipeline construction, and it is expected that preexisting herbaceous and shrub habitats would quickly become reestablished within several years following construction. Scrub/shrub cover, dominated by low woody cover and emergent wetlands, may require a longer time to establish cover similar to adjacent undisturbed lands when drought or the presence of livestock interfere with vegetation regrowth. Rapid colonization by annual and perennial herbaceous plants within the disturbed areas generally would restore most herbaceous groundcover within the first growing season; however, perennial herbaceous cover may require a longer time to establish cover similar to adjacent undisturbed lands when drought or the presence of livestock interfere with vegetation regrowth.

Pipeline construction impacts on the 49 percent of the total anticipated vegetation disturbance that supports hay/ pasture and cultivated crops would also be short-term and minor, with impacts typically limited to a single growing season. Impacts on hay pastures, rotated croplands, and open grassland range would be short- to long-term and minor, with vegetation reestablishing within several years following construction. Until reestablished, these vegetation cover classes would not be able to stabilize soils, provide mechanical filtration and energy dissipation during precipitation events, and provide wildlife habitat for cover and foraging. Short-term loss of these functions is of concern during the first one or two growing seasons, particularly along slopes where the potential for erosion from stormwater runoff and other areas prone to erosion exist.

Long-term or permanent major construction impacts would occur on approximately 2,451 acres (44 percent of the total) of forested upland and wetland vegetation (Table 5.2.3-8). Clearing trees within forested cover classes, including evergreen forest, deciduous forest, mixed forest, and woody wetland, would result in long-term and major impacts because these vegetation cover classes generally would require over a decade to regenerate outside the permanent right-of-way. After construction, all temporary construction work areas would be seeded with herbaceous species; previously forested areas would be allowed to revegetate naturally with trees and shrubs common to the area. Following construction, forested areas within the temporary construction work areas would return to forested vegetation type over time (up to 50 years for full recovery for some forest types). Revegetation in areas of jurisdictional wetlands may also be subject to additional mitigation measures (Section 5.2.1.3) that may hasten reestablishment and increase diversity of native plants in these areas.

Clearing trees within the construction work area would cause short-term and minor indirect impacts in adjacent forested areas by affecting interior forest vegetation along the edges of the construction work areas. By exposing adjacent trees to elevated levels of sunlight, wind, and evaporation rates, the probability of tree knockdown could increase, resulting in potential alteration of adjacent forest stands. Because of increased light levels penetrating the previously shaded interior, shade-intolerant species would be able to grow, and the native plant community composition within these forest edge habitats likely would change. Clearing also could temporarily reduce local competition for available soil moisture and light, and may allow some early successional species to become established and persist on the edge of the undisturbed areas adjacent to the right-of-way.

Loss or Alteration of Native Plant Communities

Eleven Minnesota native plant community systems and 19 rare native plant communities were identified within 0.5 mile of the Applicant's proposed project (Table 5.2.3-10 and Table 5.2.3-11, respectively). Long-term to permanent major impacts on 164 acres (152 occurrences), representing the eleven plant community systems, would occur during construction due to a loss by surface disturbance of native plant community habitat. This would include approximately 3.6 acres within outstanding-ranked MBS Sites, 47.7 acres within high-ranked MBS Sites, and 113 acres within moderate-ranked MBS Sites that would be subject to direct disturbance during construction (Table 5.2.3-10). Construction activities occurring within native plant communities would decrease the size of the communities and could fragment the communities where they are crossed. Some local native plant communities may reestablish over time following revegetation activities; however, it is expected that the quality and diversity of these communities would be lower than current conditions. Specific locations for moderate to outstanding-ranked MBS Site native plant communities relative to the location of the Applicant's proposed project are shown in greater detail in Appendix A.

Nineteen rare native plant communities occur within 0.5 mile of the Applicant's proposed project, six of which occur within the construction footprint on 46 acres (43 occurrences). This includes 45.5 acres of S1, S2, and S3 ranked rare native plant communities in 39 occurrences (Table 5.2.3-11). These six communities would be subject to direct disturbance, resulting in long-term to permanent major impacts, and are not expected to fully recover following reclamation. Following ground disturbing construction activities, all disturbed areas would be recontoured and revegetated according to existing vegetation management plans, including Appendix E, Applicant Environmental Protection Plan and agency approvals (such as a fen management plan) for work in and near rare native plant communities. In some circumstances, partial recovery may occur; however it is expected that the quality and diversity of these communities would be permanently reduced or completely removed following project construction within the right-of-way. Construction also would decrease the habitat available to the rare plant species that depend on the native plant communities.

Permanent and major impacts on rare native wetland plant communities and complexes could include potential permanent loss of sensitive plant species, alteration of hydrology, introduction of contaminants, introduction of aquatic invasive plants, and altered peat formation. For jurisdiction wetlands, as waters of the U.S., these impacts would require mitigation through appropriate required federal and state permits. Impacts on forested rare native plant communities include loss of trees, potential loss of old-growth stands, and fragmentation of forest patches leading to invasion by grasses and non-native plants that may prevent succession to the original native forest community. Construction impacts would be considered long-term to permanent and major because mature forests would require decades to reestablish.

Long-term and major impacts on native prairie communities include the potential for alteration of prairie soils, loss of sensitive plant communities, and introduction of invasive plants. Direct impacts on untilled prairie soils and vegetation during construction are expected to be long-term and could require a significant amount of time to achieve full recovery, if at all.

Table 5.2.3-11. Estimated Impacts on Rare Native Plant Communities and MBS Sites for the Applicant's Proposed Project

Native Plant Community	MBS Site Significance Rank[a]	Conservation Rank[b]	Construction[c]		Operations[d]		Facilities				Total Impacts[e]				Within 0.5 Mile of Route	
							Construction		Operations		Construction		Operations			
			Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.
Minnesota																
Alder – (red currant – meadow-rue) swamp	Outstanding	S3	--	--	--	--	--	--	--	--	--	--	--	--	2	2
	Not Ranked	S3	--	--	--	--	--	--	--	--	--	--	--	--	<0.1	1
Black ash – (red maple) seepage swamp	High	S1S2	5.1	2	2.4	2	0.6	3	--	--	5.7	5	2.4	2	66	5
Calcareous fen (northwestern)	High	S2	--	--	--	--	--	--	--	--	--	--	--	--	7	1
Graminoid poor fen (basin)	High	S3	--	--	--	--	--	--	--	--	--	--	--	--	12	3
Jack pine – (bush honeysuckle) woodland	Moderate	S1 or S3	10.3	5	5.4	5	1.4	5	2.3	4	11.7	10	7.7	9	715	22
Jack pine – (bush honeysuckle) woodland, bracken subtype	High	S1	--	--	--	--	0.3	1	--	--	0.3	1	--	--	68	2
Jack pine – (yarrow) woodland	High	S1S2	--	--	--	--	--	--	--	--	--	--	--	--	30	1
Mesic brush-prairie (northern)	Outstanding	S2	--	--	--	--	--	--	--	--	--	--	--	--	33	4
	High	S2	--	--	--	--	--	--	--	--	--	--	--	--	93	3
Mesic prairie (northern)	Outstanding	S2	--	--	--	--	--	--	--	--	--	--	--	--	4	2
	Moderate	S2	1.7	1	0.7	1	0.3	1	--	--	2.0	2	0.7	1	44	1

Table 5.2.3-11. Estimated Impacts on Rare Native Plant Communities and MBS Sites for the Applicant's Proposed Project

Native Plant Community	MBS Site Significance Rank[a]	Conservation Rank[b]	Construction[c]		Operations[d]		Facilities				Total Impacts[e]				Within 0.5 Mile of Route	
							Construction		Operations		Construction		Operations			
			Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.
Oak – aspen forest	Outstanding	S3	--	--	--	--	--	--	0.8	1	--	--	0.8	1	128	15
	High	S3	--	--	--	--	--	--	--	--	--	--	--	--	88	2
	Moderate	S3	16.4	3	7.2	3	1.6	9	1.2	2	18.0	12	8.4	5	1,024	34
	Below	S3	6.3	1	2.6	1	0.9	4	<0.1	1	7.2	5	2.6	2	60	1
	Not Ranked	S3	--	--	--	--	--	--	--	--	--	--	--	--	0	2
Red pine – white pine forest	Outstanding	S2	--	--	--	--	--	--	0.7	1	--	--	0.7	1	5	1
	High	S2	--	--	--	--	--	--	--	--	--	--	--	--	50	13
	Moderate	S2	--	--	--	--	--	--	--	--	--	--	--	--	44	1
Red pine – white pine woodland, balsam fir subtype	High	S3	--	--	--	--	--	--	--	--	--	--	--	--	23	3
Red pine – white pine woodland, mountain maple subtype	High	S3	--	--	--	--	--	--	--	--	--	--	--	--	10	2
Spikerush – bur reed marsh (northern)	Outstanding	S2	--	--	--	--	--	--	--	--	--	--	--	--	13	23
	Moderate	S2	--	--	--	--	--	--	--	--	--	--	--	--	0	1
	Not Ranked	S2	--	--	--	--	--	--	--	--	--	--	--	--	0	7
Sugar maple – basswood – (bluebead lily) forest	High	S3	--	--	--	--	--	--	--	--	--	--	--	--	98	2
Tamarack seepage swamp (aspen parkland)	Outstanding	S3	--	--	--	--	--	--	--	--	--	--	--	--	27.0	1
	Moderate	S3	--	--	--	--	--	--	--	--	--	--	--	--	10.1	1

Table 5.2.3-11. Estimated Impacts on Rare Native Plant Communities and MBS Sites for the Applicant's Proposed Project

Native Plant Community	MBS Site Significance Rank[a]	Conservation Rank[b]	Construction[c]		Operations[d]		Facilities				Total Impacts[e]				Within 0.5 Mile of Route	
							Construction		Operations		Construction		Operations			
			Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.
Wet-brush prairie (northern)	High	S3	--	--	--	--	--	--	--	--	--	--	--	--	65	5
Wet prairie (northern)	High	S3	--	--	--	--	--	--	--	--	--	--	--	--	100	3
White pine – white spruce – paper birch forest	High	S2	0.6	3	0.3	3	<0.1	1	--	--	0.6	4	0.3	3	60	9
Minnesota subtotal			***40***	***15***	***19***	***15***	***5***	***24***	***5***	***9***	***46***	***39***	***24***	***24***	***2,878***	***173***

Sources: Minnesota DNR 2016a, 2016d; North Dakota PR 2016; Wisconsin DNR 2016a.

[a] Refer to Note [a] in Table 5.2.3-6

[b] Conservation status rank denotes rarity of S1 = critically imperiled, S2 = imperiled, S3 = vulnerable to extirpation; some ranks encompass ranges (ex: S1S2, S1 or S3), CMX = community complex

[c, d, e] Refer to Notes of Table 5.2.3-9

Notes:

Values in table may not sum to subtotals and totals due to rounding.

No occurrences of rare native plant communities are listed for North Dakota or Wisconsin.

"--" = no occurrence

In addition to direct effects in the construction footprint, construction activities could result in negligible to short-term minor impacts on native plant communities adjacent to the construction work area. Potential impacts caused by surface runoff from the construction work area include increased sedimentation and the introduction or spread of invasive species. Sedimentation can affect surrounding uplands or wetlands, as well as waterways in the vicinity of the construction. While these impacts could occur, the Applicant would implement construction procedures to control runoff through use of a variety of sediment control barriers and procedures aimed at minimization or reduction of impacts on adjacent habitats. Noxious weed and invasive plant management and control would be implemented during construction and operations in an effort to minimize the effect of noxious weeds on adjacent habitats.

Although three old-growth forest stands and one HCVF, Kettle Lake Peatlands, were identified within 0.5 mile of the Applicant's proposed project, no construction would occur within these forests. All temporary construction areas (ATWS, access roads, and yards) avoid these forests, and no direct construction impacts would occur. Potential Indirect impacts include the spread of noxious weeds and invasive plants and potential removal of contiguous forest areas that serve as protective buffers.

Spread of Noxious Weeds and Invasive Plants

Fourteen weed species listed by respective State Noxious Weed Acts (Table 5.2.3-1), and 18 other invasive plant species, occur near or within the Applicant's proposed project (Table 5.2.3-3).

Disturbed soil in cleared work areas would be susceptible to invasion by noxious weeds and invasive plants that already occur in the vicinity. Establishment of these species often inhibit regeneration of native vegetation. Impacts associated with invasion of noxious weeds are difficult to quantify; however, impacts likely would be short-term and minor, as noxious weeds and invasive plant management measures would be in place during and after construction, as identified in the Applicant's Environmental Protection Plan (Appendix E). This plan details noxious weed and invasive plant control measures for construction, and management of noxious weeds and invasive species for the operational life of the pipeline. The Project would be required to manage all noxious weeds (including those not identified in Table 5.2.3-3) for which federal, state, or local (county or city) agency management policies or regulations exist. Measures to ensure that the spread of weeds is minimized include equipment cleaning, use of weed-free mulch, and use of weed-free seed mix.

Operations Impacts

Loss or Alteration of Vegetation Cover

Permanent major impacts would occur from operation of the project from the loss of 291 acres of existing vegetation that would be converted to aboveground facilities (pump stations and MLV sites) and access roads for the life of the Project (Table 5.2.3-9).

In addition, the Applicant's proposed project would be require vegetation management, including periodic mowing, brush clearing, tree cutting, and pipeline inspections that would occur for the life of the Project. Short-term and negligible to minor impacts would occur within the affected vegetation cover classes as a result of routine vegetation management. Maintenance requiring pipeline inspection would result in short-term minor impacts on existing vegetation because measures would be implemented to avoid impacts on vegetation and the disturbed areas would revegetated following construction.

Approximately 1,091 acres of forested and woody wetland vegetation communities within the operational footprint would be subject to routine vegetation management. This represents a permanent major impact to these vegetation cover classes, as these forested communities would be effectively converted to other vegetation cover types for the life of the Project, as described above.

Loss or Alteration of Native Plant Communities

Approximately 78 acres of native plant communities occurs within the operations right-of-way (Table 5.2.3-10). Upon inception of operations activities, these areas will have been previously been disturbed by construction and revegetation actions. These represent nine native plant community systems, including 3.3 acres of communities ranked as Outstanding, 18.3 acres of communities ranked as High, and 57 acres of acres of communities ranked as Moderate, prior to construction activities. Short-term minor impacts on remaining components of these native plant communities could occur during routine management and pipeline maintenance requiring visual inspections. These maintenance activities would be generally limited in duration.

Six rare native plant communities occur within the permanent right-of-way of the Applicant's Proposed Project. Maintenance work would incur short-term to minor impacts on 24 acres of rare plant communities previously disturbed by construction activities. This includes 10 acres of S1 rank and 2 acres of S2 rank rare native plant communities (Table 5.2.3-11).

Following operations maintenance activities that required ground disturbance, all disturbed areas would be recontoured and reclaimed, and then revegetated according to existing vegetation management plans and agency approvals (such as a fen management plan) for work in and near rare native plant communities.

Spread of Noxious Weeds and Invasive Plants

For the life of the Project, surface disturbance and vehicle access during maintenance activities would continue to provide an opportunity for noxious weeds and invasive species to spread. Permanent minor impacts are expected to occur as a result of noxious weed and invasive plant infestations in some areas during operation. The noxious weed and invasive plant occurrence information provided in this analysis did not identify all noxious weed or invasive species known or documented within the region; however, routine vegetation maintenance along the permanent right-of-way may include treatment/mitigation or similar measures of mechanical or chemical management of undesirable species once they are identified. The Environmental Protection Plan (Appendix E) details control measures for noxious weeds and invasive plants for the Project. The Project would be required to manage all noxious weeds for which federal, state, or local (county or city) agency management policies or regulations exist, including but not limited to, those identified in Table 5.2.3-3. Measures implemented to ensure that the spread of weeds is minimized may include equipment cleaning, use of weed-free mulch, use of weed-free seed mix during site restoration, and ensuring that noxious weed and invasive plant species management is a continued commitment during operations involving vegetation management activities.

5.2.3.3.2 Continued Use of Existing Line 3

Construction Impacts

Because the pipeline is already constructed, there would be no impacts on vegetation cover, native plant communities, or contributing to the spread of noxious weeds and invasive plants from the continued use of the existing Line 3 pipeline.

Operations Impacts

Operations impact to vegetation resources from use of the existing Line 3 pipeline would remain the same as under current conditions. The current areas of each NLCD vegetation cover class affected by the existing Line 3 pipeline are summarized in Table 5.2.3-12. Operations activities are similar to those discussed above for the Applicant's proposed project. Existing Line 3 pipeline impacts are summarized for each vegetation parameter in the following sections.

Table 5.2.3-12. Estimated Operations Impacts on Vegetation Cover for the Existing Line 3 Pipeline

Vegetation Cover Class	Operations Impacts[a] (acres)
Evergreen forest	39
Deciduous forest	245
Mixed forest	29
Scrub/shrub	96
Grassland/herbaceous	125
Hay/pasture	175
Cultivated crops	673
Woody wetlands	281
Emergent herbaceous wetlands	181
Barren land	3
TOTAL	**1,847**

Source: Homer et al. 2015.

[a] The estimate is based on total acres for the Applicant's proposed project and route alternative RA-07 along the Enbridge Mainline.

Notes:

Values in table may not sum to subtotals and totals due to rounding.

<u>Loss or Alteration of Vegetation Cover</u>

Current Line 3 operations include vegetation management; therefore, there would be no new operations impacts from vegetation management that would result from continued use of the existing Line 3. Vegetation management within the permanent right-of-way includes periodic mowing and brush clearing about every 3 to 5 years to ensure safe operation and allow for visual inspection of the permanent right-of-way. Continued use of Line 3 at its present capacity would require high levels of pipeline maintenance, with an estimated average of 267 repair or replacement procedures needed per year over the next 15 years (see Section 4.2.1 for more detail). Pipeline integrity digs require opening a trench over the pipeline with excavation equipment. Excavation and repair or replacement activities would remove vegetation cover and disturb soils similar to new pipeline construction, but excavations would be over a smaller area and would occur within the permanent right-of-way. The area of excavations are unknown, but likely would result in short- to long-term and minor to major impacts on the vegetation cover classes listed in Table 5.2.3-12.

Loss or Alteration of Native Plant Communities

No new operation impacts on Minnesota native plant communities from vegetation management would result from continued use of the existing Line 3. Long-term and major impacts on rare native plant communities that persist within the permanent right-of-way could occur during pipeline repair or replacement. Excavation and repair or replacement activities could affect nine native plant communities covering approximately 11 acres within the permanent right-of-way (Table 5.2.3-13). The areas of future excavations are unknown but could result in long-term and major impacts if excavation is required within the small area of native plant communities remaining in the permanent right-of-way.

Table 5.2.3-13. Estimated Operations Impacts on Minnesota Native Plant Community Systems for the Existing Line 3 Pipeline

Native Plant Community System	MBS Site Significance Rank	Acres[a]	No.[a]
Acid peatland system	High	3.4	1
Complex community	Moderate	3.1	2
Fire-dependent forest/woodland system	Moderate	1.1	1
Forested rich peatland system	High	0.3	1
Marsh system	Outstanding	1.8	2
Mesic hardwood forest system	High	<0.1	1
Upland prairie system	Moderate	0.7	1
TOTAL		**10.5**	**9**

Sources: Minnesota DNR 2016a, 2016d.

[a] Estimate based on totals for the Applicant's proposed project for the segment from the North Dakota border to Clearbrook, plus RA-07 from Clearbrook to Carlton along the Enbridge Mainline. No native plant communities would be crossed within the segment from Carlton to the Wisconsin border.

Notes:

Values in table may not sum to subtotals and totals due to rounding.

According to the Minnesota native plant community database, no rare native plant communities persist along the existing Line 3 pipeline between Clearbrook and Carlton (Minnesota DNR 2016d). Less than 1 acre of rare (S2 rank) northern mesic prairie occurs along the Line 3 route between the North Dakota border and Clearbrook, which could be affected by pipeline repair or replacement activities. The area of future excavations are unknown but could result in short-term and minor impacts if excavation is required within the one previously disturbed rare plant community remaining within the permanent right-of-way. One old-growth forest stand is located adjacent to the existing Line 3 right-of-way; no HCVFs are located within 0.5 mile of the existing Line 3 permanent right-of-way. These special-status forests would not be affected by continued use of Line 3.

Spread of Noxious Weeds and Invasive Plants

The opportunity for noxious weeds and invasive species to spread would be increased with continued use of the existing Line 3, facilitated by the frequent excavations for pipeline repair and replacement. Permanent minor impacts are expected to occur as a result of noxious weed and invasive plant infestations during operation.

5.2.3.3.3 System Alternative SA-04

Construction Impacts

The types of impacts vegetation resources associated with construction of SA-04 would be similar to impacts discussed above for the Applicant's proposed project.

Loss or Alteration of Vegetation Cover

Approximately 95 percent of SA-04 is located in areas dominated by agricultural land (Table 5.2.3-5). The total acreages of vegetation cover types that would be affected by construction of SA-04 are summarized in Table 5.2.3-14 and presented by state in Table 5.2.3-15. The exact descriptions for, and detailed layouts of, permanent surface facilities have not been developed for this alternative; however, it is expected that a small percentage of vegetation cover classes (assumed to be largely cropland due to its dominance within this route) would be permanently converted to surface facilities to support pipeline operations.

Table 5.2.3-14. Estimated Impacts on Vegetation Cover for System Alternative SA-04

Vegetation Cover Class	Construction Work Area[a]		Permanent Right-of-Way[b]		Within 0.5 Mile[c]	
	Acres	%	Acres	%	Acres	%
Evergreen forest	9	0%	0	0	150	0
Deciduous forest	98	1%	41	1	7,207	2
Mixed forest	<0.1	0%	<0.1	0	29	0
Scrub/shrub	<0.1	0%	<0.1	0	33	0
Grassland/herbaceous	181	2%	76	2	8,010	2
Hay/pasture	100	1%	41	1	6,642	1
Cultivated crops	10,217	95%	4,266	95	Evergreen forest	93
Woody wetlands	54	0%	23	1	4,431	1
Emergent herbaceous wetlands	85	1%	35	1	5,735	1
Barren land	20	0%	9	0	672	0
TOTAL	**10,765**	**100%**	**4,490**	**100**	**462,357**	**100**

Source: Homer et al. 2015.

[a] Based on 120-foot-wide construction work area centered on the pipeline route.

[b] Based on a 50-foot-wide operations right-of-way centered on the pipeline alignment.

[c] Within 0.5 mile of the pipeline route.

Table 5.2.3-15. Estimated Impacts on Vegetation Cover by State for System Alternative SA-04

Vegetation Cover Class	Construction Work Area[a]		Permanent Right-of-Way[b]		Within 0.5 Mile[c]	
	Acres	%	Acres	%	Acres	%
North Dakota						
Evergreen forest	1	0%	0	0	52	0
Deciduous forest	23	1%	10	1	995	1
Mixed forest	<0.1	0%	<0.1	0	<0.1	0
Scrub/shrub	<0.1	0%	<0.1	0	<0.1	0
Grassland/herbaceous	5	0%	2	0	144	0
Hay/pasture	10	0%	4	0	624	0
Cultivated crops	2,957	98%	1,239	98	125,930	98
Woody wetlands	17	1%	8	1	1,056	%
Emergent herbaceous wetlands	9	0%	4	0	339	0
Barren land	<0.1	0%	<0.1	0	18	0
North Dakota subtotal	***3,022***	***100%***	***1,267***	***100***	***129,158***	***100***
Minnesota						
Evergreen forest	<0.1	0%	<0.1	0	0	0
Deciduous forest	8	0%	3	0	1,974	1
Mixed forest	<0.1	0%	<0.1	0	<0.1	0
Scrub/shrub	<0.1	0%	<0.1	0	5	0
Grassland/herbaceous	36	1%	15	1	2,442	2
Hay/pasture	19	1%	8	1	1,466	1
Cultivated crops	3,328	96%	1,388	96	138,013	92
Woody wetlands	10	0%	4	0	972	1
Emergent herbaceous wetlands	64	2%	26	2	4,875	3
Barren land	17	0%	7	0	558	0
Minnesota subtotal	***3,482***	***100%***	***1,451***	***100***	***150,306***	***100***
Iowa						
Evergreen forest	8	0%	3	0	44	0
Deciduous forest	10	0%	4	0	1,253	1
Mixed forest	<0.1	0%	<0.1	0	<0.1	0
Scrub/shrub	<0.1	0%	<0.1	0	<0.1	0
Grassland/herbaceous	103	4%	43	4	4,570	4
Hay/pasture	39	1%	16	1	2,879	3
Cultivated crops	2,429	93%	1,012	93	101,765	91

Table 5.2.3-15. Estimated Impacts on Vegetation Cover by State for System Alternative SA-04

Vegetation Cover Class	Construction Work Area[a]		Permanent Right-of-Way[b]		Within 0.5 Mile[c]	
	Acres	%	Acres	%	Acres	%
Woody wetlands	14	1%	6	1	1,284	1
Emergent herbaceous wetlands	11	0%	5	0	468	0
Barren land	3	0%	1	0	64	0
Iowa subtotal	***2,616***	***100%***	***1,090***	***100***	***112,326***	***100***
Illinois						
Evergreen forest	<0.1	0%	<0.1	0	54	0
Deciduous forest	60	4%	25	4	2,985	4
Mixed forest	<0.1	0%	<0.1	0	29	0
Scrub/shrub	<0.1	0%	<0.1	0	27	0
Grassland/herbaceous	37	2%	16	2	855	1
Hay/pasture	33	2%	13	2	1,664	2
Cultivated crops	1,503	91%	626	91	63,528	90
Woody wetlands	13	1%	5	1	1,119	2
Emergent herbaceous wetlands	<0.1	0%	<0.1	0	54	0
Barren land	<0.1	0%	<0.1	0	32	0
Illinois subtotal	***1,645***	***100%***	***686***	***100***	***70,345***	***100***
TOTAL	**10,765**	**100%**	**4,494**	**100**	**462,136**	**100**

Source: Homer et al. 2015.

[a] Based on 120-foot-wide construction work area centered on the pipeline route

[b] Based on a 50-foot-wide operations right-of-way centered on the pipeline alignment

[c] Within 0.5 mile of the pipeline route

Agricultural lands, including cultivated crops and hay/pasture vegetation cover types, occupy 10,318 acres of the vegetation cover within the construction footprint for SA-04. Pipeline construction impacts on cultivated croplands would be short-term and minor, with impacts typically limited to a single growing season. Impacts on hay pastures, rotated croplands, and open grassland range would be short- to long-term and minor, with vegetation reestablishing within several years following construction.

Approximately 265 acres (2 percent) of the construction footprint for SA-04 consists of grassland/herbaceous and emergent herbaceous wetlands vegetation cover. Construction impacts on shrub and grassland cover classes (scrub/shrub, grassland/herbaceous, and emergent herbaceous wetlands) would be short- to long-term and minor, as these vegetation cover types would regenerate over time. Herbaceous cover would be seeded on disturbed areas following completion of pipeline construction, and it is expected that preexisting herbaceous and shrub habitats would quickly become reestablished within several years following construction. Scrub/shrub, dominated by low woody cover and emergent wetlands, may require a longer time to establish cover similar to adjacent undisturbed lands when drought or the presence of livestock interfere with vegetation regrowth.

Approximately 161 acres (less than 1 percent) of the construction footprint for SA-04 consists of forested vegetation cover. Clearing trees within forested cover classes, including evergreen forest, deciduous forest, mixed forest, and woody wetland, would result in long-term and major impacts because these vegetation cover classes generally require over a decade to regenerate outside the permanent right-of-way and may take up to 50 years for full recovery following construction. Clearing trees within the construction work area would cause short-term, minor indirect impacts in adjacent forested areas from effects on interior forest vegetation along the edges of the construction areas (see Section 5.2.3.3.1).

Loss or Alteration of Native Plant Communities

Seven Minnesota native plant community systems occur within 0.5 mile of SA-04. Construction would result in long-term to permanent major impacts on approximately 3.6 acres of three Minnesota native plant community systems. This would result in a loss of native plant community habitat in these locations. All native plant community systems identified within the SA-04 construction footprint fall within MBS Sites with a moderate rank, excepting less than an acre of high-quality ranked Upland Prairie System (Table 5.2.3-16).

Table 5.2.3-16. Estimated Impacts on Minnesota Native Plant Community Systems for System Alternative SA-04

Native Plant Community System	MBS Site Biodiversity Significance Rank	Construction Work Area[a]		Permanent Right-of-Way[b]		Within 0.5 Mile[c]	
		Acres	No.	Acres	No.	Acres	No.
Complex community	Outstanding	--	--	--	--	109	1
Floodplain Forest System	Outstanding	--	--	--	--	16	2
	Moderate	1.0	2	0.4	2	260	5
Mesic Hardwood Forest System	Outstanding	--	--	--	--	57	3
	High	--	--	--	--	102	4
	Moderate	1.1	3	0.4	3	211	6
Open Rich Peatland System	Outstanding	--	--	--	--	1	1
Upland Prairie System	Outstanding	--	--	--	--	3	4
	High	<0.1	1	--	--	173	22
	Moderate	1.5	2	0.6	2	64	11
Wet Meadow/Carr System	Outstanding	--	--	--	--	7	1
Wetland Prairie System	High	--	--	--	--	11	1
	Moderate	--	--	--	--	4	2
TOTAL		**3.6**	**8**	**1.4**	**7**	**1,019**	**63**

Sources: Minnesota DNR 2016a, 2016d.

[a] Based on 120-foot-wide construction work area centered on the pipeline route

[b] Based on a 50-foot-wide operations right-of-way centered on the pipeline alignment

[c] Within 0.5 mile of the pipeline route

"—" = no occurrence

Thirteen rare native plant communities occur within 0.5 mile of SA-04; of these, three occur within the construction work area and two within the permanent right-of-way. Pipeline construction would cause permanent major impacts on a total of 2 acres (five occurrences) of rare native plant communities, resulting in a loss of rare native plant community habitat in these locations. This includes approximately 2 acres of S2 rank and 0.3 acre of S3 rank rare native plant communities (Table 5.2.3-17).

Table 5.2.3-17. Estimated Impacts on Rare Native Plant Communities for System Alternative SA-04

Native Plant Community	MBS Site Significance Rank	Conservation Rank	Construction Work Area[a]		Permanent Right-of-Way[b]		Within 0.5 Mile[c]	
			Acres	No.	Acres	No.	Acres	No.
North Dakota								
Northern reedgrass wet meadow	NA[d]	S2S3	--	--	--	--	17	1
Wet prairie	NA[d]	S2S3	--	--	--	--	35	1
Wet-mesic tallgrass prairie	NA[d]	S1	--	--	--	--	NA	1
North Dakota subtotal							***52***	***3***
Minnesota								
Calcareous fen (southeastern)	Outstanding	S1	--	--	--	--	1	1
Dry hill prairie (southern)	Moderate	S2	--	--	--	--	15	1
Mesic prairie (southern)	Outstanding	S2	--	--	--	--	2	3
	High	S2	--	--	--	--	113	3
	Moderate	S2	1.5	2	0.6	2	48	8
	Below	S2	--	--	--	--	33	1
	Not Ranked	S2	--	--	--	--	0	1
Red oak – sugar maple – basswood – (bitternut hickory) forest	High	S3	--	--	--	--	34	3
	Moderate	S3	0.3	1	0.1	1	106	2
Seepage meadow/carr	Outstanding	S3	--	--	--	--	7	1
Silver maple – (virginia creeper) floodplain forest	Outstanding	S3	--	--	--	--	0	1
	Moderate	S3	<0.1	1	<0.1	1	154	3
Sugar maple – basswood – (bitternut hickory) forest	Outstanding	S2	--	--	--	--	35	1
	High	S2	--	--	--	--	68	1
	Moderate	S2	0.2	1	<0.1	1	43	2
Wet prairie (southern)	High	S2	--	--	--	--	11	1
	Moderate	S2	--	--	--	--	4	2
Minnesota subtotal			***2.0***	***5***	***0.7***	***5***	***672***	***35***

Table 5.2.3-17. Estimated Impacts on Rare Native Plant Communities for System Alternative SA-04

Native Plant Community	MBS Site Significance Rank	Conservation Rank	Construction Work Area[a]		Permanent Right-of-Way[b]		Within 0.5 Mile[c]	
			Acres	No.	Acres	No.	Acres	No.
Illinois								
Unusual concentration of vascular plants	NA[d]	NA[e]	--	--	--	--	15	1
Dry Sand Prairie, Midwest Type	NA[d]	NA[e]	--	--	--	--	13	1
Illinois subtotal							***18***	***2***
TOTAL Rare native plant communities			**2.0**	**5**	**0.8**	**5**	**851**	**41**

Sources: Minnesota DNR 2016a, 2016d; North Dakota PR 2016; Iowa DNR 2016; Illinois DNR 2016.

[a] Based on 120-foot-wide construction work area centered on the pipeline route

[b] Based on a 50-foot-wide operations right-of-way centered on the pipeline alignment

[c] Within 0.5 mile of the pipeline route

Notes:

Values in table may not sum to subtotals and totals due to rounding.

No occurrences of rare native plant communities are listed for Iowa.

"—" = no occurrence

<u>Spread of Noxious Weeds and Invasive Plants</u>

Eight weed species listed by the Minnesota Noxious Weed Law (Minnesota DA 2016), and 18 other invasive plant species, occur near or within the SA-04 project (Table 5.2.3-3). Construction-related impacts include the potential introduction and spread of these noxious weed and invasive plant species. The types of impacts and the Applicant-proposed measures to address them would be identical to those described for the Applicant's proposed project in Section 5.2.3.3.1. Impacts associated with invasion of noxious weeds are difficult to quantify; however, impacts likely would be short-term and minor because management actions for noxious weeds and invasive plants would be in place during and after construction.

Operations Impacts

<u>Loss or Alteration of Vegetation Cover</u>

Operations impacts would occur within the permanent right-of-way, as periodic mowing and brush clearing would be required every 3 to 5 years following construction to ensure safe operation of the pipeline and allow for routine maintenance and inspections throughout the life of the Project.

Acreages of vegetation cover types that would be affected by operation of SA-04 are summarized in Table 5.2.3-14 and listed by state in Table 5.2.3-15. Impacts on large portions of the route would be short-term and minor because 95 percent of SA-04 is used for agriculture. These areas would be maintained as agricultural land, which would not require mowing but could be subject to vegetation removal, excavation, and reclamation for future pipeline inspection activities.

Mowing of the permanent right-of-way would result in short-term minor impacts on 99 acres of woody wetland, shrub, and grassland vegetation. These impacts would occur periodically for the life of the Project.

Approximately 64 acres (one percent) of previously forested land would be maintained as herbaceous vegetation by removing trees and shrub to allow for visual inspection of the right-of-way (Table 5.2.3-14). Forested cover classes in the permanent right-of-way would be maintained as other vegetation cover classes (scrub/shrub, grassland, or emergent wetland) for the life of the Project, resulting in a permanent major impact on forested cover classes within the operational footprint of SA-04.

Loss or Alteration of Native Plant Communities

During operations-related vegetation maintenance activities and pipeline inspections within the permanent right-of-way, short-term minor impacts could occur on 1 acre (seven occurrences) of previously disturbed moderate-ranked Minnesota native plant communities and approximately 1 acre of previously disturbed S2 rank and S3 rank rare native plant communities (Table 5.2.3-17). Impacts specific to these activities on Minnesota native plant communities and rare native plant communities are addressed in Section 5.2.3.3.1.

Spread of Noxious Weeds

The opportunity for noxious weeds and invasive species to spread would continue for the life of the Project. The types of permanent impacts and the Applicant-proposed measures to address them would be identical to those described for the Applicant's proposed project in Section 5.2.3.3.1.

5.2.3.3.4 Transportation by Rail

Construction Impacts

Loss or Alteration of Vegetation Cover

The rail alternative would require as much as 200 acres to construct and operate an offloading facility and 60 acres to reactivate an abandoned rail line near Clearbrook, Minnesota. It would require as much as 100 acres to construct and operate offloading facilities and an additional 3 acres to establish a new rail spur near Superior, Wisconsin.

Vegetation cover near the Clearbrook terminal includes deciduous forest, evergreen forest, cultivated crops, and woody wetlands in undeveloped areas. Vegetation cover near the Superior terminal includes deciduous forest, woody wetlands, and scrub/shrub cover in undeveloped areas. Because a specific site has not been identified or designed, impacts on habitat by acreage cannot be quantified, but it was assumed that any impacts would be permanent and major as vegetation would be cleared during construction and permanently converted to facilities. Clearing trees within the construction work area could result in short-term, minor indirect impacts in adjacent forested areas from affecting interior forest vegetation along the edges of the construction areas, as discussed in Section 5.2.3.3.1.

Loss or Alteration of Native Plant Communities

No native plant communities in the vicinity of the Clearbrook terminal would be affected by construction of the rail alternative. Native plant communities occur to the north along the potential rail access route between Clearbrook and Gully, near Gully. Two Minnesota native plant communities could be crossed, including northwest dry-mesic oak woodland and the imperiled northern dry sand – gravel prairie (S2). These native plant communities could be affected by construction of a new reactivated rail connection between Clearbrook and Gully. This would be a reactivation of an existing rail line, and the facilities are on the edge of the mapped communities; therefore, construction impacts likely would be permanent and minor.

No native plant communities were identified in the undeveloped area around the Superior terminal where the offloading facility could be located; however, multiple occurrences of protected plants are near the terminal (Wisconsin DNR 2016a). New facilities constructed for the rail alternative would undergo permitting, likely would be sited to avoid rare native plant communities or other sensitive resources to the extent practicable, and would require minimization measures to reduce potential impacts.

Spread of Noxious Weeds and Invasive Plants

Barren soil in cleared work areas would be susceptible to invasion by noxious weeds and invasive plants that may occur in the area, which may inhibit regeneration of native vegetation. However, most cleared areas would eventually be converted to impervious surfaces or permanent facilities; consequently, little barren soil would be subject to these impacts. Impacts associated with invasion of noxious weeds likely would be short-term and negligible to minor.

Operations Impacts

Loss or Alteration of Vegetation Cover

Once the facilities are constructed, no other direct impacts on vegetation would occur during operations of the Clearbrook or Superior terminals, as the areas would be permanently converted to rail lines and rail offloading facilities for the life of the Project. Small spills and leaks at transfer facilities would be controlled, and capture of spills is an enforced regulatory component of licensed facilities' operations, resulting in negligible to minor impacts on vegetation in these areas.

Loss or Alteration of native plant communities

Operation of the rail facilities and train transportation would not likely result in loss or alteration of native plant communities because the rail alternative does not involve vegetation management or other actions that could cause such impacts. However, the existing rail transportation corridors include remnant prairies and other sensitive plant communities that could be affected by small spills and leaks if they leach into the surrounding soils from the rail bed, resulting in long-term minor to major impacts in these areas.

Spread of Noxious Weeds and Invasive Plants

The risk of introduction and spread of noxious weeds and invasive plant species would be permanent and minor to major as the use of new and existing transportation corridors would continually provide avenues to transport noxious weeds and invasive plants into areas where they do not presently occur.

5.2.3.3.5 Transportation by Truck

Construction Impacts

Loss or Alteration of Vegetation Cover

The truck alternative also would require approximately 50 acres to construct and operate an offloading facility and approximately 5 acres for road access near Clearbrook, Minnesota, resulting in a permanent loss of vegetation cover from facilities construction. Vegetation cover near the Clearbrook terminal includes deciduous forest, evergreen forest, cultivated crops, and woody wetlands in undeveloped areas. In addition, the truck alternative would require approximately 50 acres to construct and operate an offloading facility and an additional 34 acres to establish a truck route near the terminal in Superior, Wisconsin. Vegetation cover near the Superior terminal includes deciduous forest, woody wetlands, and scrub/shrub cover in undeveloped areas. During construction, permanent major impacts on vegetation would occur from clearing and grading for site preparation and from placement of fill for construction of loading/offloading facilities and new roads for access. Clearing trees within the construction work area would cause short-term, minor indirect impacts in adjacent forested areas from affecting interior forest vegetation along the edges of the construction areas, as discussed in Section 5.2.3.3.1.

Loss or Alteration of Native Plant Communities

No Minnesota native plant community sites in the vicinity of the Clearbrook terminal would be affected by construction activities. No native plant communities were identified near the potential locations for the offloading facility at the Superior terminal, although several Wisconsin threatened and endangered plants occur near this location (Wisconsin DNR 2016a) (see Section 5.2.5). Because no native plant communities were identified near the areas that likely would be used to construct the offloading facilities, none are likely to be affected by construction. New facilities constructed for the truck alternative would undergo permitting, likely would be sited to avoid any rare native plant communities or other sensitive resources that may subsequently be found, and would require minimization measures to reduce potential impacts.

Spread of Noxious Weeds and Invasive Plants

Barren soil in cleared work areas would be susceptible to invasion by noxious weeds and invasive plants that may occur in the area, which may inhibit regeneration of native vegetation. However, most cleared areas would eventually be converted to impervious surfaces or permanent facilities; consequently, little barren soil would be subject to these impacts. Impacts associated with invasion of noxious weeds likely would be short-term and negligible to minor.

Operations Impacts

Loss or Alteration of Vegetation Cover

Once the facilities are constructed, no other direct impacts on vegetation would occur during operations of the Clearbrook or Superior terminals, as the areas would be permanently converted to access roads and offloading facilities for the life of the Project. Small spills and leaks at transfer facilities would be controlled, and capture of spills is an enforced regulatory component of licensed facilities' operations, resulting in negligible to minor impacts on vegetation in these areas.

Loss or Alteration of Native Plant Communities

Once the facilities are constructed, no other direct impacts on native plant communities would occur. Four rare native plant communities and the Floodwood Bog HCVF border the truck transportation routes. Mechanical wear, equipment spills, and leaks could contribute to short-term and minor impacts on these rare native plant communities if contamination disperses from the roadways. Small spills and leaks from tanker trucks during transit likely would remain on the roadway; however, the existing transportation corridors are adjacent to several sensitive plant communities that could be affected by small spills, result in potential long-term minor to major impacts in affected areas.

Spread of Noxious Weeds and Invasive Plants

The risk of introduction and spread of noxious weeds and invasive plants would be permanent and minor to major, as the use of new and existing transportation corridors would continually provide avenues to transport noxious weeds and invasive plants into areas where they do not presently occur.

5.2.3.3.6 Existing Line 3 Supplemented By Rail

Impacts on vegetation associated with the combined use of the existing Line 3 pipeline and the rail alternative would be the same as the impacts identified for continued operation of the existing Line 3 pipeline in addition to the identified for the rail alternative.

5.2.3.3.7 Existing Line 3 Supplemented By Truck

Impacts on vegetation associated with the combined use of the existing Line 3 pipeline and the rail alternative would be the same as the impacts identified for continued operation of the existing Line 3 pipeline in addition to the identified for the truck alternative.

5.2.3.4 Summary and Mitigation

5.2.3.4.1 Summary

Potential impacts on all vegetation types for the Applicant's proposed project and CN Alternatives are summarized in Table 5.2.3-18. This includes a summary of potential construction- and operations-related impacts on existing land cover, MBS Sites, and native plant communities, as well as potential impacts from the spread of noxious weeds and invasive plants. Avoidance and minimization measures considered in the assessment of pipeline alternatives include rerouting, use of HDD, and preparation of, and adherence to, an agency-approved site- and resource-specific crossing plan. Many of these procedures would also be applicable to the rail and truck transport alternatives.

The impact assessment also considered the effects of implementation of BMPs during construction and operation and the Applicant's revegetation and reclamation commitments for the pipeline rights-of-way. Similar construction practices and revegetation and reclamation were assumed to be implemented for relevant construction areas of the other CN Alternatives.

<u>Construction Impacts</u>

Many impacts on vegetation would be short-term and minor, while other impacts would be permanent and major within the footprint of the aboveground facilities and the permanent right-of-way. Individual impacts at specific locations along all the alternatives where the existing vegetation can recover is anticipated to be minor, with appropriate use of BMP construction and operation practices. However, others would need to be maintained in a way that prohibits return to its existing state, and would be permanently altered or removed. Due to the great lengths of all alternatives, the total impact would be additive and distributed along the routes. The importance of these impacts is determined by the distance of the alternative, number of vegetation communities affected, and the quality of vegetation resources affected.

Loss or Alteration of Vegetation Cover

Clearing and grading the pipeline construction work area and other construction-related areas would result in a loss and alteration of vegetation. Forested and scrub/shrub vegetation communities within the construction work area would be cleared and would require many years to reestablish in areas outside of the permanent right-of-way, resulting in long-term to permanent major impacts. The Applicant's proposed project would have a substantially greater impact on forested and scrub/shrub vegetation communities than the other CN Alternatives, all of which would have a similar level of impact.

Areas cleared of other vegetation types during pipeline construction, including grassland/herbaceous, hay/pasture, cultivated crops, and emergent wetlands vegetation cover class types, would be reclaimed after construction to the specifications or conditions of the authorizing/permitting agency. The recovery period for these areas would range from a single growing season to several years. As a result, the impacts would be short-term and minor. SA-04 would affect a substantially greater area of these vegetation types than the other CN Alternatives, with the Applicant's proposed project affecting substantially more than the rail or truck alternatives. However, the impact from implementation of the rail or truck alternatives would be permanent and major since construction of permanent aboveground facilities would not provide the opportunity for reclamation of vegetation.

Loss or Alteration of Rare Native Plant Communities

Clearing and grading would also result in the loss of rare native plant communities. The impacts typically would be permanent and major as these communities would be lost. The Applicant's proposed project would affect approximately 46 acres of rare native plant communities, whereas SA-04 would affect approximately 2 acres of the communities, the rail transport alternative would affect 1 rare plant community, and the truck transport alternative would not affect any rare native plant communities. For the pipeline alternatives, the impacts would be long-term to permanent and major.

Spread of Noxious Weeds and Invasive Plants

Noxious weed and invasive plant management and control would be implemented during construction to minimize the effect of noxious weeds. The potential for impacts due to the spread of noxious weeds and invasive plants during construction would be the same for all CN Alternatives, although the potentially affected area would be greatest for SA-04 followed by the area of the Applicant's proposed project. The impact due to construction for all alternatives would be short-term and negligible to minor.

<u>Operations Impacts</u>

Loss or Alteration of Vegetation Cover

Vegetation management activities during pipeline operation would prevent trees and large shrubs from reestablishing within the pipeline permanent right-of-way. This would affect approximately 1,105 acres of previously forested areas within the permanent right-of-way for the Applicant's proposed project and about 64 acres for SA-04. The impact for both pipelines would be permanent and major. The forested and scrub/shrub areas cleared from the construction work area and outside of the permanent right-of-way would be allowed to regenerate, but the process would take decades to reach full recovery. For the pipeline alternatives, the Applicant's Integrity Management Program would require periodic excavation to repair or replace sections of pipe segments, which would affect the vegetative cover of the permanent right-of-way. The existing Line 3 pipeline would require substantially more of these integrity digs than a newly installed pipeline and would therefore have a greater impact on vegetation.

Loss or Alteration of Rare Native Plant Communities

Potential impacts on rare native plant communities from pipeline operations would likely be minor because these communities are unlikely to persist within the permanent right-of-way after the construction disturbance. The Applicant's proposed project supports the largest area of rare native plant communities within the permanent right-of-way and represents the greatest potential impact on these communities. The rail and truck alternatives could affect rare native plant communities along the rail and truck routes if petrochemicals from engine leaks leach into the surrounding soils.

Spread of Noxious Weeds and Invasive Plants

As a result of implementation of a noxious weed and invasive plant management and control plan for the pipeline alternatives, the risk of spreading infestations of noxious weeds and invasive plants during operations would be similar for the pipeline routes. The impact would be long-term and minor, although SA-04 would have a greater area potentially affected than either of the other pipeline alternatives—the Applicant's proposed project or use of existing Line 3. The rail and truck alternatives may present a greater transmission risk because the large increase in traffic along new and existing transportation corridors would provide avenues to transport noxious weeds and invasive plants into areas where they do not presently occur. For all CN Alternatives, the potential impact of the spread of noxious weeds and invasive species would be permanent and minor.

5.2.3.4.2 Mitigation

BMPs for vegetation are presented in the revegetation and monitoring guidance in the Applicant's Environmental Protection Plan (Appendix E). Following construction, the entire pipeline right-of-way would be reclaimed following the detailed measures in this plan, including implementation of compaction prevention measures, seeding, plantings, application of soil amendments, and a period of monitoring to document stabilization of the right-of-way. In areas where soil quality is a concern for revegetation, applicable agencies would be consulted to develop seed mixes and seeding dates adapted to the immediate areas of concern.

The Applicant has committed to preparation and implementation of the following plans, procedures, and general vegetation protection measures during construction:

- Co-locate construction within and near existing utility corridors to minimize environmental impacts;
- Develop and adhere to Project-specific construction methods and procedures for vegetation clearing methods, including treatment of existing vegetation, topsoil segregation, storage, and reapplication;
- Restore preconstruction contours and use slope breakers, sediment barriers, mulch, geotextile fabric, and other erosion control devices to stabilize the disturbed areas during the vegetation regrowth phase and reduce runoff into the adjacent environment;
- Co-locate the Project with existing rights-of-way where feasible;
- Design and plan Project pipeline construction (including parking, access, and temporary work areas) to reduce environmental impacts on sensitive plant communities, such as rare native plant communities, calcareous fens, wetland vegetation, old-growth forests, and prairie vegetation;
- Inspect and clean all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species; and
- Use certified weed-free mulch, topsoil, and seed mix.

Prior to construction, the lead and assisting agencies would be consulted on identification of avoidance and mitigation measures for rare plant communities, old-growth forests, and HCVFs that are located within the pipeline route and could be affected by construction or operation. Avoidance measures could include minor pipeline route adjustments, use of directional drilling, or preparation and adherence to an agency-approved, site-specific crossing plan. Impacts on rare plant communities that cannot be avoided would be addressed through implementation of the Project's approved revegetation and monitoring measures, and invasive and noxious weed control measures outlined in the Environmental Protection Plan (Appendix E).

Measures that would be implemented to prevent the spread of noxious and invasive weeds during construction and operations include minimizing the time between ground-disturbing work and site reclamation and reseeding, staking avoidance areas at known weed locations, and implementing other BMPs.

In addition to the avoidance and minimization measures and BMPs that the Applicant has identified, Minnesota DNR identified the following mitigation measures that could reduce impacts on vegetation:

- Defining equipment cleaning methods and inspection standards to ensure that equipment is free of invasive species. On Minnesota DNR lands, following Operational Order 113 would further reduce the spread of noxious weeds and invasive plants and animals.
- Replanting appropriate tree species for restoration within cleared forested areas to reduce the recovery time, prevent changes in watershed hydrology, and runoff impacts that could alter stream geomorphology.
- Woody vegetation typically would not be cleared at ATWS. If clearing of woody vegetation is necessary, potential mitigation to offset the clearing could include reestablishing or enhancing the existing cover type within up to 50 feet of surface waters, depending on topography. On state forest lands or WMAs, tree planting may be desired for all temporary workspaces within the property boundary to reduce erosion and runoff, and to reestablish trees for potential future large woody habitat recruitment to streams and rivers.
- In counties where oaks are affected by oak wilt disease caused by a non-native fungus, seasonal restrictions on tree clearing would reduce the chance of sap-sucking beetles transporting fungal spores through fresh wounds during the infection period that extends from April through July.
- Removal, debarking, or chipping of cut pines and pine slash larger than 3 inches in diameter within 3 weeks of cutting during May through mid-August would prevent pine bark beetle outbreaks in pine stands.

Table 5.2.3-18. Summary of Potential Impacts on Vegetation for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,e]
Construction Impacts							
Loss or alteration of vegetation cover	Long-term to permanent/ major impacts • 2,202 acres of forests/woody wetlands Short-term/minor impacts • 256 acres of scrub/shrub • 165 acres of grasslands • 2,734 acres of croplands and pastures • 249 acres of herbaceous wetlands No impacts • 12 acres of barren land • 5,617 acres total impacts • 84% adjacent to existing corridors	No impact	Long-term to permanent/ major impacts • 161 acres of forests/woody wetlands Short-term/minor impacts • <1 acre of scrub/shrub • 181 acres of grasslands • 10,317 acres of croplands and pastures • 85 acres of herbaceous wetlands No impacts • 20 acres of barren land • 10,765 acres total impacts • 100% adjacent to existing corridors	Permanent/major impacts • 263 to 363 acres total	Permanent/major impacts • 139 acres total	Permanent/major impacts • 263 to 363 acres total	Permanent/major impacts • 139 acres total
Loss or alteration of rare native plant communities	Long-term to permanent/major impacts	No impact	Long-term to permanent/major impacts	Permanent/major impacts	No impact	Permanent/major impacts	No impact

Table 5.2.3-18. Summary of Potential Impacts on Vegetation for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,e]
	• 46 acres of rare native plant communities		• 3.6 acres of rare native plant communities	• 1 rare native plant community		• 1 rare native plant community	
Spread of noxious weeds and invasive plants	Short-term/minor impacts	No impact	Short-term/minor impacts	Short-term/ negligible to minor impacts	Short-term/ negligible to minor impacts	Short-term/ negligible to minor impacts	Short-term/ negligible to minor impacts
Operations Impacts							
Loss or alteration of vegetation cover (permanent right-of-way)	Permanent impacts • 290 acres, across all vegetation classes Permanent/major impacts • 1,015 acres of forests/woody wetlands Short-term/minor impacts • 131 acres of scrub/shrub • 73 acres of grasslands • 1,091 acres of croplands and pastures • 132 acres of herbaceous wetlands No impacts	Permanent/major impacts • 594 acres of forests/woody wetlands Short-term/minor impacts • 96 acres of scrub/shrub • 125 acres of grasslands • 848 acres of croplands and pastures • 181 acres of herbaceous wetlands No impacts • 3 acres of barren land • 1,847 acres total	Permanent/major impacts • 64 acres of forests/woody wetlands Short-term/minor impacts • <1 acre of scrub/shrub • 76 acres of grasslands • 4,307 acres of croplands and pastures • 35 acres of herbaceous wetlands No impacts • 9 acres barren land • 4,490 acres total	Negligible to minor impacts	Negligible to minor impacts	Short-term to permanent/minor to major impacts	Short-term to long-term/minor to major impacts

Table 5.2.3-18. Summary of Potential Impacts on Vegetation for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,e]
	• 2 acres of barren land • 2,444 acres total						
Loss or alteration of rare native plant communities	Short-term/minor • 24 acres in 6 different rare native plant communities (that will be previously disturbed by construction)	Short-term/minor • <1 acre in 1 rare native plant community	Short-term/minor impacts • <1 acre in 4 rare native plant communities	Long-term/minor to major impacts • 1.1 miles in 5 rare native plant communities • 59 miles railroad prairies	Short-term to long-term/minor to major impacts • 4 rare native plant communities • Floodwood Bog HCVF	Short-term/minor impacts • See existing Line 3 and Rail	Short-term/minor impacts • See existing Line 3 and Truck
Spread of noxious weeds and invasive plants	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor to major impacts	Permanent/minor to major impacts	Permanent/minor to major impacts	Permanent/minor to major impacts

HCVF = high conservation value forest

a No single dataset in this summary table provides a complete indication of all relevant impacts to vegetation. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, acreage counts for the broad land cover types crossed do not consider how unique or sensitive certain areas might be within the broad cover type classes. However, data about rare native plant communities can aid the reader in understanding the extent of potential impacts on unique and highly sensitive areas. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

b Quantitative information in the tables should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-198 through 5-222. The table above, for example provides acreages of rare native plant communities identified within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to rare native plant communities is contained in the impacts discussion in the text.

c The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-198 to 5-210. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

d Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on pages 5-210 to 5-212. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

Table 5.2.3-18. Summary of Potential Impacts on Vegetation for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,e]

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-213 to 5-219. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-2-19 to 5-218. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-220 to 5-222. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

5.2.3.5 References

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5.2.4 Fish and Wildlife

Fish and wildlife provide important social and cultural resources; they are managed by federal and state agencies for consumption and conservation. The general Project area supports a diversity of fish and wildlife, including coldwater, coolwater, and warmwater fisheries; reptiles, amphibians, and mammals; including big and small game mammals; fur-bearing mammals; and nongame mammal species; and various bird species, including both game and non-game species. Lakes, rivers, streams, and wetlands provide habitat for fish as well as for aquatic and terrestrial wildlife. Wildlife habitats include a variety of vegetation communities that provide foraging opportunities, shelter, overwintering, migration stopover, and breeding habitats for a wide variety of wildlife.

This section identifies the common and abundant fish and wildlife resources that may be affected by construction or operation of the Applicant's proposed project or the CN Alternatives (continued use of existing Line 3, system alternative SA-04, transportation by rail, transportation by truck, or existing Line 3 supplemented by rail or truck). It also presents the assessment of the potential for construction and operation of the Project to affect those resources.

This section first describes the regulations relevant to assessing impacts on fish and wildlife resources, the methods used to conduct the impact assessment, and the existing conditions within the defined ROIs (identified below). The potential construction- and operation-related impacts on fish and wildlife for the Applicant's proposed project and the CN Alternatives are presented next. A summary and comparison of the impacts for the alternatives are included at the end of the section, along with potential mitigation measures that could minimize impacts.

Wildlife protected under state and federal endangered species regulations are addressed in Section 5.2.5. ORVWs are addressed in Section 5.2.1.2. Potential impacts on fish and wildlife resources from an unanticipated crude oil release are addressed in Chapter 10.

5.2.4.1 Regulatory Context and Methodology

5.2.4.1.1 Regulatory Context

Regulations pertaining to fish and wildlife are managed by federal (e.g., USFWS) and state natural resources agencies. The goal of these agencies is to conserve, protect, and enhance fish, wildlife, and other natural resources for the benefit of the public. Fish, wildlife, and their habitats that are protected under federal or state endangered species or other protective regulations for special or unique resources are discussed in Section 5.2.5. Other federally enacted regulations provide protection for fish and wildlife not otherwise protected under the Endangered Species Act of 1973 (ESA), as amended. These include the Migratory Bird Treaty Act of 1918 (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). USFWS has statutory authority and responsibility for enforcing the MBTA (16 U.S.C. 703–712; 40 Stat. 755 as amended), and the BGEPA (16 U.S.C. 66-8-668d).

The MBTA makes it illegal for anyone to capture, kill, or possess migratory birds, or any parts, nests, or eggs of any migratory bird except under terms of a valid permit issued pursuant to federal regulations. In addition to the MBTA, Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," further directs executive departments and agencies to promote migratory bird conservation conventions to protect migratory birds and their habitats, including migratory waterfowl and game birds. The MBTA prohibits the take of any migratory bird without prior authorization from USFWS. "Migratory birds" are all species native to the United States or its territories. Nonnative birds (e.g., house sparrow [*Passer domesticus*], European starling [*Sturnus vulgaris*]) are not protected under the MBTA (USFWS 2016a).

Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are additionally protected under the BGEPA. This act prohibits anyone from taking (i.e., pursuing, shooting or shooting at, poisoning, wounding, killing, capturing, trapping, molesting, or disturbing) eagles, including their parts (e.g., feathers), nests, or eggs (USFWS 2016b). This definition also covers impacts from human-induced alterations at nest sites when eagles are not present; therefore, if removal, relocation, or destruction of an eagle nest is necessary and unavoidable, a permit and consultation with USFWS would be required. Minnesota also issues permits for removal or disturbance of active and inactive bald eagle and osprey (*Pandion haliaetus*) nests per its statutory authority as provided by Chapter 97A (Game and Fish), Part 97A.045 (Commissioner, General Powers and Duties), Subdivision 2 (Power to Protect Wild Animals).

The National Invasive Species Act (16 U.S.C. 4701) is a federal law that requires state management plans along with regional panels to actively fight the spread of aquatic invasive species in U.S. waterways. Table 5.2.4-1 identifies the appropriate state agency and regulations pertaining to transport, introduction, or spread of invasive species that would apply to the Applicant's proposed project and CN Alternatives.

Table 5.2.4-1. State Regulations Concerning Invasive Species

State	Administering Agency	Regulation
North Dakota	North Dakota Game and Fish Department	Aquatic Nuisance Species (ND Century Code Ch. 30.03.06)
Minnesota	Minnesota Department of Natural Resources	Invasive species laws (Minn. Stat. Ch. 84D and Minn. R. Ch. 6216)
Iowa	Iowa Department of Natural Resources	Aquatic Invasive Species (Iowa AC 571.90)
Illinois	Illinois Department of Natural Resources	Injurious Species (Illinois AC 17 Ch. 1[b][805])
Wisconsin	Wisconsin Department of Natural Resources	Invasive Species Rule (WI Code Ch. NR 40)

States also have fisheries and wildlife protection and management laws in addition to endangered species laws. Individual states have developed a variety of management unit structures to address specific goals and agency strategies (e.g., state parks, wildlife refuges, and waterfowl protection areas).

5.2.4.1.2 Methodology

The methods used to assess potential impacts on fish and wildlife resources and their habitats from construction and operation of the Applicant's proposed project and CN Alternatives are described in this section. The ROIs for this evaluation encompassed the area that could be affected, including indirectly, by construction and operation within 0.5 mile from the centerlines of the alternative pipeline routes. As described below, the assessment of potential direct impacts focused on the areas directly affected by construction and operation activities. In addition, invasive species locations were identified within 1 mile of the pipeline route centerlines. For facilities required for the rail and truck transport alternatives, impacts were evaluated in the areas where the new structures and roadways likely would be constructed and in areas adjacent to those sites.

The impact analysis identified changes to fish and wildlife resources and their habitats, including consideration of the following:

- Fish and aquatic habitats
  - Fish distribution and habitat use, muskellunge (*Esox masquinongy*) waters, designated trout streams and lakes, and mussel concentration areas; and
  - Lakes, rivers, and streams, AMAs, Fish Index of Biotic Integrity (IBI) Lakes, waters infested with aquatic invasive species, LBS, and Sentinel Lakes.
- Wildlife and wildlife habitats
  - Wildlife distribution and habitat use, raptor nests and colonial waterbird colonies; and
  - Vegetated land cover, designated wildlife conservation areas (e.g., WMAs, waterfowl production areas, wetland management districts, Bureau of Land Management (BLM) land, federal and state forests, state parks, recreation areas, natural areas, nature preserves, scenic trails, and private conservation areas), and Audubon Important Bird Areas (IBAs).

The methods used to evaluate potential impacts on fisheries and aquatic habitats, and on wildlife and wildlife habitats are described below.

Fisheries and Aquatic Habitat

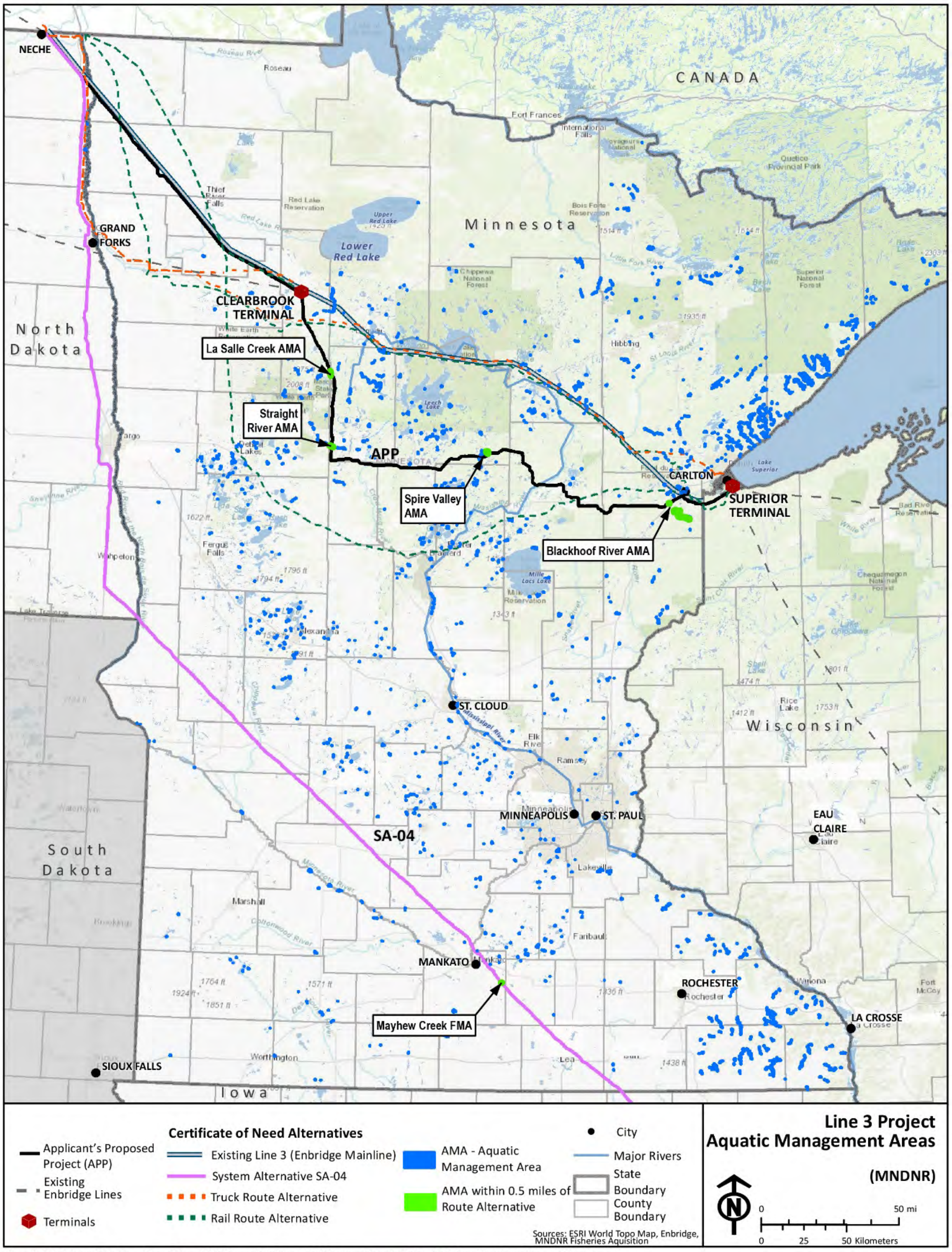
Descriptions of fish, fisheries, aquatic habitats, and aquatic invasive species were obtained from publicly available sources published by federal and state agencies, including data from USFWS, USGS, Minnesota DNR, Wisconsin DNR, North Dakota Game and Fish, Iowa DNR, and Illinois DNR.

The analysis of Project impacts considered the proximity of the Applicant's proposed project and CN Alternatives to classified waterbodies or areas, including AMAs, Sentinel Lakes, LBS, designated wildlife lakes, and waterbodies assigned an IBI. These management units are described below. Additional waterbody classifications specific to individual species (e.g., trout streams and muskellunge lakes) were also included in the analysis.

<u>Management Units Considered</u>

Aquatic Management Areas were established by the State of Minnesota to "protect, develop and manage lakes, rivers, streams, and adjacent wetlands and lands that are critical for fish and other aquatic life for water quality, and for their intrinsic biological value, public fishing, or other compatible outdoor recreational uses" (Minn. Stat. Ch. 86A, Subd. 14) (Figure 5.2.4-1). In Minnesota, the demand for shoreline property is high, and such areas are rapidly being developed. Minnesota DNR acquires riparian shoreline parcels to designate as AMAs in order to (1) establish protections for critical fish and wildlife habitat; (2) ensure that non-boat public access to water resources will always be available; and (3) ensure that habitat can be developed in previously disturbed areas (Minnesota DNR 2016a). North Dakota and Wisconsin do not specifically designate AMAs but manage more general wildlife areas for hunting, fishing, trapping, and other recreational activities (see Section 5.2.4.2.3).

Sentinel Lakes have been designated to model and monitor Minnesota ecosystems for detection and better understanding of environmental stressors in order to guide management that sustains fisheries and water resources for future generations (Minnesota DNR 2016b).



Source: Minnesota DNR 2016a

Figure 5.2.4-1. Aquatic Management Areas Crossed by the Applicant's Proposed Project and CN Alternatives

Lakes of Biological Significance have been identified and classified by Minnesota DNR subject matter experts based on objective criteria for four community types (aquatic plants, fish, amphibians, and birds). Unique plant or animal presence is the primary measure of a lake's biological significance. Lakes are assigned one of three biological significance classes:

- Outstanding – Plants: high aquatic plant richness, high floristic quality, and a population of an endangered or threatened plant; important wild rice lakes. Fish: exceptional fishery for selected game fish or an outstanding nongame fish community. Birds: endangered or threatened colonial waterbird nesting area; presence of several endangered, threatened, or special concern lake bird species; or six or more lake bird Species of Greatest Conservation Need.[12]
- High – Plants: high aquatic plant richness, high floristic quality, or a population of an endangered or threatened plant. Fish: populations of more than one fish of special concern or Species of Greatest Conservation Need. Birds: colonial waterbird nesting area; history of endangered or threatened colonial waterbird nesting; presence of endangered, threatened, or special concern lake bird species or five lake bird Species of Greatest Conservation Need. Amphibians – mudpuppy presence.
- Moderate – Plants: high aquatic plant richness, high floristic quality, or a population of an endangered or threatened plant. Fish: populations of one fish species of special concern or fish Species of Greatest Conservation Need. Birds: history of colonial waterbird nesting; presence of an endangered, threatened, or special concern lake bird species; or several lake bird Species of Greatest Conservation Need (Minnesota DNR 2015a).

Designated Wildlife Lakes in Minnesota include 56 public lakes covering over 56,000 acres that are designated, reserved, and managed for wildlife. Most of the 56 lakes are located in the southern portion of the state where watersheds have been highly modified to improve drainage. Management of designated wildlife lakes includes temporary lowering of lake levels to improve wildlife habitat, and includes regulation of motorized watercraft and recreational vehicles.

Index of Biotic Integrity is a biologically based method for measuring the integrity of aquatic systems that incorporates fish data on species richness, community assemblage, and trophic composition. Each metric represents an aspect of the biological assemblage structure, function, or other measurable characteristic that changes in some predictable way with increased human-induced stress. Fish IBI scores respond to differences in land use patterns, trophic state, and aquatic vegetation.

Other waterbodies evaluated include DNR fish hatcheries, muskellunge waters, and designated trout streams and lakes. In Minnesota, Iowa, and Wisconsin, trout streams and lakes are designated to protect and foster the propagation of trout and provide fishing opportunities and angler access. Further detail for these waterbody classification systems is included in the discussions of existing conditions below.

<u>Data Sources and Potential Impact Areas</u>

Specific geospatial data sources evaluated for impacts on fish and aquatic habitats included:

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[12] Animals whose populations are rare, declining, or vulnerable to decline and are below levels desirable to ensure their long-term health and stability (Minnesota DNR 2006)

- USGS National Hydrography Dataset;
- Minnesota DNR and Minnesota PCA geospatial data for:
  - AMAs (Minnesota DNR 2016a),
  - Sentinel Lakes (Minnesota PCA 2016),
  - Lakes with Fish IBI scores (Minnesota DNR 2014a),
  - LBS (Minnesota DNR 2015b),
  - Designated Wildlife Lakes (Minnesota DNR 2016c),
  - Trout lakes and streams (Minnesota DNR 2015c),
  - Muskie lakes (Minnesota DNR 2008),
  - Infested waters list (Minnesota DNR 2016d), and
  - Minnesota Natural Heritage Information System (NHIS) mussel concentration areas (Minnesota DNR 2016e); and
- USGS nonindigenous aquatic species (USGS NAS 2016).

No single one of the datasets listed above provides a complete indication of all relevant impacts to fisheries and aquatic habitat, but together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, data from the USGS National Hydrography Dataset can be used to gain a broad understanding of the types and number of waters crossed. However, information from other datasets, like the Sentinel Lakes and LBS datasets, helps to define the extent of potential impacts on high quality habitats.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with the qualitative descriptions of impacts that are contained in the text. Tables in this section provide counts, for example, of streams crossed by the Applicant's pipeline route and alternatives and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to stream habitats is contained in the text of this section.

Impacts on fish and aquatic habitats from construction of the Applicant's proposed project were evaluated within the footprints provided by the Applicant for the construction work area, ATWS, access roads, pipe yards, pipeline permanent right-of-way, valve pads and driveways, and pump stations. Using GIS, these footprints were overlain on the resource maps to identify the potentially affected resources. The potentially affected areas during operation of the Applicant's proposed project were identified in a similar manner, using a 50-foot-wide permanent right-of-way.

Areas potentially affected during construction of SA-04 were estimated using the same method, except using a 120-foot-wide construction work area centered on SA-04. Potential impact areas for operations were identified using a 50-foot-wide permanent right-of-way overlain on available resource maps.

For the Applicant's proposed project and System SA-04, the ROI for the fisheries and aquatic habitat evaluation encompasses the area that could be directly affected by construction within 0.5 mile from the route centerlines, in addition to indirect effects that may occur within areas beyond the construction work areas.

Other CN Alternatives evaluated consist of continued use of the existing Line 3 pipeline, rail transport, truck transport, and the combined use of the Line 3 pipeline supplemented by rail or truck transport. These alternatives were qualitatively reviewed for potential impacts based on available fish and aquatic habitat information, descriptions of potential locations for new facilities, and descriptions of potential transportation routes.

Typical impacts on fisheries habitat from pipeline construction and operational maintenance were qualitatively evaluated by considering the sensitivity of the waterbody and considering the impact mechanism that could affect resident biota. Waterbody crossing methods could result in temporary increased turbidities and sedimentation that would negatively impact sensitive biota. Permanent impacts, such as the reduction or modification of riparian vegetation, could affect physicochemical attributes within a stream resulting in stress on resident populations. Similarly, erosional impacts resulting from changes to riparian habitat could result in long-term quality effects to aquatic habitats.

Wildlife and Wildlife Habitat

Descriptions of common wildlife (e.g., abundance, distribution, and seasonal sensitivity) and wildlife habitats were obtained from publicly available information published by state agencies, including Minnesota DNR, Wisconsin DNR, North Dakota Game and Fish, Iowa DNR, Illinois DNR, and the Audubon Society. Information on raptor nest locations was obtained from reports on raptor nest surveys completed for the Applicant’s proposed project (Merjent 2015a, 2015b); data were not collected for the route alternatives. Colonial waterbird nesting locations were evaluated based on NHIS data (Minnesota DNR 2016e).

Designated Management Units

Wildlife conservation areas have been designated within each state that would be crossed by the Applicant’s proposed project and CN Alternatives. The impacts analysis considered the proximity of the Applicant’s proposed project and CN Alternatives to areas considered significant for conservation of wildlife or for preservation of wildlife habitat. The areas are presented under various naming conventions, including but not limited to, WMAs, waterfowl production areas, wetland management districts, BLM land, federal and state forests, state parks, recreation areas, natural areas, nature preserves, scenic trails, and private conservation areas. USGS Gap Analysis Program (GAP) data provide a compilation of these conservation areas. Each area is assigned a status code (1, 2, or 3) to indicate the level of protection and management objectives. All three of these GAP Status Codes include permanent protection from conversion of natural land cover over all or most of their area (USGS GAP 2013). GAP Status 1 and 2 lands are managed for biodiversity, while GAP Status 3 lands include areas managed for multiple uses.

Each of the states crossed maintains designated WMAs. These areas generally are established to protect lands and waters with productive habitat for fish and wildlife, as well as fish- and wildlife-oriented recreation (e.g., hunting, fishing, and bird watching) (Minnesota DNR 2016f; Wisconsin DNR 2016a). WMA managers actively plant food plots, restore native plants and wetlands, conduct prescribed burns, and manipulate water levels.

Audubon IBAs established by the National Audubon Society (rather than by state or federal agencies) are a useful management tool to identify areas that contain vital resources for birds and may concentrate birds. Audubon IBAs include both public and private lands and lack formal protections. IBAs are identified through a rigorous process by bird experts. Each IBA represents a place that supports: species of conservation concern (e.g., threatened and endangered species), range-restricted species (e.g., those species limited spatially), species that occur in only one habitat type or biome, or species or groups of species (e.g., waterfowl or shorebirds) that are vulnerable because they congregate in large numbers. While all IBAs are recognized for their importance to birds, some are of greater significance than others. IBAs are prioritized hierarchically, from greatest to least significant, as global, continental, or state.

In addition to these wildlife areas, general vegetation land cover types, including large blocks (greater than 100 acres) of forested and forested wetland habitats, provides important information about available habitats and the wildlife that likely use them. Further details for each of these land classification systems are provided in the discussion of existing conditions below.

Data Sources and Potential Impact Areas

Specific geospatial data sources evaluated for impacts on wildlife and wildlife habitats included:

- NLCD (Homer et al. 2015) for land cover information, including aquatic and terrestrial (vegetation) habitats;
- Federal, state, and local wildlife conservation areas and easements (USGS GAP 2016);
- Minnesota wildlife refuge inventory (Minnesota DNR 2016g);
- Audubon IBAs (Audubon 2016);
- Minnesota NHIS colonial waterbird nesting aggregations (Minnesota DNR 2016e); and
- Raptor nest surveys for the Applicant's proposed project (Merjent 2015a, 2015b).

No single one of the datasets listed above provides a complete indication of all relevant impacts to wildlife and wildlife habitat, but together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, while NLCD data in the ROI can aid the reader in generally understanding the potential for impacting different wildlife habitat tyypes, information that the IBA dataset provides is necessary for a specific understanding of potential impacts to high quality bird habitats.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with an understanding of the qualitative descriptions of impacts that are contained in the text in this section. Tables in this section provide acreage estimates, for example, of general vegetative cover types crossed and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to wildlife and wildlife habitat is contained in the text of this section.

Areas of potential impacts on wildlife and wildlife habitat from construction of the Applicant's proposed project were evaluated within the Project footprints provided by the Applicant for the construction work area, ATWS, access roads, pipe yards, permanent right-of-way, MLVs and driveways, and pump stations. Using GIS, these footprints were overlain on the resource maps to identify the resources potentially affected. The potentially affected areas during operation of the Applicant's proposed project were identified in a similar manner, using a 50-foot-wide permanent right-of-way.

Construction impacts for SA-04 were similarly evaluated using a 120-foot-wide construction work area centered on SA-04, and operations impacts were estimated using a 50-foot-wide permanent right-of-way overlain on the wildlife distribution and wildlife habitat resource maps.

The ROI for the wildlife and wildlife habitat evaluation encompasses the area that could be directly or indirectly affected by pipeline construction within 0.5 mile from the route centerlines because some construction activities and indirect effects may occur in areas beyond the construction work areas.

Other CN Alternatives—including continued use of the existing Line 3 pipeline, rail transport, truck transport, and combined use of the Line 3 pipeline supplemented by rail or truck—were qualitatively reviewed for potential impacts based on available wildlife species distribution and wildlife habitat information, the descriptions of potential locations for new facilities, and the descriptions of potential transportation routes.

Typical impacts on terrestrial wildlife habitat from pipeline construction and operational maintenance were qualitatively evaluated, including the alteration of vegetation cover. Permanent loss of wildlife habitat was quantified as the area required for maintenance of permanent facilities. Temporary loss and permanent alteration of wildlife habitats were quantified as the size and quality of the area disturbed by the construction work areas and permanent right-of-way by providing the total acres disturbed within wildlife conservation areas and by vegetation cover class. Habitats susceptible to fragmentation were identified by locating large blocks (greater than 100 acres) (Homer et al. 2015) of continuous upland forest and woody wetland cover that would be crossed by the pipeline alternative routes where those routes would not be co-located with other linear infrastructure. Particular attention was given to large, mature core or interior forested areas that serve as habitat for protected migratory birds and other wildlife.

The potential for wildlife mortality impacts was qualitatively evaluated based on occurrence, the animal's ability to move away from construction activities, and the animal's susceptibility to being run over or hit by equipment or crew vehicles. The potential for wildlife disturbance, displacement, or blockage of movements also was qualitatively evaluated based on occurrence, locations of migration corridors, locations of sensitive breeding or migration staging areas, and differential sensitivity to human activities.

5.2.4.2 Existing Conditions

5.2.4.2.1 Applicant's Proposed Project

Fisheries and Aquatic Habitat

The Applicant's proposed project would cross surface waters, including large rivers; perennial (permanent) streams, intermittent (wet part of the year) streams, and ephemeral (wet only after precipitation) streams; large lakes; shallow lakes; and wetlands. Potential impacts related to surface water crossings are addressed in Section 5.2.1.2.

Typically, large rivers are quite wide; flow more slowly than smaller rivers; and have numerous meanders and oxbows, islands, and backwaters. The backwater areas of these rivers are biologically productive and provide important spawning areas for several species of fish, as well as refuge habitat for many other animal species. Connectivity of these rivers is an important feature and influences the distribution of fish populations and other species. Smaller rivers, streams, and wetlands provide foraging areas, nesting areas, and refuge for a myriad of species of fish and wildlife, including SGCN birds such as yellow rails (*Coturnicops noveboracensis*) and sedge wrens (*Cistothorus platensis*) (see Section 5.2.5 for more information about SGCN). The Mississippi River, also within the Clearbrook-to-Carlton segment of the Applicant's proposed project, has a naturally reproducing population of muskellunge that has been supplementally stocked with fingerlings or adults since 2006.

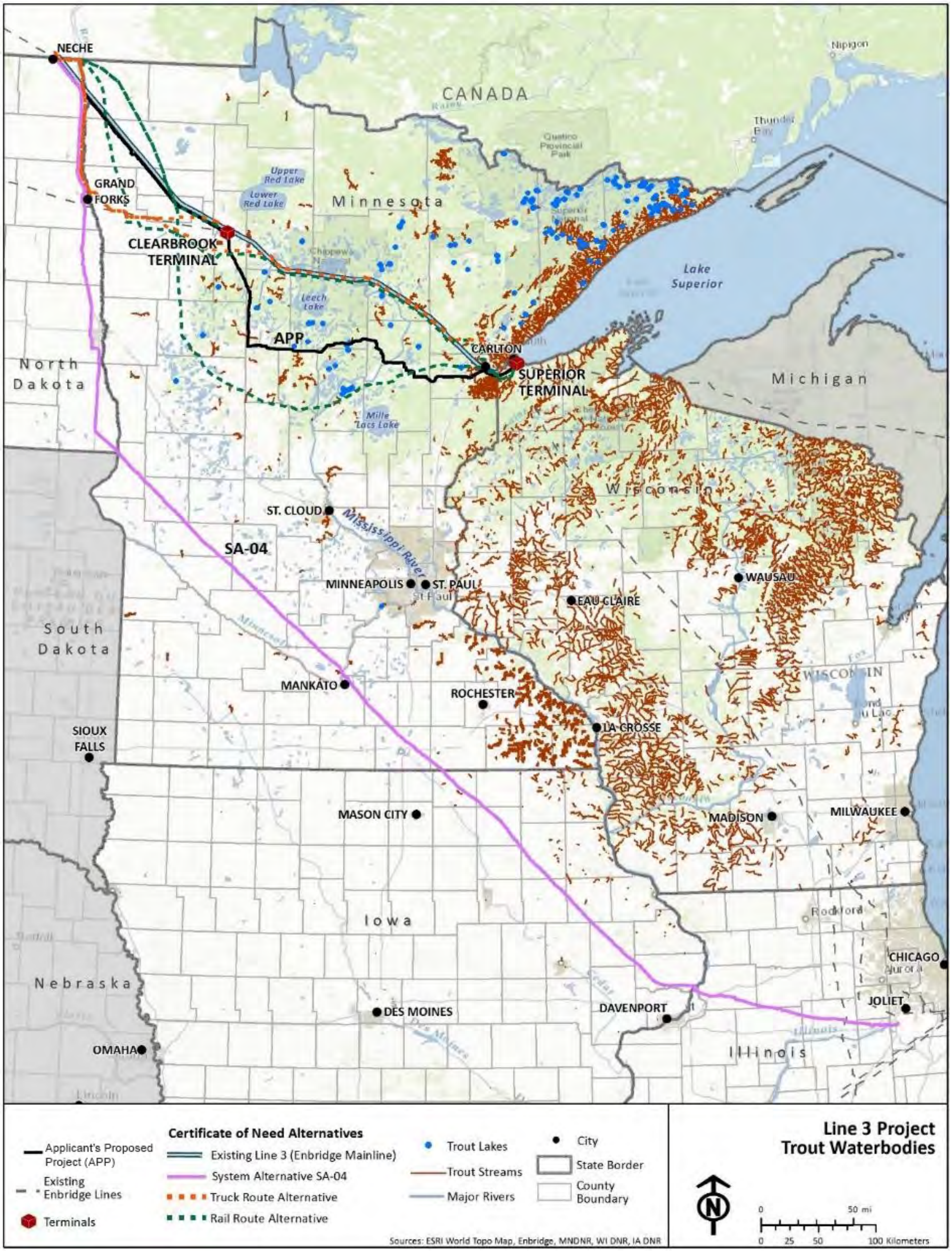
The Applicant's proposed project would traverse areas with abundant freshwater lakes. Lakes are important to Minnesota's environment and economy (e.g., hunting and fishing, many forms of lake recreation, and the tourism industry). Good-quality lake habitat is largely the result of healthy, intact watersheds and shorelines. Watersheds influence water quality, where more intact watersheds tend to result in lakes with better water quality. Shoreline habitat provides bottom substrates, structure, and vegetation that fish and other aquatic animals need for foraging, spawning substrate, and cover from predation.

Shallow lakes provide habitat for many species. They are permanent or semi-permanent waterbodies that are less than 15 feet deep and typified by abundant aquatic plant growth that results from generally high levels of nutrients (e.g., phosphorus, nitrogen, and minerals) and abundant sunlight availability in shallow water. Wetlands and vegetated fringes form along the edges of lakes and include stands of emergent and floating-leaved aquatic plants such as cattails (*Typha* spp.), bulrush (several genera), water lily (*Nymphaea* spp.) and reeds (several genera), as well as submerged plants (e.g., coontail [*Ceratophyllum demersum*]), creating an extended littoral zone. These plants provide excellent food and habitat for zooplankton, insects, fish, waterfowl, and other wildlife. Abundant aquatic vegetation also helps to maintain water clarity by anchoring sediments. Shallow lakes are important breeding, nesting, and foraging areas for waterfowl and waterbirds such as ducks, geese, herons, rails, and many more (Minnesota DNR 2016h).

Four AMAs occur within 0.5 mile of the Applicant's proposed project: Blackhoof River AMA, La Salle Creek AMA, Spire Valley AMA, and Straight River AMA (see Figure 5.2.4-1).The Applicant's proposed project runs directly adjacent to Portage Lake. Portage Lake meets the criteria for a Lake of Biological Significance and is also a Sentinel Lake.

The ROI includes Minnesota DNR-designated trout streams, which occur throughout the state (Figure 5.2.4-2). There are 22 trout streams (21 in Minnesota and one in Wisconsin) identified within 0.5 mile of the Applicant's proposed project, as described in more detail in Section 5.2.4.3.1. Five lakes rated for the Fish IBI are located in the ROI in the following watersheds: Roosevelt, Island, Waukenabo, Big LaSalle, and Portage. The Applicant's proposed project would cross or be located within 1 mile of waters containing invasive species in Minnesota and Wisconsin. Invasive species established in waters that would be crossed by the Applicant's proposed project include reed canary grass (*Phalaris arundinacea*), flowering rush (*Butomus umbellatus*), rusty crayfish (*Orconectes rusticus*), faucet snail (*Bithynia tentaculata*), zebra mussel (*Dreissena polymorpha),* curly leaf pondweed (*Potamogeton crispus*), common carp (*Cyprinus carpio*), ruffe (*Gymnocephalus cernua*), and Eurasian milfoil (*Myriophyllum spicatum*).

Federal, state, and tribal agencies have identified significant fisheries with recreational or commercial value that occur in waterbodies (e.g., streams, rivers, lakes, and ponds) at or immediately downstream of proposed crossings. Maintaining abundant populations of fish requires high-quality aquatic habitat and healthy ecosystems. Fisheries can be defined as coldwater, coolwater, or warmwater and are associated with particular fish assemblages. These fisheries can include both game and nongame species.



Source: Minnesota DNR 2015c

Figure 5.2.4-2. Trout Streams and Lakes in Relation to the Applicant's Proposed Project and Certificate of Need Alternatives

Generally, coldwater fisheries support trout and salmon (Salmonidae); these are important commercial and sport fishes that require cold, clean water for survival and reproduction. Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), and pink salmon (*Oncorhynchus gorbuscha*) have been introduced to Lake Superior and now spawn in its tributaries (Minnesota DNR 2016i). Lake trout (*Salvelinus namaycush*) are naturally reproducing in cold lakes throughout the region. The native brook trout (*Salvelinus fontinalis*) and the introduced brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) are also present in rivers and streams in the region. No salmon species occur within streams crossed by the Applicant's proposed project.

Coolwater fisheries support gamefish such as northern pike (*Esox lucius*) and muskellunge or muskie, walleye (*Sander vitreus*), and yellow perch (*Perca flavescens*). Northern pike generally inhabit clear, shallow, warm waters near shore but move to deeper water midsummer to use coolwater areas (Michigan DNR 2016a). Muskellunge survive in a wide range of temperatures and prefer clear water (ADW 2016). They move from shallow, weedy water to deeper water as they grow larger (ADW 2016). Walleye occur in submerged bars and rocky areas of shallow bay lake waters in spring and fall but also move to cooler, deeper water (i.e., less than 50 feet) in summer (Michigan DNR 2016b). Yellow perch generally prefer relatively shallow water (i.e., less than 30 feet deep) near shore (Michigan DNR 2016c).

Warmwater fisheries support catfish and bullheads (Ictaluridae), sunfish and bass (Centrarchidae), carp and minnows (Cyprinidae), and temperate bass (Moronidae). Catfish and bullheads occur throughout the region, but are most common in warm, fertile rivers and lakes (Minnesota DNR 2016j). Sunfish, including the bluegill (*Lepomis macrochirus*), which is the most popular sunfish, prefer lakes and slow streams (Minnesota DNR 2016k). Bass, both largemouth (*Micropterus salmoides*) and smallmouth (*Micropterus dolomieu*), are becoming increasingly popular with anglers. Largemouth bass tend to favor clear lakes with abundant aquatic vegetation, and they can tolerate quite warm water temperatures. Smallmouth bass are often in rivers with suitable gravel or rubble for spawning that are warmer than those that support trout (Minnesota DNR 2016l). Carps and minnows occupy a variety of habitats, including coldwater and warmwater environments (Cornell 2016), and several are listed as SGCN; however, the common carp, and a number of Asian carp species are invasive fish. The white bass (*Morone chrysops*), important for sport fishing due to its size and abundance, occurs in rivers, tributaries, and reservoirs, as well as in several lakes (Minnesota DNR 2016m). The yellow bass (*Morone mississippiensis*) is present in the Mississippi River backwaters below Lake Pepin (Minnesota DNR 2016m).

All three main types of fishery (coldwater, coolwater, and warmwater) are present in the region. Protected and rare species are discussed in Section 5.2.5, including species listed by state or federal endangered species regulations.

Wildlife and Wildlife Habitat

The Project region supports a diversity of terrestrial wildlife, including mammals, birds, amphibians, reptiles, and invertebrates. Mammals include both game (those species that are hunted or trapped such as big and small game animals, and fur-bearing animals) and nongame species (small mammals and non-hunted species). Birds can be resident or migratory and include game species (waterfowl and upland game birds such as wild turkey [*Meleagris gallopavo*]) and nongame species (e.g., songbirds). Amphibians and reptiles include frogs, toads, salamanders, snakes, lizards, and turtles. Invertebrates include a wide variety of insects and other arthropods (e.g., spiders), as well as mussels. This section describes the existing wildlife resources in the vicinity of the Applicant's proposed project.

Applicant's Proposed Project

Wildlife Habitats

Northern Minnesota is relatively undeveloped with large expanses of protected lands that are home to many species of wildlife. The Applicant's proposed project would cross 10 broad-scale vegetation cover classes: evergreen forest, deciduous forest, mixed forest, shrub/scrub, grassland/herbaceous, hay/pasture, cultivated crops, woody wetlands, emergent herbaceous wetlands, and barren land (Homer et al. 2015). Each of these cover classes is defined in Table 5.2.3-2 in Section 5.2.3.1.2, Methodology. In general, the Applicant's proposed project occurs within ecoregions with forested uplands, forested wetlands, non-forested wetlands, prairie/grasslands, and agricultural areas. Table 5.2.4-2 lists the acreages of vegetation types crossed by the Applicant's proposed project.

Table 5.2.4-2. Vegetation Cover Potentially Affected by the Applicant's Proposed Project (acres)

Vegetation Cover Class	Con[a]	Op[b]	ATWS[c]	Access Roads	Pump Stations	MLVs	Total[d]	
							Con	Op
Evergreen forest	177	71	18	19	1	1	199	87
Deciduous forest	1,416	622	97	103	2	2	1,544	698
Mixed forest	20	8	1	2	<0.1	<0.1	21	11
Shrub/scrub	239	117	15	13	2	<0.1	256	131
Grassland/herbaceous	131	63	32	9	4	0	165	73
Hay/pasture	585	262	121	45	16	1	706	323
Cultivated crops	1,699	726	327	22	20	2	2,028	768
Woody wetlands	419	204	18	13	3	1	438	219
Emergent herbaceous wetlands	229	122	19	7	3	0	249	132
Barren land	4	2	8	1	<0.1	<0.1	12	2
TOTAL	**4,917**	**2,197**	**656**	**234**	**50**	**6**	**5,617**	**2,444**

Source: Homer et al. 2015.

[a] Con = Enbridge-provided footprint for construction work area in Minnesota. In North Dakota and Wisconsin, estimated construction impact area in acres based on 120-foot-wide construction work area centered on route, including the 50-foot-wide permanent right-of-way.

[b] Op = Enbridge-provided footprint in Minnesota. Estimated permanent impact acres based on 50-foot-wide right-of-way centered on route in North Dakota and Wisconsin.

[c] ATWS = additional temporary workspaces (includes pipe yards)

[d] Total: Con = sum of pipeline construction work area, ATWS, and temporary access roads; Op = sum of pipeline permanent right-of-way, primary access roads, pump stations, and MLVs (mainline valves).

Note:

Values in table may not sum to subtotals and totals due to rounding.

Forested uplands, including evergreen, deciduous, or mixed forests, typically exhibit closed canopies, dense understories, large trees, and downed trees. These areas are important habitat components for a variety of birds, salamanders, white-tailed deer (*Odocoileus virginianus*), and large carnivores such as gray wolves (*Canis lupus*) and black bears (*Ursus americanus*).

The shrub/scrub cover class includes shrub and young trees less than 5 meters tall, and includes vegetated areas in an early successional stage or trees stunted from environmental conditions (Homer et al. 2015). These habitats support white-tailed deer, small mammals, reptiles, and several bird species (e.g., ruffed grouse [*Bonasa umbellus*], American woodcock [*Scolopax minor*])

Grasslands and prairies are typified by large open areas with grasses and flowering plants dominating, which provide habitat for many species of pollinators, songbirds, small mammals, snakes, deer, coyotes (*Canis latrans*), and red fox (*Vulpes vulpes*).

Agricultural lands, including hay/pasture and cultivated crops, attract white-tailed deer, sandhill cranes (*Grus canadensis*), trumpeter swans (*Cygnus buccinator*), and wild turkeys that come to feed on crops.

Emergent herbaceous wetlands, such as marshes, and woody wetlands are permanently or periodically inundated with water and provide habitat for amphibians and reptiles, aquatic insects, aquatic mammals such as muskrats (*Ondatra zibethicus*), and many species of birds. Calcareous fens are a type of wetland that support unique plant and animal species (see Sections 5.2.1.3 and 5.2.5).

Barren land includes areas where vegetation accounts for less than 15 percent of the total cover. It may include areas of exposed bedrock, rockslides, glacial debris, strip mines, gravel pits, and other accumulations of earthen material (Homer et al. 2015). These areas provide minimal habitat for wildlife. However, reptiles (e.g., snakes) and small mammals may find shelter in between rocks.

Management Units

Wildlife conservation lands that occur along or near the Applicant's proposed project are listed in Table 5.2.4-3. The Applicant's proposed project occurs within the vicinity of a variety of Minnesota DNR wildlife management and conservation areas, including WMAs, wildlife refuges, state forests, and recreation areas.

Portions of six WMAs occur within the ROI for the Applicant's proposed project (Grayling Marsh, Lawler, Lowe, McGregor, Mud Lake, and Salo Marsh). Two (Grayling Marsh and Lawler) are located within the construction and operation area. Grayling Marsh WMA consists mostly of lowland habitats managed for sharp-tailed grouse (*Tympanuchus phasianellus*) and sandhill cranes. Other game species at this site include white-tailed deer, American black bear, small game, forest upland birds, and waterfowl. Lawler WMA consists mostly of marsh and low brush areas that are managed for deer and waterfowl (Minnesota DNR 2016l).

Figure 5.2.4-3 provides an overview of WMAs, wildlife refuges, and other conservation lands near the Applicant's proposed project and system alternative SA-04. The lands shown in Figure 5.2.4-3 include those assigned GAP Status Codes 1, 2, and 3 to indicate the level of protection and management objectives as well as wildlife refuges and state WMAs.

Table 5.2.4-3. Wildlife Conservation Lands within 0.5 Mile of the Applicant's Proposed Project and System Alternative SA-04

Location, Designation Type, and Name	Applicant's Proposed Project		System Alternative SA-04	
	Acres	Number of Parcels	Acres	Number of Parcels
North Dakota				
Habitat or Species Management Area				
Dakota Tallgrass Prairie Wildlife Management Area	--	--	34,806.8	1
Resource Management Area				
Pembina County Waterfowl Production Area (designated)	243.9	5	280.4	7
Pembina County Waterfowl Production Area (not designated)	--	--	36.5	2
North Dakota subtotal	***243.9***	***5***	***35,123.8***	***10***
Minnesota				
Protective Management Area				
Wetlands Reserve Program	--	--	11.4	2
Habitat or Species Management Area				
Clair Rollings Wildlife Management Area	--	--	29.7	1
Grayling Marsh Wildlife Management Area	820.1	1	--	--
Horning Pit Wildlife Management Area	--	--	34.2	2
Lawler Wildlife Management Area	197.8	2	--	--
Lowe Wildlife Management Area	57.9	1	--	--
Lyle-Austin Wildlife Management Area	--	--	12.4	1
McGregor Wildlife Management Area	152.1	1	--	--
Mud Lake Wildlife Management Area	3.6	1	--	--
Mueller Wildlife Management Area	--	--	38.4	1
Red Cedar River Wildlife Management Area	--	--	35.5	1
Salo Marsh Wildlife Management Area	201.6	1	--	--
Sena Wildlife Management Area	--	--	114.6	1
Swan Lake Wildlife Management Area	--	--	40.4	1
Windot Wildlife Management Area	--	--	5.7	2
Resource Management Area				
Bureau of Land Management land	60.8	1	--	--
Litchfield Wetland Management District	--	--	457.9	4
Morris Wetland Management District	--	--	319.4	6

Table 5.2.4-3. Wildlife Conservation Lands within 0.5 Mile of the Applicant's Proposed Project and System Alternative SA-04

Location, Designation Type, and Name	Applicant's Proposed Project		System Alternative SA-04	
	Acres	Number of Parcels	Acres	Number of Parcels
State Forest Lands				
Fond du Lac	987.8	2	--	--
Foothills	1,811.4	1	--	--
Hill River	5,056.0	1	--	--
Huntersville	4,504.0	2	--	--
Land O'Lakes	5,913.6	5	--	--
Mississippi Headwaters	1,335.2	2	--	--
Paul Bunyan	264.9	1	--	--
Savanna	579.6	6	--	--
Waukenabo	545.5	4	--	--
White Earth	207.6	1	--	--
Private Conservation Land				
Conservation Reserve Enhancement Program	--	--	751.0	32
Marginal cropland – limited	22.3	4	29.5	4
Marginal cropland – perpetual	--	--	33.2	5
Miller Prairie Fee	--	--	144.2	1
Reinvest in Minnesota Wetlands Reserve Program	--	--	431.1	10
Riparian buffer strip	--	--	5.3	2
Riparian lands	--	--	70.3	2
Minnesota subtotal	***22,721.8***	***37***	***2,564.0***	***78***
Iowa				
Habitat or Species Management Area				
Elma Wildlife Management Area	--	--	81.6	1
Recreation Management Area				
Pioneer State Recreation Area	--	--	8.3	2
Iowa subtotal	--	--	***89.9***	***3***
Illinois				
National Forest - National Grassland				
Midewin National Tallgrass Prairie	--	--	154.6	4
National Wildlife Refuge				
Upper Mississippi River Wildlife and Fish Refuge	--	--	0.9	1

Table 5.2.4-3. Wildlife Conservation Lands within 0.5 Mile of the Applicant's Proposed Project and System Alternative SA-04

Location, Designation Type, and Name	Applicant's Proposed Project		System Alternative SA-04	
	Acres	Number of Parcels	Acres	Number of Parcels
Protective Management Areas				
Coon Creek	--	--	10.7	1
East Grove	--	--	6.8	1
Lower Fox River-Blake's Landing Nature Preserve	--	--	0.0	4
Marsh Relicts	--	--	6.4	1
Mississippi River	--	--	213.4	1
Joliet Army Ammunition Plant	--	--	78.9	4
Des Plaines	--	--	10.2	1
State Park				
Hennepin Canal	--	--	44.1	1
Local Forest				
McKinley Woods Preserve 1	--	--	49.7	1
McKinley Woods Preserve 2	--	--	0.2	1
Illinois subtotal	--	--	***575.9***	***20***
Wisconsin				
Protective Management Area				
Statewide Natural Area	231.0	1	--	--
Recreation Management Area				
North Country National Scenic Trail	2.0	2	--	--
Wisconsin subtotal	***232.9***	***3***	--	--
TOTAL	**23,198.6**	**45**	**38,353.6**	**111**

Source: USGS GAP 2016.

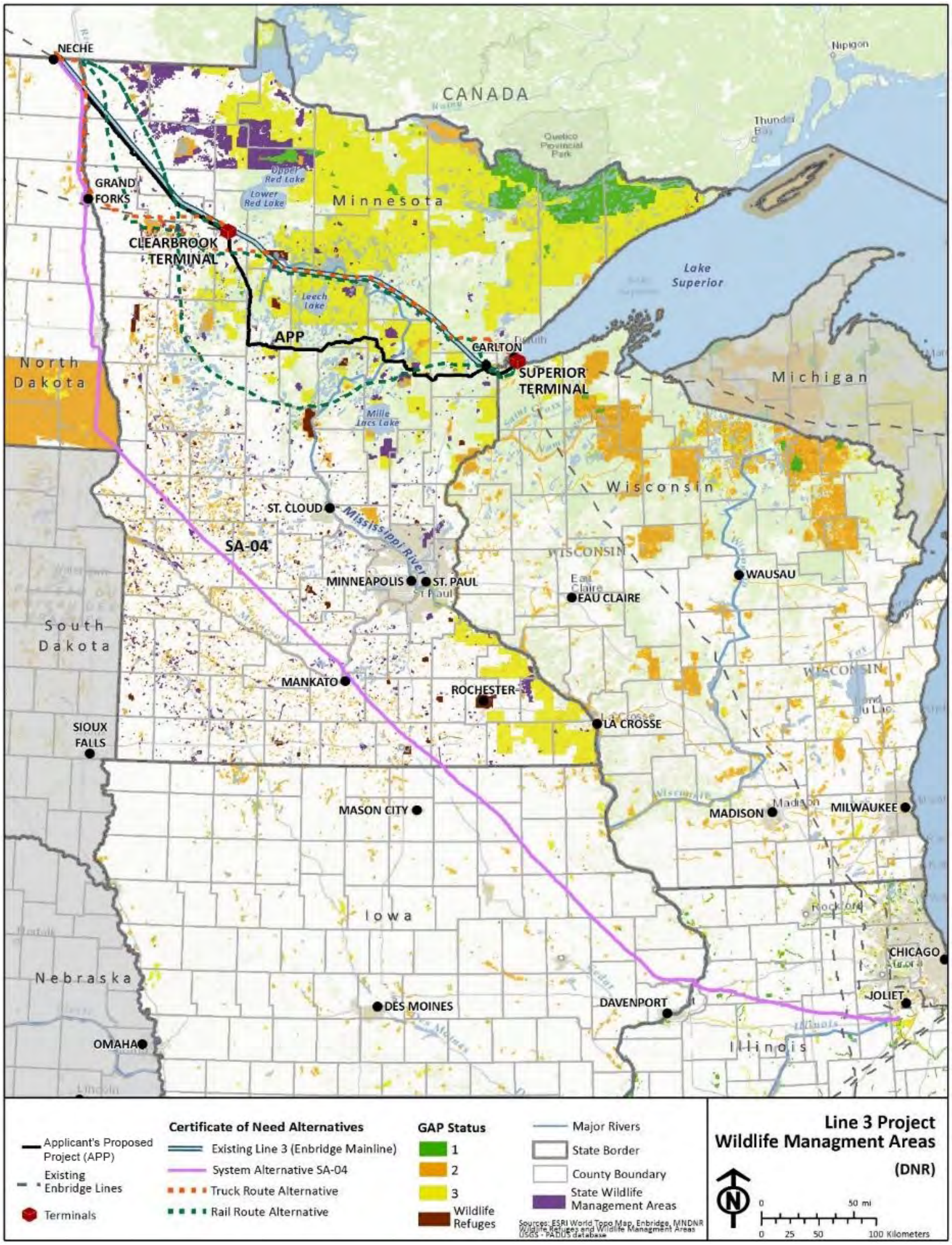
Notes:

Values in table may not sum to subtotals and totals due to rounding.

Represents GAP Status 1, 2, and 3 areas only; these lands have permanent protection from conversion of natural land cover that provides wildlife habitat for all or most of the area.

Acreage of conservation lands and number of parcels within 0.5 mile of the Applicant's proposed project and system alternative SA-04 route.

"--" = no occurrence



Source: USGS GAP 2016

Note: GAP Status 1 and 2 lands are managed for biodiversity, while GAP Status 3 lands include areas managed for multiple uses.

Figure 5.2.4-3. Wildlife Management Areas and Refuges near the Applicant's Proposed Project and Certificate of Need Alternatives

IBAs in the vicinity of the Applicant's proposed project are as follows (Figure 5.2.4-4):

- Itasca State Park IBA – This state priority IBA supports 222 species of birds. Itasca's extensive stands of boreal forests with mixed hardwoods provide excellent habitat for many northern birds such as crossbills (*Loxia* spp.), gray jays (*Perisoreus canadensis*), finches (Fringillidae), thrushes (Turdidae), black-backed woodpeckers (*Picoides arcticus*), and warblers (Parulidae). Over 20 species of nesting warblers and multiple breeding pairs of bald eagles are supported by the park.

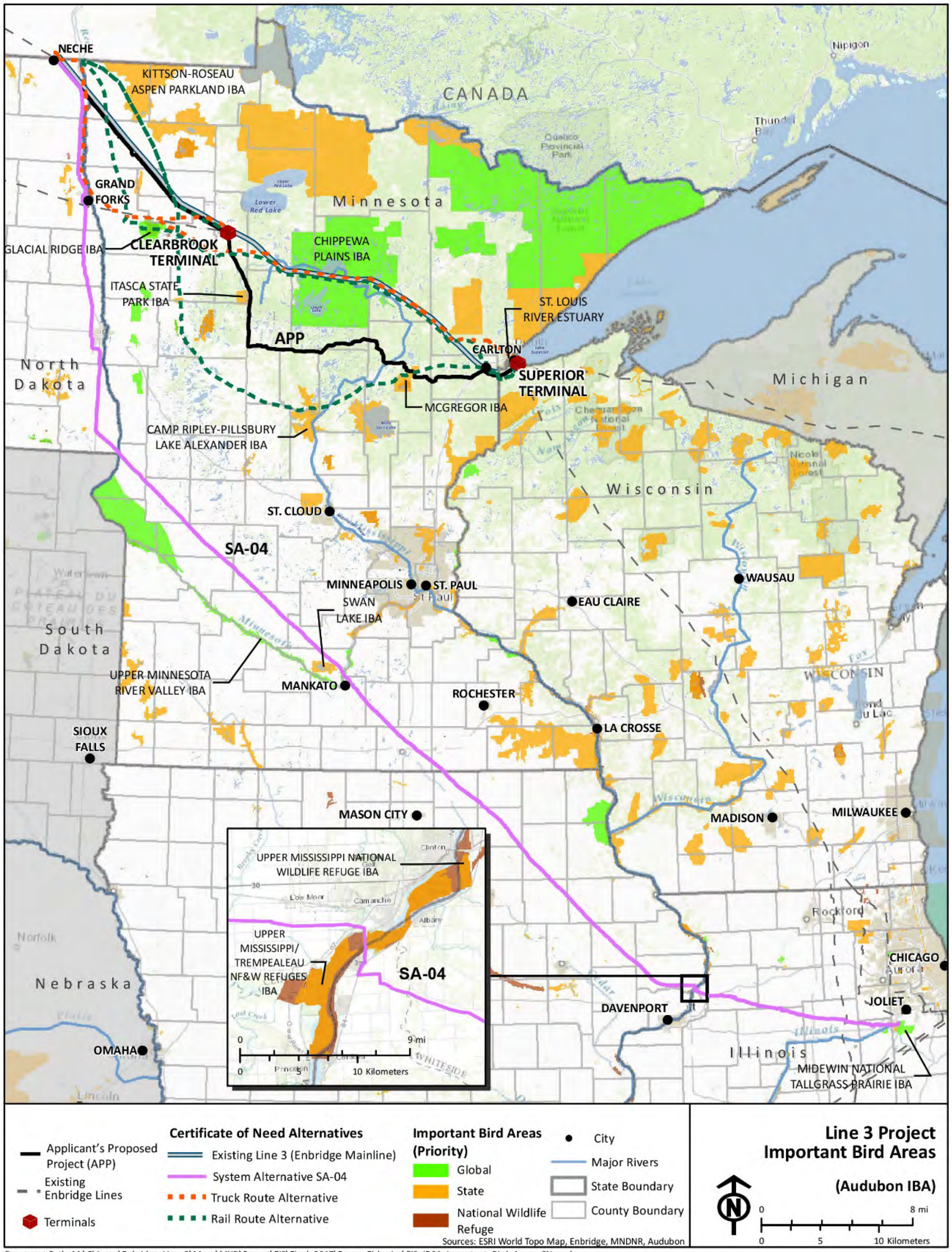
- McGregor IBA – This state priority IBA contains various habitats to support many bird species, including wetlands, lowland forests, upland deciduous forests, open brushlands, and open grasslands. Species that use the IBA for nesting include, but are not limited to, the American bittern (*Botaurus lentiginosus*), yellow rail, sora (*Porzana carolina*), black tern (*Chlidonias niger*), and sandhill crane; 12 species of warblers; the trumpeter swan; bald eagle; American woodcock; wood thrush (*Hylocichla mustelina*); black-billed cuckoo (*Coccyzus erythropthalmus*); LeConte's sparrow (*Ammodramus leconteii*); and bobolink (*Dolichonyx oryzivorus*). The site is also known for the large number of ring-necked ducks (*Aythya collaris*) it supports during migration.

Wildlife in the Project Region

<u>Mammals</u>

Large Mammals and Big Game

The white-tailed deer is the most common big game animal occurring along the pipeline routes. Deer occur throughout the Project region and are an ecologically, socially, and economically important species. White-tailed deer inhabit a wide variety of habitats and are highly adaptable. Croplands, grasslands, shrublands, orchards, woodlands, and residential areas provide foraging and resting areas for deer. White-tailed deer eat a varied diet that may include acorns, corn, soybeans, mushrooms, grasses, tree leaves, buds, twigs and bark, wild grapes, apples, and assorted shrubs. During winter, deer often aggregate or "yard" in forested stream bottoms and other areas protected from heavy snows. Wolves, coyotes, bears, and bobcats (*Lynx rufus*) are natural predators of deer. White-tailed deer are hunted for sport and meat, and permits are available for hunting using firearms (e.g., shotgun, rifle), muzzleloaders, or archery (e.g., bow and arrow).



Source: Audubon 2016.

Figure 5.2.4-4. Audubon Important Bird Areas near the Applicant's Proposed Project and Certificate of Need Alternatives

Black bears are another big game mammal that occur in the Project region. Black bears occur mainly in the northern third of Minnesota but range as far south as the interface between the forested and agricultural areas (Minnesota DNR 2016i). There are roughly 20,000 black bears in Minnesota (Minnesota DNR 2016n). Wisconsin is home to a robust black bear population estimated at more than 28,000 bears. The black bear's primary range in Wisconsin includes the northern third of the state (Wisconsin DNR 2016b). Black bears are generally found in forests, swamps, and other areas with dense cover, but they also venture into clearings to feed. Black bears feed primarily on new plant growth in spring, switching to ants and ant pupae and a variety of berries in summer, and nuts (acorns and hazelnuts) in autumn. Black bears supplement their diets with corn and other crops, bird eggs, honey, and deer fawns opportunistically. Black bears are hunted for their meat and fur, primarily from the coniferous areas of northeast Minnesota. Sport hunting is their main source of mortality. Minnesota hunters harvest an average of about 3,000 black bears annually (Minnesota DNR 2016n).Wisconsin hunters harvested approximately 4,643 bears in 2016 (Wisconsin DNR 2016c).

While elk (*Cervus canadensis*) are managed as a game species in many states, only two small remnant populations are present in Minnesota and elk are listed as a Species of Concern in the state. Elk once were distributed throughout Minnesota, but the native woodland elk (*C. elaphus canadensis*) and prairie elk (*C. e. manitobensis*) subspecies were nearly extirpated from the state by the early 1900s because of excessive hunting during the 1800s. In the early 1930s, captive-bred elk were used to reestablish a population in northwest Beltrami County. Since then, a second elk herd has become established in Kittson and Roseau counties near the border with Manitoba, Canada. This northern herd is believed to include individuals that have naturally emigrated from Canada, North Dakota, or the original Beltrami County reintroduced herd (Minnesota DNR 2016o). Elk prefer a diet of grasses and forbs, but their diet varies by season. Elk will browse on willow (*Salix* spp.), aspen (*Populus* spp.), and other woody vegetation, and will consume many agricultural crops. Wolves, coyotes, black bears, and cougars (*Puma concolor*) are natural predators of elk. Elk hunting is conservatively managed in Minnesota. Each year, a limited number of licenses are offered to Minnesota residents to hunt elk. Hunters are selected using a lottery system. In 2014, 1,167 hunters applied for a license, but only nine permits were issued and six elk ultimately were harvested (Minnesota DNR 2014b).

Moose (*Alces alces*) occur in the Project region in the northeastern portion of North Dakota, and in the northwestern and northeastern portions of Minnesota. Moose hunting was permitted in Minnesota in both of these regions until 1997 when it was prohibited in the northwest corner. Hunting continued in the northeast portion of the state until a 2013 aerial survey revealed that the moose population had declined in this area by 52 percent since 2010, after which Minnesota DNR suspended moose hunting indefinitely (Minnesota DNR 2013, 2016p). Moose hunting is prohibited in Wisconsin, where a combination of parasites common to white-tailed deer and unregulated hunting caused their earlier disappearance by the early 1900s (Wisconsin DNR 2016d). Moose eat aspen, maple (*Acer* spp.), and cherry (*Prunus* spp.) trees and many kinds of water plants (Minnesota DNR 2016q). Wolves and bears are natural predators of moose.

Cougars, also known as mountain lions or pumas, are rare but could occur within the region. Cougars occurred throughout most of Minnesota prior to European settlement (Minnesota DNR 2016i). Today, they are occasionally observed in Minnesota. Because there is no evidence of a viable breeding population in Minnesota, cougars are not currently tracked in the Minnesota DNR's Rare Features Database. Cougars are hunted in southwestern North Dakota but not within the Project area. Cougars are not considered a game animal in Minnesota, Iowa, Illinois, or Wisconsin, and are considered rare migrant occurrences within these states.

Mid-Sized Mammals, Small Game, and Furbearers

The Project region is home to a number of mid-sized mammals, many of which are classified as "small game" in hunting regulations or as furbearers in trapping regulations. Common small game and furbearers that are hunted or trapped in the Project area include the badger (*Taxidea taxus*), beaver (*Castor canadensis*), bobcat, coyote, fisher (*Martes pennanti*), pine marten (*Martes martes*), red fox, gray fox (*Urocyon cinereoargenteus*), mink (*Neovison vison*), muskrat, Virginia opossum (*Didelphis virginiana*), river otter (*Lontra canadensis*), rabbits and hares (Leporidae), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), squirrels (Sciuridae), and weasels (Mustelidae). Many furbearers are associated with water and wetlands (e.g., muskrats, mink, otters, and beavers). Rabbits, raccoons, opossums, and coyotes are present in a wide variety of habitats, including croplands, residential areas, hedgerows, and forests. Squirrels require forested habitats with abundant mix of mast producing trees such as elms, maples, oaks, walnut, and/or hickory. Mid-sized mammals not traditionally hunted or trapped include the porcupine (*Erethizon dorsatum*) and groundhog (*Marmota monax*).

Small Mammals

Small mammals, including mice, moles, voles and shrews, are important members of ecosystems. Herbivorous small mammals shape vegetative communities by spreading seeds and grazing. Their burrowing activities and the addition of feces and urine to the soil influence soil chemistry through changes in nutrient and mineral cycling rates and pathways (Hull Sieg 1987). Small mammals such as shrews and bats also function as secondary consumers by preying on invertebrates and other mammals. Small mammals serve as food supply for a large number of predators and can influence predator population cycles. Predators such as foxes, various owl species, and various hawk species rely heavily on rodents and other small mammals for food.

Species of small mammals that are likely to occur in the Project region include, but are not limited to, the southern bog lemming (*Synaptomys cooperi*), meadow vole (*Microtus pennsylvanicus*), red-backed vole (*Myodes gapperi*), meadow jumping mouse (*Zapus hudsonius*), woodland jumping mouse (*Napaeozapus insignis*), western harvest mouse (*Reithrodontomys megalotis*), white-footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), star-nosed mole (*Condylura cristata*), and Norway rat (*Rattus norvegicus*) (Minnesota DNR 2016r). Shrews are the smallest mammals in the Project area. Shrews that could occur in the Project region include the pygmy shrew (*Sorex minutus*), short-tail shrew (*Blarina brevicauda*), masked shrew (*Sorex cinereus*), northern water shrew (*Sorex palustris*), and arctic shrew (*Sorex arcticus*) (Minnesota DNR 2016s).

Bats are important to ecosystems in part because they consume vast numbers of insects, including agricultural pests. Bats occurring in the Project area are primarily forest dwelling and/or associated with riparian areas, and are insectivorous. In summer the bats roost in trees or in buildings, and in fall migrate to caves to hibernate through the winter. They return to their summer roosting locations in spring. The little brown bat (*Myotis lucifugus*) and big brown bat (*Eptesicus fuscus*) are the most common species in Minnesota. Other species that occur in the Project region include the northern long-eared bat (*Myotis septentrionalis*), hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*), silver-haired bat (*Lasionycteris noctivagans*), and tri-colored bat (*Perimyotis subflavus*). The northern long-eared bat was recently listed as threatened by USFWS (see Section 5.2.5).

Birds

Waterfowl and Gamebirds

All waterfowl and most gamebirds occurring in the Project region are considered migratory birds and are protected under the MBTA (which prohibits the take of any migratory birds without authorization from USFWS). Hunting regulations are developed and authorized by USFWS and state game and fish departments. Waterfowl are harvested primarily in autumn, with some goose seasons occurring in spring. Many waterfowl species breed in or migrate through areas that would be crossed by the Applicant's proposed project, SA-04, or facilities developed for the CN Alternatives (Table 5.2.4-4). Important recreational waterfowl include the Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), ring-necked duck, and blue-winged teal (*Anas discors*). Waterfowl habitats include wooded river bottoms, flooded forests, lakes (particularly those with wild rice), rivers, marshes, and flooded grain fields.

Other gamebird species include the American woodcock, Wilson's snipe (*Gallinago delicata*), mourning dove (*Zenaida macroura*), wild turkey, sandhill crane, greater prairie chicken (*Tympanuchus cupido*), sharp-tailed grouse, and introduced gamebirds such as the ring-necked pheasant (*Phasianus colchicus*) and gray (Hungarian) partridge (*Perdix perdix*). These species occur in areas crossed by the Applicant's proposed project, SA-04, or facilities developed for the CN Alternatives (Table 5.2.4-4).

Nongame Birds

The upper Midwest is home to many nongame bird species. Birds are an important part of healthy functioning ecosystems, including forests and prairies, and also developed areas such as agricultural, urban, and suburban areas. While a number of bird species are resident or migrate only short distances, many species perform long annual migrations in spring and fall. Minnesota, Iowa, Illinois, and Wisconsin are located on the Mississippi Flyway, a key migration flyway for millions of birds and hundreds of species that roughly follows the Mississippi River. North Dakota is part of the Central Flyway that encompasses the Great Plains area and links central Canada with the region surrounding the Gulf of Mexico. Nongame birds occur in all habitat types in the ROI, including coniferous, deciduous, and mixed forests; riparian areas and forested and non-forested wetlands; lakes, rivers, and streams; grasslands, prairies, and pastures; and shelterbelts and agricultural lands. Table 5.2.4-4 provides a list of some of the more common species expected to occur in the Project region.

Bald eagles once were protected by the ESA. Through the federal government's banning of Dichlorodiphenyltrichloroethane (DDT) and various conservation actions taken across the United States, populations recovered sufficiently and bald eagles were removed from the endangered species list (delisted) in 2007. However, bald eagles are still protected under the MBTA and the BGEPA. This legislation also protects their nesting structures, which tend to be used for a number of years. Bald eagles prefer to nest near lakes and rivers in forested areas where tall, large-diameter trees are available for nesting. Due to a growing population, more eagles have been found nesting in non-typical locations, such as tree lines in agricultural landscapes.

Table 5.2.4-4. Game and Nongame Birds Typical of Habitats Crossed by theCertificate of Need Alternatives

Habitat	Game	Nongame
Evergreen and mixed forests	--	Broad-winged hawk (*Buteo platypterus*), northern goshawk (*Accipiter gentilis*), sharp-shinned hawk (*Accipiter striatus*), boreal owl (*Aegolius funereus*), eastern whip-poor-will (*Antrostomus vociferus*), black-backed woodpecker (*Picoides arcticus*), hairy woodpecker (*Picoides villosus*), northern flicker (*Colaptes auratus*), pileated woodpecker (*Dryocopus pileatus*), yellow-bellied sapsucker (*Sphyrapicus varius*), merlin (*Falco columbarius*), blue-headed vireo (*Vireo solitarius*), red-eyed vireo (*Vireo olivaceus*), blue jay (*Cyanocitta cristata*), common raven (*Corvus corax*), gray jay (*Perisoreus canadensis*), brown creeper (*Certhia americana*), veery (*Catharus fuscescens*), black-and-white warbler (*Mniotilta varia*), black-throated green warbler (*Setophaga virens*), nashville warbler (*Oreothlypis ruficapilla*), yellow-rumped warbler (*Setophaga coronata*), chipping sparrow (*Spizella passerina*), dark-eyed junco (*Junco hyemalis*), white-throated sparrow (*Zonotrichia albicollis*), pine siskin (*Spinus pinus*)
Deciduous and mixed forests	Ruffed grouse (*Bonasa umbellus),* wild turkey (*Meleagris gallopavo*)	Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), barred owl (*Strix varia*), great horned owl (*Bubo virginianus*), ruby-throated hummingbird (*Archilochus colubris*), downy woodpecker (*Picoides pubescens*), red-bellied woodpecker (*Melanerpes carolinus*), eastern wood-pewee (*Contopus virens*), least flycatcher (*Empidonax minimus*), great crested flycatcher (*Myiarchus crinitus*), blue-headed vireo (*Vireo solitarius*), red-eyed vireo (*Vireo olivaceus*), tufted titmouse (*Baeolophus bicolor*), white-breasted nuthatch (*Sitta carolinensis*), house wren (*Troglodytes aedon*), wood thrush (*Hylocichla mustelina*), hermit thrush (*Catharus guttatus*), veery, cedar waxwing (*Bombycilla cedrorum*), American redstart (*Setophaga ruticilla*), chestnut-sided warbler (*Setophaga pensylvanica*), ovenbird (*Seiurus aurocapilla*), indigo bunting (*Passerina cyanea*), rose-breasted grosbeak (*Pheucticus ludovicianus*), scarlet tanager (*Piranga olivacea*), Baltimore oriole (*Icterus galbula*)
Riparian areas, wetlands (forested or non-forested)	Canada goose (*Branta canadensis*), wood duck (*Aix sponsa*), gadwall (*anas strepera*), mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), northern shoveler (*Anas clypeata*), green-winged teal (*Anas crecca*), canvasback (*Aythya valisineria*), redhead (*Aythya americana*), ring-necked duck (*Aythya collaris*), lesser scaup (*Aythya affinis*), common goldeneye (*Bucephala clangula*), American coot (*Fulica americana*), sandhill crane (*Grus canadensis*), American woodcock (*Scolopax minor*), Wilson's snipe (*Gallinago delicate*)	Trumpeter swan (*Cygnus buccinator*), pied-billed grebe (*Podilymbus podiceps*), red-necked grebe (*Podiceps grisegena*), western grebe (*Aechmophorus occidentalis*), American bittern (*Botaurus lentiginosus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), green heron (*Butorides virescens*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), yellow rail (*Coturnicops noveboracensis*), black tern (*Chlidonias niger*), Forster's tern *(Sterna forsteri*), short-eared owl (*Asio flammeus*), belted kingfisher (*Megaceryle alcyon*), bank swallow (*Riparia riparia*), marsh wren (*Cistothorus palustris*), sedge wren (*Cistothorus platensis*), swamp sparrow (*Melospiza georgiana*), red-winged blackbird (*Agelaius phoeniceus*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*)

Table 5.2.4-4. Game and Nongame Birds Typical of Habitats Crossed by theCertificate of Need Alternatives

Habitat	Game	Nongame
Lakes, rivers, streams	Canada Goose, wood duck, canvasback, redhead, ring-necked duck, lesser scaup, common goldeneye	Common loon (*Gavia immer*), red-necked grebe, western grebe, double-crested cormorant (*Phalacrocorax auritus*), American white pelican (*Pelecanus erythrorhynchos*), osprey, bald eagle, ring-billed gull (*Larus delawarensis*), belted kingfisher
Prairies, grasslands, pastures, open habitats	Greater prairie chicken (*Tympanuchus cupido*), sharp-tailed grouse (*Tympanuchus phasianellus*)	Turkey vulture (*Cathartes aura*), northern harrier, killdeer (*Charadrius vociferus*), upland sandpiper (*Bartramia longicauda*), American kestrel (*Falco sparverius*), eastern kingbird (*Tyrannus tyrannus*), loggerhead shrike (*Lanius ludovicianus*), horned lark (*Eremophila alpestris*), barn swallow (*Hirundo rustica*), eastern bluebird (*Sialia sialis*), clay-colored sparrow (*Spizella pallida*), field sparrow (*Spizella pusilla*), grasshopper sparrow (*Ammodramus savannarum*), Henslow's sparrow (*Ammodramus henslowii*), Savannah sparrow (*Passerculus sandwichensis*), vesper sparrow (*Pooecetes gramineus*), bobolink (*Dolichonyx oryzivorus*), eastern meadowlark (*Sturnella magna*), western meadowlark (*Sturnella neglecta*), dickcissel (*Spiza americana*)
Agricultural areas, shelterbelts	Canada goose, mallard, gray (Hungarian) partridge (*Perdix perdix*), ring-necked pheasant (*Phasianus colchicus*), wild turkey, sandhill crane, mourning dove (*Zenaida macroura*)	Turkey vulture, northern harrier, red-tailed hawk (*Buteo jamaicensis*), killdeer, rock pigeon (*Columba livia*), great horned owl, common nighthawk (*Chordeiles minor*), American kestrel, American crow (*Corvus brachyrhynchos*), black-billed magpie (*Pica hudsonia*), black-capped chickadee (*Poecile atricapillus*), gray catbird (*Dumetella carolinensis*), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), eastern bluebird, song sparrow (*Melospiza melodia*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*), red-winged blackbird, American goldfinch (*Spinus tristis*), house finch (*Haemorhous mexicanus*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*)

Sources: Minnesota DNR 2016t, 2016u.

Osprey were also affected by DDT and suffered population declines in the 1960 and 1970s. Their populations have since recovered and they occur throughout much of the upper Midwest. While osprey used to rely entirely on dead trees for nests, they now also use man-made structures such as powerline poles and communication towers for nesting. Raptor stick nest surveys were conducted within 0.5 mile along the Applicant's proposed project to locate and identify bald eagle and osprey nests between 2014 and 2016. Six active bald eagle nests and one active osprey nest were observed during the most recent survey in 2016 (Table 5.2.4-5). An additional stick nest was documented in Carlton County, Minnesota; however, the status of the nest and the species using the nest, if any, is not currently known.

Table 5.2.4-5 Raptor Stick Nests within 0.5 Mile of the Applicant's Proposed Project in North Dakota and Minnesota (2014, 2015, and 2016)

County, State	Distance from Workspace (miles)	Nest Status			Common Name
		2014	2015	2016	
Pembina, North Dakota	0.2	No data	Active	Active	Bald eagle
Clearwater, Minnesota	0.1	Not present	Not present	Active	Bald eagle
Clearwater, Minnesota	1.0	Not present	Inactive	Active	Bald eagle
Hubbard, Minnesota	0.0	Inactive	Active	Active	Osprey[a]
Carlton, Minnesota	0.2	Inactive	Inactive	No data	Unknown
Cass, Minnesota	0.1	Not present	Not present	Active	Bald eagle
Cass, Minnesota	0.5	Not present	Inactive	Active	Bald eagle
Aitkin, Minnesota	0.4	Not present	Active	Active	Bald eagle

Sources: Merjent 2015a, 2015b.

[a] Considered a bald eagle nest in 2014, but an osprey was observed in 2015 and 2016.

Reptiles and Amphibians

Amphibians are four-legged, cold-blooded (meaning they get their warmth from the environment) animals that typically start out as larvae living in water (e.g., tadpoles). The young generally undergo metamorphosis from larva with gills to an adult air-breathing form with lungs. Amphibians use their skin as a secondary respiratory surface; some small terrestrial salamanders and frogs lack lungs and rely entirely on their skin for respiration. Reptiles are cold-blooded animals that can be four-legged, like turtles and lizards, or may have descended from four-legged ancestors, like snakes. Unlike amphibians, reptiles do not have an aquatic larval stage. Many amphibians and reptiles move between aquatic and terrestrial habitats and as such are major links in the flow of energy between these habitats.

Amphibians and reptiles commonly occurring in and around wetlands, lakes, ponds, and rivers in the Project region include turtles such as the snapping turtle (*Chelydra serpentine*), painted turtle (*Chrysemys picta*), map turtles (*Graptemys* spp.), and the spiny softshell turtle (*Apalone spinifer*a); frogs that are highly aquatic as adults such as the green frog (*Lithobates clamitans*) and mink frog (*Lithobates septentrionalis*); aquatic salamander species such as the eastern newt (*Notophthalmus viridescens*) and common mudpuppy (*Necturus maculosus*); and snakes, including the brown snake (*Storeria dekayi*) and northern watersnake (*Nerodia sipedon*). Amphibians and reptiles that are more likely to be associated with grasslands, prairies, and agricultural areas in the Project region include hognose snakes (*Heterodon* spp.), garter snakes (*Thamnophis* spp.), and the smooth green snake (*Opheodrys vernalis*), prairie skink (Plestiodon septentrionalis), and Great Plains toad (*Anaxyrus cognatus*). Amphibians and reptiles associated with forested habitats in the Project region include treefrogs (*Hyla* spp.), the spring peeper (*Pseudacris crucifer*), American toad (*Anaxyrus americanus*), and salamanders (*Ambystoma* spp.).

Invertebrates

Invertebrates are an essential component of the food chain in many ecosystems. Many hundreds of species of invertebrates occur within the aquatic, wetland, and upland areas that would be crossed by the Applicant's proposed project and the CN Alternatives. Notable groups of aquatic insects include mayflies (*Ephemeroptera*), caddisflies (*Trichoptera*), dragonflies and damselflies (*Odonata*), and midges and mosquitoes (*Diptera*). Other aquatic invertebrates include mollusks such as native mussels (*Palaeoheterodonta*), snails (*Gastropoda*), and crayfish (*Astacidea*). Commonly seen upland invertebrates include bees, ants, and wasps (*Hymenoptera*); ladybugs and other beetles (*Coleoptera*); butterflies and moths (*Lepidoptera*); grasshoppers, katydids, and crickets (*Orthoptera*); cicadas, leafhoppers and other true bugs (*Hemiptera*); and ticks, spiders, and mites (*Arachnida*).

5.2.4.2.2 Continued Use of Existing Line 3 Pipeline

The existing Line 3 pipeline is co-located with existing pipelines, transmission lines, and roads along all of its length. The route, which extends through predominately forested and wetland areas, crosses 81 waterbodies, 6 trout streams, and 2 AMAs (Clearwater and Little Otter Creek), and is within 0.5 mile of 6 other AMAs. The route also crosses two Minnesota LBS with a rating of outstanding as well as passing within 0.5 mile of four lakes managed for muskellunge.

The route of the existing Line 3 pipeline crosses several wildlife conservation areas, including one wildlife refuge and three state forests; it also crosses the Chippewa Plains IBA.

The general types of aquatic resources, wildlife habitat, and species described for the Applicant’s proposed project (see Section 5.2.4.2.1) also occur along the existing Line 3 pipeline right-of-way. The fish and wildlife species described above for the Applicant’s proposed project are common to northern Minnesota and could be present in the areas crossed by existing Line 3.

5.2.4.2.3 System Alternative SA-04

Fisheries and Aquatic Habitat

System alternative SA-04 would cross over 600 waterbodies, including large rivers, perennial streams, intermittent streams, ephemeral streams, large lakes, shallow lakes, and wetlands. Water crossings are discussed in Section 5.2.1.2. Two trout streams occur within 0.5 mile of SA-04, although neither would be crossed.

SA-04 would pass through the Mayhew Creek Fisheries Management Area (FMA), as shown in Figure 5.2.4-1. North Dakota, Iowa, and Illinois do not specifically designate AMAs but manage more general wildlife areas for hunting, fishing, trapping, and other recreational activities.

> No lakes rated for Fish IBI occur within 0.5 mile of SA-04 (Minnesota DNR 2014a), no LBS would be crossed by SA-04 (Minnesota DNR 2015b), and no Sentinel Lakes would be crossed by SA-04 (Minnesota DNR 2016b). The Minnesota River crossing for SA-04 contains a freshwater mussel site (Minnesota DNR 2016e); the occurrence of mussels in a waterbody suggests good water quality.

SA-04 would cross infested waters in North Dakota, Minnesota, Iowa, Illinois, and Wisconsin. Invasive species established in these waters include common carp, zebra mussel, rusty crayfish, Eurasian milfoil, bighead carp, and silver carp.

All three types of fisheries (coldwater, coolwater, warmwater) are present in the regions crossed by SA-04. Protected and rare species are discussed in Section 5.2.5, including species listed by state or federal threatened and endangered species regulations.

Wildlife and Wildlife Habitat

SA-04 would cross the same 10 NLCD cover classes as the Applicant's proposed project and the existing Line 3 pipeline right-of-way (see Section 5.2.3 for a general discussion of vegetation along SA-04). Broadly, SA-04 occurs within ecoregions that are dominated by the presence of cultivated crops (95 percent of the total land cover), but also include areas of forest, scrub/shrub, grassland/herbaceous, hay/pasture, woody wetlands, barren land, and emergent herbaceous wetlands.

Each of the states crossed by SA-04 maintain designated WMAs. SA-04 would pass near 10 WMAs (1 in North Dakota, 8 in Minnesota, and 1 in Iowa). Figure 5.2.4-3 provides an overview of WMAs, wildlife refuges, and other conservation lands near SA-04. The lands shown in Figure 5.2.4-3 include those assigned GAP Status Codes 1, 2, and 3, which indicate the level of protection and management objectives as discussed previously.

IBAs in the vicinity of SA-04 include the following (Figure 5.2.4-4):

- Swan Lake IBA – This state priority IBA supports large breeding colonies of red-necked grebes, eared grebe (*Podiceps nigricollis*), and western grebes (*Aechmophorus occidentalis*) in summer. The lake also supports a large black-crowned night heron (*Nycticorax nycticorax*) rookery, breeding populations of least bitterns, Forster's terns (*Sterna forsteri*), and black terns. Swamp sparrows (*Melospiza georgiana)* and marsh wrens (*Cistothorus palustris*) are also common breeders at the site. In spring, nearly all waterfowl occurring in southwestern Minnesota occur within this IBA.
- Upper Minnesota River Valley IBA – This global priority IBA supports over 200 bird species during spring, summer, and fall. Surrounded by intensely farmed areas, the river valley corridor provides prime bird habitat and is a migration corridor for waterfowl, shorebirds, raptors, warblers, vireos, thrushes, flycatchers, and sparrows.
- Upper Mississippi National Wildlife Refuge (NWR) IBA – This state priority IBA is an important site for migrating waterfowl, particularly canvasbacks and tundra swans, as well as nesting waterbirds and breeding and wintering bald eagles. The Mississippi River is a significant bird migration route, especially for seasonal migrations of waterfowl. An estimated 40 percent of the nation's waterfowl and shorebirds use the Mississippi River valley during spring and fall migration.
- Upper Mississippi/Trempealeau National Fish and Wildlife Refuges IBA – This state priority IBA encompasses the Trempealeau Refuge and the Upper Mississippi Refuge from the confluence of the Mississippi and Chippewa rivers south through eight counties in southwest Wisconsin. Habitats include large tracts of floodplain forest, forested wetlands, bluffs, braided river channels, open water, forested islands, riverine wetlands, and prairie. Hundreds of thousands of waterfowl and landbirds use this IBA as migratory corridors and stopover sites, including over half the eastern population of canvasbacks (*Aythya valisineria*) and 20 percent of the tundra swan (*Cygnus columbianus*) population. The forests and wetlands also support significant breeding populations of great blue herons, bald eagles, red-shouldered hawks (*Buteo lineatus*), yellow-billed cuckoos (*Coccyzus americanus*), cerulean warblers (*Setophaga cerulea*), and prothonotary warblers (*Protonotaria citrea*).
- Midewin National Tallgrass Prairie IBA – This global priority IBA is a 19,000-acre complex of 21 natural biological communities that provide habitat for 348 species of native plants,

> approximately 230 vertebrate species of animals, and numerous invertebrate species, including mussels. This IBA provides critical fall and spring migration habitat as well as breeding habitat for a large number of grassland birds, many of which are becoming rare (Audubon 2016).

The ROI for SA-04 supports a diversity of wildlife, mammals, birds, amphibians, reptiles, and invertebrates. Existing wildlife species in the vicinity of SA-04 are similar to those described above for the Applicant's proposed project; however, a few species, including elk, moose, and black bear are not likely to occur along this route.

5.2.4.2.4 Transportation by Rail

The rail alternative would require an area of between 100 and 200 acres for construction and operation of a rail loading facility and an additional 84 acres to construct and operate a new rail line connection near Gretna, Canada. These facilities would be located in Canada and as such are not addressed as part of this environmental review.

In the United States, the rail offloading facility would require between 100 and 200 acres of land that is identified as agricultural lands and wetlands near Clearbrook, Minnesota, along with reestablishment of 10 miles of existing track in Clearbrook.

The rail offloading facility near Superior, Wisconsin, would require approximately 100 acres adjacent to the existing Enbridge terminal and construction of a less than 1-mile interconnection between existing rail lines in Superior.

Fisheries and Aquatic Habitat

Small drainages occur in the area near Clearbrook, Minnesota. Several intermittent streams originate within the immediate area of the potential location for a new facility. No conservation lands or AMAs occur in the vicinity. Reestablishing rail line access would require several stream crossings.

The potential location for a new facility near the Superior terminal is entirely wetlands, primarily forested and scrub/shrub wetlands.

Wildlife and Wildlife Habitat

Along the rail route from northwest Minnesota to Clearbrook, the vegetated land cover is mostly cultivated farmland with remnant prairie patches. Reestablishing rail line access between Gully and Clearbrook would require passing through forested areas, including a patch of northwest dry-mesic oak woodland and northern dry prairie. A site of moderate biodiversity occurs near Gully, north of the rail line. The land cover around Clearbrook, Minnesota, includes deciduous and evergreen forests, woody and emergent wetlands, and hay/pasture and cultivated croplands, which provide habitat for white-tailed deer, small mammals, and birds. The rail line is surrounded by hay/pasture, cultivated croplands, and scattered forest and wetlands. The rail line east of Gully is bordered by dry sand-gravel prairie (northern) and northwestern dry-mesic oak woodland (Minnesota DNR 2016v).

From Clearbrook to Superior, vegetated land cover is dominated by woody and emergent wetlands along with some hay and cultivated croplands. The vegetation near Superior, Wisconsin, is primarily deciduous forest with patches of woody wetlands and scrub/shrub wetlands that provide habitat and food for many breeding birds, small mammals, and reptiles, as well as hunting areas for birds of prey. No conservation lands or wildlife refuges occur in the vicinity of the Superior terminal.

The rail route crosses several wildlife areas, with Chippewa National Forest being the largest, and also crosses several IBAs.

- Kittson-Roseau Aspen Parkland IBA – This state priority IBA consists of almost 400,000 acres of aspen parkland landscape in extreme northwestern Minnesota. The IBA lies within the Aspen Parkland Physiographic Area, which harbors the highest number of breeding birds of any physiographic area on the continent. Eleven sandhill crane roost sites with 12,000 birds and 262 bird species including significant numbers of horned grebes, Wilson's phalaropes, yellow rails, marbled godwits (*Limosa fedoa*), short-eared owls, American bitterns, upland sandpipers, and Nelson's sharp-tailed sparrows have been documented.
- Glacial Ridge IBA – This global priority IBA includes a large complex of prairie grasslands and wetlands at the southern extent of Minnesota's Aspen Parkland region which is characterized by a mosaic of prairie, sedge wetlands, and aspen groves. Glacial Ridge is one of the top sites in Minnesota for prairie birds, particularly species dependent on wet prairie and sedge wetlands. Of the 164 species recorded here, 16 are state listed species including burrowing owls (*Athene cunicularia*), greater prairie chickens, marbled godwits, and yellow rails. A total of 43 SGCN are found in the IBA with relatively high numbers of American bitterns, upland sandpipers, Le Conte's sparrows (*Ammodramus leconteii*), and bobolinks. This area also supports fall migratory sandhill crane roosts with 2,000 to 6,000 birds documented, and is within the northwest Minnesota sandhill crane breeding range.
- Camp Ripley-Pillsbury-Lake Alexander IBA – This state priority IBA supports the greatest known concentration of nesting red-shouldered hawks (a state listed Special Concern Species) in the state. Habitat consists of relatively large blocks of upland deciduous and riparian forests. In addition, 228 species of birds have been documented here since monitoring started in 1991, including 28 species of warblers (and one of the most northerly reports of the hooded warbler [*Setophaga citrina*]). Other listed species that occur in this IBA include the bald eagle, trumpeter swan, yellow rail, and Louisiana waterthrush (*Parkesia motacilla*). Other important features within this IBA are the 21 miles of the Mississippi River and 27 miles of major tributaries (Crow Wing and Gull rivers), that provide important riparian corridors and migration pathways.
- Chippewa Plains IBA – This global priority IBA is a vast area of large lakes (Winnibigoshish, Leech, Cass, and Pokegama), rivers, and streams, as well as large tracts of upland and lowland forests. The Mississippi River, which flows through the IBA, provides a large river ecosystem complemented by smaller river systems throughout the IBA. Chippewa Plains is important for migrating waterfowl, with 160,000 ring-necked ducks and 30,000 lesser scaup (*Aythya affinis*) recorded in 2011. Nesting waterbirds include the ring-billed gull (*Larus delawarensis*), herring gull (*Larus argentatus*), American white pelican (*Pelecanus erythrorhynchos*), common tern (*Sterna hirundo*), and Caspian terns (*Hydroprogne caspia*).
- McGregor IBA – This state priority IBA contains habitat for many birds including wetlands, lowland forests, upland deciduous forests, open brushlands, and open grasslands. McGregor IBA is known for its fall ring-necked duck migration but also supports a variety of nesting bird species such as the American bittern, yellow rail, sora, black tern, sandhill crane,

trumpeter swan, bald eagle, American woodcock, wood thrush, black-billed cuckoo, LeConte's sparrow, and bobolink, and 12 species of warblers.

- St Louis River Estuary IBA - This state priority IBA contains an extensive riverine system with numerous bays, wetlands, and forested areas along its adjacent shoreline. The St. Louis River Estuary is a freshwater ecosystem that is one of the largest tributaries draining into the largest, by surface area, lake in the world. This IBA is an important migratory stopover for 31 species of waterfowl and 27 species of shorebirds along with large numbers of waterbirds, raptors, and songbirds that move along the western shore of Lake Superior during migration.

5.2.4.2.5 Transportation by Truck

The truck alternative would require an area of approximately 50 acres for construction and operation of a truck loading facility, and upgrades to existing access roads near Gretna. These facilities would be located in Canada and as such are not addressed as part of this environmental review.

In the United States, truck facilities near Clearbrook would require approximately 50 acres to construct and operate offloading facilities, and approximately 5 acres for road access. Truck facilities near the terminal in Superior would require approximately 50 acres to construct and operate a truck offloading facility, and 34 acres at the Superior terminal.

Fisheries and Aquatic Habitat

Small drainages occur in the area near Clearbrook, Minnesota. Several intermittent streams originate within the potential location for a new facility. No conservation lands or AMAs occur in the vicinity.

The potential location for a new facility near the Superior terminal is entirely wetlands, primarily forested and scrub/shrub wetlands.

Wildlife and Wildlife Habitat

The vegetated land cover around Clearbrook, Minnesota, includes deciduous and evergreen forests, woody and emergent wetlands, and hay/pasture and cultivated croplands, which provide habitat for white-tailed deer, small mammals, and birds.

The vegetation near Superior, Wisconsin is deciduous forest with patches of woody wetlands and scrub/shrub wetlands that provide habitat and food for many breeding birds as well as hunting areas for birds of prey. No conservation lands or wildlife refuges occur in the vicinity of the Superior terminal.

Along the truck route from northwest Minnesota to Clearbrook, the land cover is mostly cultivated farmland with remnant prairie patches. From Clearbrook to Superior, land cover is dominated by woody and emergent wetlands along with some hay and cultivated croplands.

The truck route crosses through several wildlife areas, with Chippewa National Forest being the largest, and also crosses through the Glacial Ridge, Chippewa Plains, and St. Louis River Estuary IBAs. Each of these IBAs is describe above in Section 5.2.4.2.4.

5.2.4.2.6 Existing Line 3 Supplemented by Rail

The existing conditions for continued use of existing Line 3 supplemented by rail transport are similar to those described above for continued use of the existing Line 3 pipeline and the rail alternative.

5.2.4.2.7 Existing Line 3 Supplemented by Truck

The existing conditions for continued use of existing Line 3 supplemented by truck transport are similar to those described above for continued use of the existing Line 3 pipeline and the truck alternative.

5.2.4.3 Impact Assessment

5.2.4.3.1 Applicant's Proposed Project (from Neche to Superior)

The potential impacts of construction and operation of the Applicant's proposed project are described below.

Construction Impacts

Clearing and grading would be required for construction of the pipeline, MLVs, new and expanded pump stations, and cathodic protection sites—as well as for access roads and ATWS, including six pipe yards in Minnesota. Construction activities that may affect fish, wildlife, and their habitats could include clearing, grading, dewatering, trenching, blasting, access road construction, waterbody crossings, surface water withdrawals and discharges (e.g., for hydrostatic testing), fueling and use of hazardous materials, facilities construction, and restoration or reclamation of construction areas.

<u>Fisheries and Aquatic Habitat</u>

Construction of the Applicant's proposed project would require 192 stream crossings in Minnesota, 25 in North Dakota, and 10 in Wisconsin. The surface waters crossed support warmwater, coolwater, and coldwater trout fisheries.

Surface Water Crossing Methods and Measures Proposed as Part of the Project

Surface water crossings would be designed as close to perpendicular to the axis of the stream channel as engineering and routing constraints allow to create the shortest possible crossing length. The Applicant would determine and obtain approval for specific crossing methods based on factors such as waterbody size, sensitivity, water levels, soil/sediment stability installation, and anticipated season of installation (Appendix G). The Applicant would cross waterbodies using the most environmentally appropriate and feasible method based on consultation among the Applicant, appropriate regulatory agencies, and engineering personnel. Methods that may be used include the wet open-cut method, dry open-cut methods (dam-and-pump and flume), the guided bore method, or the HDD method. These methods are summarized below:

- The wet open-cut method involves trenching through the waterbody while the water continues to flow through the construction work area. The wet trench method has the greatest potential for impacts on fisheries and aquatic habitat.
- The dam-and-pump method is used to cross sensitive waterbodies with low gradients and low-flow or meandering channels. It involves installing temporary dams across the waterbody both upstream and downstream of the crossing location, with pumps and piping used to carry streamflow around the construction area. The construction area located

between the two dams is then dewatered utilizing pumps. This method results in less sedimentation and turbidity than the wet open-cut method.

- The flume method can be used on relatively shallow and narrow waterbodies that do not have large rocks or bedrock at the trench line and have a relatively straight channel. Similar to the dam-and-pump method, two dams and pumps are used to dewater the work area. One or more pipes (flumes) extend the course of the waterbody through both dams, carrying streamflow through the construction area. This method results in less sedimentation and turbidity than the wet open-cut method.
- A guided bore could be used to cross ditches adjacent to roads or railroads. The guided bore method involves digging a pit on each side of the waterbody, boring a tunnel from one pit to the other, and installing the pipe in the tunnel. Dewatering and sheet-piling are needed to maintain the integrity of the excavated pits. This method typically results in no sediment release to surface water.
- HDD involves drilling under the surface water and installing the pipeline without physical disturbance of the surface water. HDD crossings are advantageous because they do not disturb streambeds or streambanks and they maintain stream flow and fish passage. However, they require ATWS on both sides of the crossing, which involves vegetative clearing, soil disturbance, and subsequent restoration activities. This method would be used to cross the most environmentally sensitive areas such as sensitive fishery resources and impaired waters. Unless there is a streambed collapse above the boring hole or a release of drilling fluid occurs (see Section 5.2.1.2), use of this crossing method would not alter or remove aquatic habitat and would not affect fisheries.

The currently planned crossing methods for the Applicant's proposed project are listed in Appendix G. Crossing method has not been identified for crossings in North Dakota or Wisconsin. Four AMAs crossed, or within 0.5 mile of the Applicant's proposed project, are listed in Table 5.2.4-6.

Table 5.2.4-6. Aquatic Management Areas Crossed by the Applicant's Proposed Project in Minnesota (acres)

Aquatic Management Area	Construction Work Area[a]	Permanent Right-of-Way[b]	Within 0.5 Mile of Centerline[c]
Blackhoof River AMA	0	0	44.4
La Salle Creek AMA	0.4	0.2	27.4
Spire Valley AMA	0	0	56.2
Straight River AMA	<0	0	16.6
TOTAL	**0.4**	**0.2**	**144.6**

Source: Minnesota DNR 2016h.

[a] Enbridge-provided footprint for construction work area, including additional temporary workspaces and access roads

[b] Enbridge-provided footprint for permanent right-of-way, including primary access roads, pump stations, and mainline valves

[c] Acres of Aquatic Management Area (AMA) within 0.5 mile of the centerline of the Applicant's proposed project

To avoid or reduce impacts on fisheries and aquatic habitat during construction, the Applicant would implement the measures described in its Environmental Protection Plan (Appendix E), including the following:

- Prepare a list of waterbodies to be crossed and the type of crossing method to be used for each crossing, as a part of obtaining Section 401/404 permits from USACE and Minnesota PCA for all surface water crossings.
- Comply with the seasonal restrictions and other requirements in the Section 401/404 permits to limit impacts on aquatic resources.
- Complete the crossings as quickly as possible to allow suspended sediment levels to return to pre-construction levels after in-stream work is completed.
- Cross waterbodies using the most environmentally appropriate and feasible method based on consultation among the Applicant, appropriate regulatory agencies, and engineering personnel. Methods that may be used include the wet open-cut method, dry open-cut methods (dam-and-pump and flume), the guided bore method, or the HDD method.
- Develop and implement BMPs in collaboration with state and federal agencies to avoid and minimize potential impacts associated with water crossing methods (e.g., use of silt or straw as sediment runoff barriers and use of construction mats to minimize ground pressure and soil compaction).
- Implement erosion and sediment control measures and limit the duration of construction in waterbodies, including the measures listed in Section 1.9 of the Applicant's Environmental Protection Plan (Appendix E) (e.g., temporary stabilization, erosion control blankets, mulch, cat tracking, and temporary slope breakers).
- Comply with Minnesota DNR guidance on water crossing by avoiding in-water work during the exclusion periods: from September 1 through April 15 or September 15 through April 30 for coldwater fisheries (trout) stream crossings, and from March 15 to June 15 or April 1 to June 30 for coolwater and warmwater fisheries stream crossings, depending on the Minnesota DNR region in which the work occurs.
- Suspend temporary water intake hoses or structures above the stream or lake bottom and equip the intakes with screens or equivalent devices to prevent fish uptake.
- Install trench breakers at all waterbody crossings, as appropriate, to prevent diversion of water into upland portions of the pipeline trench and to keep accumulated trench water out of the waterbody.
- Wash and dry equipment designated for use within waterbodies prior to use; purge and clean all pumps before proceeding from one crossing location to the next if designated noxious weeds or invasive aquatic species (e.g., zebra mussels and Eurasian milfoil) are known to be present in the area. Follow all permit requirements to prevent the spread of invasive species.
- Maintain a 20-foot-wide buffer of undisturbed herbaceous vegetation at all streambanks during the initial clearing and complete any in-stream trenching within 24 hours of initiation at minor waterbodies and within 48 hours at intermediate or major waterbodies (not including HDD crossings).

- Comply with the measures in the Environmental Protection Plan (Appendix E) to avoid or minimize impacts due to the unanticipated release of drilling fluids used in HDD crossings. These measures include (1) planned response actions if releases of drilling mud were to occur in waterbodies or upland areas; (2) containment, clean-up, and notification procedures; and (3) steps to be taken to restore affected areas.
- Discharge hydrostatic waters in a manner that avoids discharge into surface waters with commercially or recreationally important species, and in compliance with the stipulations of permits required for both intake and discharge. This would include seasonal restrictions and limitations associated with infested waters.

General Potential Impacts on Fisheries and Aquatic Habitat from Surface Water Crossings

Streambank alteration. Construction of the Applicant's proposed project would require clearing of vegetation from the construction work area. Removal of large trees and other woody vegetation near waterbodies would result in loss of shading, nutrients, and habitat features for fish at waterbody crossings. In addition, this change in streambank features would alter aquatic habitats used by fish for cover, spawning, and foraging. Loss of riparian cover can result in increased water temperatures, which can be detrimental to coldwater species such as trout or salmon.

The amount of vegetation that would be permanently removed adjacent to surface waters would be restricted to the permanent right-of-way at waterbody crossings, and streambanks would be restored with prescribed riparian vegetation. Revegetation would take longer for forested areas in the construction work areas adjacent to the permanent right-of-way as compared to prairie or agricultural areas. Therefore, vegetation clearing for construction of the Applicant's proposed project in grassy or agricultural streambank areas would result in indirect, short-term, and negligible to minor impacts on fisheries and aquatic habitats; for forested or other woody streambank areas would be long-term and minor to major, depending on existing surface water conditions. Removal of vegetation along waterbodies also can create conditions for bank destabilization and further erosion, which would result in direct temporary to short-term minor impacts on species residing in the immediate vicinity while the Applicant undertakes measures to stabilize the banks. For example, erosion can suffocate eggs and other aquatic species.

As a part of the crossing construction process, riverbeds and streambeds would be restored to pre-construction condition, with no impediments to water flow anticipated, and streambanks would be restored to pre-construction grades when practicable. If the slope of the bank is determined to be unstable, it would be reshaped to prevent slumping. The use of open-cut crossings during pipeline construction would result in short- to long-term minor impacts on channel morphology and stability, which in turn would result in short-to long-term minor impacts on fisheries and aquatic habitats.

The wet open-cut crossing method would result in greater amounts of sedimentation than the other methods. As currently planned, only 16 of the surface water crossings would be accomplished using the wet open-cut method. Crossings using the dam-and-pump and flume methods would increase sedimentation, but less than the wet open-cut method. The guided bore and HDD methods would not result in increased sedimentation if conducted successfully. However, if a frac-out were to occur, the consequences can be major because of the release of materials into already sensitive or impaired waters (more information about frac-outs below).

Increased sedimentation and turbidity can degrade aquatic habitat by filling in inter-gravel spaces and pool habitats, which reduces spawning habitat, rearing habitat, and benthic invertebrate production.

Reduced productivity of aquatic invertebrates can result in reduced food available for insectivorous fish. Mussels are particularly vulnerable to suffocation from in-stream construction activities. Fine sediments introduced by these processes can suffocate fish eggs and newly hatched larvae living in gravel, resulting in reduced survival. In addition, sediments can abrade the sensitive gill membranes of young and adult fish, resulting in injury or death; and can reduce ability of fish to locate prey or escape predation, leading to increased energy expenditure for foraging and increased mortality. Large concentrated sediment plumes can cause sediment accumulation within the gills of young and adult fish, which can lead to suffocation and increased mortality of fish that are not able to move away from sediment plumes fast enough to find refuge.

Disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation. The increase in sedimentation is not expected to be substantial, and the impact on fisheries and aquatic habitat from increases in sedimentation associated with surface water crossings would be temporary to short term and minor. With successful use of the guided bore or HDD crossing methods, sedimentation would not increase and fisheries and aquatic habitats would not be affected. If a frac-out were to occur, the impacts would be short to long-term and major.

Removal of Large In-stream Structures. At some surface water crossings, large in-water structures (e.g., large woody debris and boulders) may have to be removed during construction of the crossing. These structures would be replaced after completion of the crossing, and stream hydrodynamics would transport sediments from upstream to the disturbed area until equilibrium is reestablished. This construction activity would result in a temporary to short-term, negligible to minor impact on aquatic habitat.

Direct Impacts on Fisheries. Trenching and backfilling, damming, and other in-stream construction activities could result in direct or indirect injury or mortality of fish. Mussels are particularly vulnerable to crushing from in-stream construction activities. However, fish would likely respond to the increased in-stream activities by leaving the construction area and avoiding direct impacts. Small fish species and juvenile individuals of larger fish species may be injured or killed by entrainment, which results when a fish gets trapped within hoses or pipes being used to dewater construction areas or divert surface waters around construction areas. Fish entrainment can be reduced by screening the ends of pipes and pump hoses, smaller fish may still be injured or killed by being impinged, trapped against, the screening due to suction and water pressure. The potential direct impacts of in-stream construction on aquatic communities would be temporary and minor.

Leaks or Small Spills. Spills and leaks of fuel or other hazardous liquids could occur during vehicle and equipment operation, during refueling and lubricating of construction equipment, and from leaks from storage containers or equipment working in or near streams. To protect surface water resources, NPDES permits would require secondary containment of hazardous materials, prohibition of engine degreasing at work sites, containment and collection of liquid and solid wastes, and a spill prevention and response plan for fueling and maintenance of vehicles. The Applicant would store petroleum products, hazardous chemicals, and lubricating oils; conduct refueling, maintenance, and lubricating operations; and perform concrete coating activities in upland areas more than 100 feet from surface waters (Appendix E). Although these and other similar measures would be implemented, small leaks or spills could reach surface waters and would alter water quality in the area of the release and for short distances downstream. Because such releases would likely be small and rapidly dispersed, the impacts on fisheries and aquatic habitats are expected to be temporary to short term and minor.

Potential impacts on fisheries and aquatic habitats from an unanticipated release of crude oil are discussed in Chapter 10.

Unanticipated Release of Drilling Fluids. For HDD crossings, there is a risk of escape of drilling fluids (frac-out) into rivers at crossings. During drilling, fluid (water, bentonite clay, and possible additives) is circulated through the drilling pipe to lubricate the drill bit, remove drill cuttings, and stabilize the open hole. The potential exists for an inadvertent release or “frac-out” of this drilling fluid to occur when pressurization of the drill hole is beyond the containment capability of the overburden soil material, which would allow the drilling fluid to flow to the ground or riverbed surface. Although bentonite clay is non-toxic, drilling mud can smother aquatic wildlife and increase turbidity in affected surface waters. The consequences of a frac-out are amplified in waters where this technique is used, because these waters are already identified as sensitive or impaired. Additives may be mixed with the drilling fluids/mud for viscosity or lubricating reasons. Only non-hazardous additives approved by Minnesota PCA under permit conditions would be used, and a Material Safety Data Sheet for the drilling fluid would be maintained onsite. If a frac-out occurred near the streambank, bank stability may be compromised. Construction personnel would monitor the crossing to detect releases of drilling mud.

The HDD operator would constantly monitor drilling fluid pressures during pilot hole operations and, if a loss in fluid pressure or circulation were identified, the operator would notify onsite construction observers who would visually monitor the portion of the drill path where the drill tool is located to determine whether a drilling mud release occurred. If a release occurred, the Applicant would implement containment, response, and clean-up procedures as outlined in the Environmental Protection Plan (Appendix E) to limit the potential for drilling mud to reach surface water. These procedures include containment using straw bales, sandbags, pumps and hoses, vacuum trucks; response activities, including adjusting drill rates and pump volumes or stopping drilling, removal of mud with pumps and appropriate storage away from the waterbody prior to disposal; and coordination with appropriate agencies to discuss additional containment or clean-up requirements. If a frac-out occurred and went undetected or was not quickly contained, impacts on surface water quality as well as on fisheries and aquatic habitat could be long-term and major. However, with implementation of the Applicant-proposed measures to respond to a drilling mud release during HDD construction, the impact of a release could be short term to long-term and major, depending on the nature of the release and resources near the location of the crossing.

Hydrostatic Test Water Withdrawal and Discharge. The Applicant would withdraw water for hydrostatic testing, dust control, trench dewatering, and HDD installation. Hydrostatic testing would require approximately 11 to 17 million gallons of water for each construction spread that would be obtained from lakes, streams, or groundwater wells. The Applicant is currently evaluating transferring water from one test section to another in order to minimize the total quantity of water needed to complete the hydrostatic test. The volume of water appropriation needed for dust control, trench dewatering, and HDD installation has not been determined. Prior to construction, the Applicant would obtain a water appropriation permit from Minnesota DNR.

Withdrawals from surface waters for construction could result in entrainment of small fish, eggs, and macroinvertebrates during extraction; however, intakes would be equipped with a screen or equivalent device to prevent uptake of aquatic species. Smaller fish and invertebrates may still be injured or killed by being impinged, trapped against, the screening due to suction and water pressure. Spawning fish could be displaced through decreased water levels, fish eggs could desiccate if water levels drop too low, or eggs may experience delayed development due to impaired water quality. Larval and juvenile fish could be affected through entrainment during water withdrawal, decreased survival under conditions of poor water quality, and reduced prey availability.

As stipulated in permit requirements, the Applicant would select appropriation sites that would meet Minnesota DNR's criteria of "doing no harm," and all appropriation sites would be reviewed by Minnesota DNR prior to issuance of a water appropriation permit. The permit requires that water withdrawals have a minimal potential for impacts on groundwater resources and must not adversely affect trout streams, calcareous fens, or other significant environmental resources. If water is withdrawn from surface water, hose intakes would be equipped with screens to prevent entrainment of aquatic species, and adequate waterbody flow rates and volumes would be maintained to protect aquatic life and allow for downstream uses as required by the water use permit (Appendix E).

Hydrostatic test water would be discharged from a test section in one of two ways: (1) into well-vegetated upland areas using controlled-flow velocity with a dewatering structure such as a silt fence and straw bales or into geotextile filter bags that are used to avoid soil erosion, sediment transport, and bottom scouring; or (2) into the waterbody from which it was withdrawn to prevent the spread of invasive species or degradation in water quality; the discharge rate would not exceed the permitted applicable discharge rate (Appendix E). Water would be treated as specified in the NPDES permit prior to discharge; and the Applicant would monitor pH, dissolved oxygen levels, and any other parameters required by the permit, as described in Appendix D of the Environmental Protection Plan (Appendix E). Discharges would adhere to all conditions set forth in NPDES and water appropriation permits, including discharge over approved energy dissipation measures (e.g., sand bags, plastic sheeting, or natural rock riprap) and the sedimentation control measures as described above. If inter-basin transfers of water occur, there is also the potential to introduce and spread aquatic nuisance species; however, hydrostatic waters would be discharged through a filtering device to the source waterbody and following all requirements of acquired permits.

With adherence to water appropriation and NPDES permit conditions and implementation of Applicant-proposed measures described above, impacts on fisheries and aquatic habitats from water appropriation and discharge during construction would be temporary and minor. No impacts on mussel beds will occur during construction of the Applicants's proposed project.

Impacts on Management Units and Managed Species

Aquatic Management Areas. LaSalle Creek would be crossed using the dry-crossing method; this would affect 0.4 acre of the La Salle Creek AMA. The LaSalle Creek AMA is 28 acres and provides angling opportunities (as described below, LaSalle Creek is also a designated trout stream). This would be the second pipeline to cross this AMA; an existing pipeline crossing is at the southern extent of this AMA. Woody vegetation would be removed from the construction work area during construction and, depending on the crossing method used, the habitat quality of LaSalle Creek adjacent to the crossing location may be reduced. The crossing of La Salle Creek has the potential to introduce invasive species and result in the loss of habitat and reduction of habitat quality. However, these impacts are expected to be short term, and negligible to minor as little habitat would be lost in the construction work area and BMPs would be in place to prevent the spread of invasive species.

The Applicant's proposed project would come within 0.5 mile of three other AMAs but would not directly disturb these areas. AMAs represent good-quality aquatic habitats with functional adjacent uplands.

Other Management Units. Thirty-nine sensitive aquatic resources are present within 0.5 mile of the Applicant's proposed project, including five lakes rated for Fish IBI, 10 LBS, one Sentinel Lake, 21 trout streams, one trout lake, and one lake managed for muskellunge. No Significant Wildlife Lakes would be impacted by the Applicant's preferred project.

The Applicant's proposed project would not cross any of the five lakes rated for Fish IBI that occur within 0.5 mile; therefore, no impacts are anticipated. One of the lakes, Portage Lake, is also a designated Sentinel Lake; the construction work area of the Applicant's proposed project would be directly adjacent to Portage Lake. BMPs would be in place to prevent erosion or other impacts on this lake during construction. The disturbance area would be restored to pre-construction conditions once the construction is complete. Little habitat would be lost due to construction, and BMPs would be in place to reduce impacts on aquatic habitats as described above, so the resultant impact is expected to be short term and negligible to minor.

Of the 10 LBS within 0.5 mile of the Applicant's proposed project (Appendix L, Table L-2), one unnamed, moderate-ranked wetland would be within the construction work area. None of these LBS would be crossed by the route centerline. This could result in the introduction of invasive species, loss of habitat, and reduction of habitat quality. However, the impacts would be direct, short-term and negligible to minor, as little habitat would be removed and BMPs would be in place to prevent spread of invasive species.

No hatcheries are within 0.5 mile of the Applicant's proposed project, and none are immediately downstream of a water crossing along the Applicant's proposed project. The nearest hatchery is the Spire Valley trout hatchery, which is located about 0.65 mile upstream of a crossing; the hatchery's water supply is dependent on artesian groundwater quantity and quality. As a result, construction of the Applicant's proposed project would not affect the hatchery.

Twenty-one trout streams are within 0.5 mile of the Applicant's proposed project; the Applicant's proposed project crosses 6 of those trout streams (Table 5.2.4-7). One trout lake (Marion Lake in Cass County) is within 0.5 mile of the Applicant's proposed project but is not within the construction work area.

Trout streams are sensitive to erosion, sedimentation, and changes to riparian vegetation in areas adjacent to the streams because those habitats provide shade and cooling. Pipeline construction could alter groundwater connectivity or flow resulting in warming of the stream and reduced habitat suitability for trout and their invertebrate prey. Trout streams may have groundwater discharge zones or wetland seepage areas on hillsides or slopes with deep organic soils that could be disrupted during construction. Destabilization of these soils could result in long-term increases to nutrients and sediments in the streams. Removal of vegetation along small trout streams could result in less large woody vegetation in the stream. However, riparian vegetation would be removed only from the construction work area adjacent to the trout stream and only if either wet or dry open-cut crossing methods are used. If HDD methods are used for crossing clearing of vegetation could be limited to the 50-foot permanent right-of-way. Trees and shrubs would not be allowed to reestablish within the permanent right-of-way, which could lead to permanent major thermal effects on trout streams. If tributaries to trout streams are crossed, some downstream impacts from sedimentation could occur, depending on the distance to the trout stream. The Applicant's proposed project would cross the Moose Horn River downstream of a protected trout stream and upstream of a tributary (King Creek) to a protected trout stream. As noted in Section 5.2.1.1, the impacts of sedimentation on surface water crossings and the impact of pipeline crossings for the Applicant's proposed project on water quality would be temporary to short term and minor. As a result of these considerations, and with selection of the most appropriate crossing method and application of appropriate BMPs, the resultant impacts on trout streams from construction of the Applicant's proposed project would be permanent to short-term and minor to major, depending on the crossing.

Table 5.2.4-7. Trout Streams within 0.5 Mile of the Applicant's Proposed Project in Minnesota and Wisconsin

Trout Streams – (Kittle Number or WBIC)[a]	Approximate Milepost	Con[b]	Op[c]	ATWS[d]	Access Roads
Blackhoof River (S-001-003)	MN 408.1	1	1	--	--
King Creek (M-050-046-029-023)	MN 344.2	1	1	--	--
LaSalle Creek (M-163)	MN 171.4	--	--	--	--
LaSalle Creek (M-163)	MN 171.7	1	1	--	--
Pine River, South Fork (M-106-013)	MN 232.7	--	--	--	--
Red River (WBIC 2845800)	WI 366.7	--	--	--	--
Spring Brook (M-106-004-002-001)	MN 265.3	1	1	--	--
Straight River (M-096-035-002-002)	MN 198.3	1	1	--	--
Unnamed stream (M-050-046-029-023-002)	MN 344.8	--	--	--	--
Unnamed stream (M-050-046-029-029)	MN 406.3	--	--	--	--
Unnamed stream (M-106-013-008)	MN 232.4	--	--	--	--
Unnamed stream (S-001.9-009)	MN 313.4	--	--	--	--
Unnamed stream (S-001.9-011)	MN 364.2	--	--	--	--
Unnamed stream (S-001-003-027.8)	MN 408.1	--	--	--	--
Unnamed stream (S-001-003-028)	MN 352.1	--	--	--	--
Unnamed stream (S-001-003-029)	MN 352.3	1	1	--	--
Unnamed stream (S-001-003-030)	MN 352.7	--	--	--	--
Unnamed stream (S-001-003-030-001)	MN 408.7	--	--	--	--
Unnamed stream (S-001-003-030-001-B001)	MN 408.8	--	--	--	--
Unnamed stream (S-002-008-001)	MN 339.9	--	--	--	--
Unnamed stream (S-002-008-001-005)	MN 361.8	--	--	--	--
TOTAL		**6**	**6**	**--**	**--**

Sources: Minnesota DNR 2015c; Wisconsin DNR 2016e.

[a] Water Body Identification Code (WBIC) is used to identify waterbodies in Wisconsin. Kittle number is used to identify waterbodies in Minnesota.

[b] Con = Enbridge-provided footprint for construction work area

[c] Op = Enbridge-provided footprint for permanent right-of-way

[d] ATWS = additional temporary workspace (includes pipe yards)

"--" = no occurrence

Wildlife and Wildlife Habitat

General Potential Impacts

Construction would include clearing and grading of the construction work area, ATWS, temporary and permanent access roads, and the sites of MLVs, new and expanded pump stations, and cathodic protection sites. Other construction activities that could affect wildlife and wildlife habitats include trenching, dewatering, blasting, waterbody crossings, surface water withdrawals and discharges (e.g., for hydrostatic testing), fueling and use of hazardous materials, facility construction, and restoration or reclamation of temporary construction areas. Wildlife may be affected directly by construction activities or indirectly from disturbances caused by human activity and noise associated with construction activities. Although only a narrow band of habitat would be directly altered by construction, indirect effects would occur over a wider area.

As noted above, the Applicant would incorporate measures into the Project to avoid or minimize construction impacts on fisheries and fisheries habitat, and many of those measures would help to avoid or minimize impacts on wildlife and wildlife habitats. In addition to those measures identified previously, the Applicant would implement the following measures to avoid or reduce impacts on wildlife and wildlife habitats:

- Confine clearing activities to the approved construction work areas and adhere to erosion control specifications to minimize impacts on vegetation, aquatic resources, and wildlife.
- Fell trees toward previously cleared construction areas to prevent damage to adjacent trees.
- Upon completion of pipeline installation and backfilling and construction of facilities, revegetate disturbed areas in accordance with the Environmental Protection Plan (Appendix E) unless otherwise directed by landowners or land managing agencies.
- Restore cleared areas and reseed with an appropriate seed mix (e.g., Minnesota BWSR-approved mixes) to minimize the duration of vegetative disturbance.
- Slope the ends of open trenches to provide ramps for wildlife that fall into the trench (e.g., small animals such as rodents, amphibians, and snakes) to escape.
- Handle, store, and dispose of food and general waste generated during construction to reduce attraction for opportunistic scavengers such as raccoons, crows, and gulls that could prey on other wildlife in the area.
- Handle, store, and dispose of all solid waste and hazardous materials in accordance with stipulations of permits and as presented in the Environmental Protection Plan.

Construction of the Applicant’s proposed project would result in the disturbance of 2,202 acres of forested habitats as well as 2,028 acres of cultivated crop land. Forest and cultivated crops account for approximately 75 percent of the vegetation affected by construction.

The areas cleared would remain clear of brush, trees, and vegetation until restoration is completed. This would result in the loss of habitat for some species, including those species that use tree and shrub habitats for cover, forage, and nesting. The effects on wildlife habitat generally would be short term and minor, except in areas where woody vegetation is removed or wetlands affected. In those areas, the impact would be long-term to permanent and minor to major, because of the long recovery period for forested areas and the sensitivity of wetlands to disturbance. Woody vegetation would be permanently excluded from the permanent right-of-way of the pipeline but would be allowed to recover in the construction work area outside of the permanent right-of-way. This loss of habitat would affect small mammals, amphibians, reptiles, and other small animals to a greater extent than large animals (e.g., deer and large birds), which have larger territories and can avoid the active construction areas. As a result, the impact on wildlife from the loss of habitat would range from temporary to permanent and minor for small wildlife species, and short term and minor for larger species.

Clearing, grading, trenching, and the use of construction vehicles and equipment would result in direct impacts on some common animals, particularly small and mid-sized mammals, reptiles, amphibians, and invertebrates. Members of these species would be affected more than large wildlife because of their relative lack of mobility compared to that of larger animals (e.g., deer and coyotes). Burrows and dens could be destroyed or abandoned during clearing and excavation, resulting in displacement or loss of young, and loss of foraging or cover habitat during rearing seasons. Burrowing animals would be expected to return and recolonize the right-of-way after construction; however, compacted areas, such as temporary work areas, may become less suitable habitat because they would no longer be conducive to burrowing (Lauzon et al. 2002). In addition, if clearing is conducted during the bird nesting season, nests could be destroyed or abandoned, resulting in loss of eggs and young, and loss of foraging or cover habitat during nesting seasons. Although open trenches would be sloped at the ends, some small animals may become trapped in open trenches and may not survive. As a result of these considerations, it anticipated that the direct impact of these activities on wildlife would be temporary to short term and minor.

Many animals would be temporarily displaced from the active construction areas and adjacent areas because of clearing activities, noise, and human disturbance. Human disturbance could influence wildlife behavior or cause displacement of species that are less tolerant of human intrusion or more sensitive to noise, and intraspecific competition could increase stress among some individuals. Noise disturbance from construction activities also could lead to nest abandonment and subsequent depredation of eggs or young. The indirect effects of construction disturbance may include reduced foraging time and increased alerting behaviors, which could result in increased energy expenditure and potentially lower survival or reproduction. These indirect impacts would be reduced with implementation of the BMPs incorporated into the Project as described above. In addition, nearby habitat could provide cover and suitable escape habitat for many of the common wildlife species that would be displaced, and mobile animals could return to the area after completion of construction and restoration activities, if appropriate habitats are available. Consequently, the impact of these displacements during construction would be temporary to short term and minor.

The Applicant may be required to trap beavers or alter or remove beaver dams to lower water elevations within the construction corridor prior to construction. Because beavers would likely move back to the area once construction is complete (Wisconsin DNR 2005), these activities would result in a temporary to short-term and negligible to minor impact on beavers and on the altered waterbodies. Removal of a beaver dam may require a separate Public Waters Work Permit and, depending on the location, may not be permitted where beaver dams maintain control of basin water levels.

Disturbed areas would be susceptible to invasion by noxious and invasive species, which could result in degradation of wildlife habitat. However, implementation of BMPs to address invasive species would reduce the potential establishment and spread of noxious weeds, resulting in short-term and negligible to minor impacts.

During construction and clearing of the right-of-way, vehicle emission by-products (e.g., polycyclic aromatic hydrocarbons, aldehydes, carbon monoxide, nitrogen oxides, ozone, and sulfur oxides) could contaminate soil and vegetation in the areas immediately adjacent to the construction vehicles and equipment. The construction period at any location would be relatively short and would occur only during daytime hours—except for HDD crossings of surface waters, which would occur for 24 hours per day, and the level of contamination in vegetation is not expected to be substantial. Although it is possible that species such as pollinators and herbivores that inhabit the areas where vegetation is exposed to these contaminants could be affected, the impact would be short-term and negligible.

Potential Impacts on Management Units and Managed Species

Table 5.2.4-8 lists the wildlife conservation lands potentially affected by the Applicant's proposed project. Construction of the Applicant's proposed project would result in habitat loss or alteration of approximately 507 acres within WMAs and state forests, including approximately 15 acres of the Grayling Marsh WMA and approximately 3 acres of the Lawler WMA. Loss or alteration of habitats could adversely affect both game and nongame wildlife that use these WMAs until vegetation has recovered. The impact on the WMAs would be short to long-term depending on the existing habitat types and minor to major depending on the landscape context of these public areas to the areas around them.

Construction would also occur on land within eight state forests, resulting in the loss and alteration of forest habitat as well as forest fragmentation. Because the recovery of forested areas in the temporary construction work area (i.e., the disturbed areas outside of the permanent right-of-way) would take decades, the impact would be long-term to permanent but minor to major, based on the relatively small area affected compared to the nearby forested areas and habitat fragmentation.

Table 5.2.4-8. Wildlife Conservation Lands Potentially Affected by the Applicant's Proposed Project

Designation Type and Name	Con[a] Acres	Op[b] Acres	Facilities		Total[c]	
			Con Acres	Op Acres	Con Acres	Op Acres
North Dakota						
Resource Management Area						
Pembina County Waterfowl Production Area	0	0	0	1.5	0	1.5
North Dakota subtotal	***0***	***0***	***0***	***1.5***	***0***	***1.5***
Minnesota						
Habitat or Species Management Area						
Grayling Marsh Wildlife Management Area	14.1	6.4	0.6	--	14.7	6.4
Lawler Wildlife Management Area	2.9	1.5	--	--	2.9	1.5
Lowe Wildlife Management Area	--	--	--	--	--	--
McGregor Wildlife Management Area	--	--	--	--	--	--
Mud Lake Wildlife Management Area	--	--	--	--	--	--
Salo Marsh Wildlife Management Area	--	--	--	--	--	--
State Forest Lands						
Badoura	--	--	--	0.4	--	0.4

Table 5.2.4-8. Wildlife Conservation Lands Potentially Affected by the Applicant's Proposed Project

Designation Type and Name	Con[a] Acres	Op[b] Acres	Facilities		Total[c]	
			Con Acres	Op Acres	Con Acres	Op Acres
Fond du Lac	--	--	--	--	--	--
Foothills	42.3	18.6	11.8	1.1	54.1	19.7
Hill River	102.9	48.3	5.0	6.0	107.9	54.3
Huntersville	96.9	42.9	11.9	7.4	108.8	50.3
Land O'Lakes	130.2	58.1	25.9	5.2	156.1	63.3
Mississippi Headwaters	25.1	10.7	3.8	6.7	28.9	17.4
Paul Bunyan	--	--	--	--	--	--
Savanna	8.7	4.6	0.2	0.1	8.9	4.7
Waukenabo	15.8	8.3	0.5	0.7	16.3	9.0
White Earth	--	--	--	1.5	--	1.5
Minnesota subtotal	***438.9***	***199.4***	***59.7***	***29.1***	***498.6***	***228.5***
Wisconsin						
Protective Management Area – Land, Lake, or River						
Statewide Natural Area	8.6	3.5	NA	NA	8.6	3.5
Recreation Management Area						
North Country National Scenic Trail	--	--	NA	NA	--	--
Wisconsin subtotal	***8.6***	***3.5***	***NA***	***NA***	***8.6***	***3.5***
TOTAL	**447.5**	**202.9**	**59.7**	**30.6**	**507.2**	**233.5**

Source: USGS GAP 2016.

[a] Con = Enbridge-provided footprint for construction work area in Minnesota. In North Dakota and Wisconsin, estimated construction work area in acres based on 120-foot-wide construction work area centered on route, including the 50-foot-wide permanent right-of-way.

[b] Op= Enbridge-provided footprint in Minnesota. Estimated permanent impact area in acres based on 50-foot-wide permanent right-of-way centered on route in North Dakota and Wisconsin.

[c] Total: Con = sum of pipeline construction work area, additional temporary workspaces (including pipe yards), and temporary access roads; Op = sum of pipeline permanent right-of-way, primary access roads, pump stations, and mainline valves (including valve pads and driveways).

Notes:

Values in table may not sum to subtotals and totals due to rounding.

"--" = no occurrence

NA = not available

The Applicant's proposed project would cross the McGregor IBA. Construction during the nesting season (beginning May 1 for most birds of conservation concern) could result in the loss of bird eggs and young. The Applicant would work with Minnesota DNR and USFWS to develop measures that would avoid and minimize disturbance of migratory birds. The impact on the IBA and breeding birds within the IBA from removal of vegetation would be short- to long-term and minor based on to the relatively small area affected compared to the acreage of the unaffected portion of the IBA.

The route would not cross the Itasca State Park IBA, and the pipeline corridor would be co-located with an existing pipeline for most of the length near this IBA. As a result, no impacts are expected on this IBA; if noise and disturbance affected some species within the IBA, the impact would be temporary and negligible.

Raptor habitat could be compromised by removal of trees from the construction work area and extra workspaces in adjacent areas. Many of these species require large, unfragmented habitats. In addition, because most raptors reuse nest structures for many years, loss of nest structures would require a pair to find a new nest tree and build a new nest. If suitable new nest trees are not available within established territories, new territories would need to be established. These processes would lead to increased energy demands during nesting and could lead to reduced or lost reproduction in subsequent years. Most migratory birds begin nesting from mid-April through late July; however, bald eagles may nest as early as February (Minnesota DNR 2016x). Construction during the nesting season (beginning May 1 for most birds of conservation concern) could result in loss of bird eggs and young. The Applicant would work with USFWS to develop measures to avoid and minimize impacts on migratory birds. Raptor nests identified during 2014 to 2016 surveys would be avoided when possible. If removal of one of these nests is unavoidable, a permit and consultation with USFWS and Minnesota DNR may be required.

Two colonial waterbird nesting sites (rookeries) occur within 0.5 mile of the Applicant's proposed project; both sites provide habitat for great blue herons. Waterbirds can be vulnerable to development, particularly when appropriate replacement habitat is not available. Direct impacts may occur from the loss of nesting habitat; indirect impacts could occur from disturbance to adults, nests, and young due to construction. Wildlife agencies often recommend a buffer of no impact around the colony and/or season restrictions on construction; although the Applicant has not received conservation measures or guidance from the USFWS or Minnesota DNR regarding rookeries. The Shell River rookery is about 1,220 feet, from the closest construction work area. The impact on this rookery is expected to be indirect, temporary, and negligible to minor, depending on the time of year construction takes place. The Mahtowa rookery is about 340 feet from the closest construction work area. Because construction activities are expected to occur within a distance that would affect the Mahtowa colony, the Applicant should consult with Minnesota DNR and USFWS, to establish construction BMPs and timeframes to minimize impacts on the rookeries; a permit may be required. The impact of construction within this buffer zone would be temporary to long-term and could be minor to major, depending on the construction activities conducted.

Impacts from Habitat Fragmentation

Habitat fragmentation is caused when contiguous habitats are divided into separate fragments. Large-block habitats (habitats larger than 100 acres) are susceptible to impacts from fragmentation, particularly large, mature core or interior forested areas that serve as habitat for migratory birds and other wildlife. Construction of linear projects such as pipelines can cause habitat fragmentation as well as changes in vegetation cover. Potential fragmentation effects on wildlife habitat include a decrease in total habitat area, amount of interior habitat, biodiversity (richness), and connectivity. Fragmentation may also cause an increase in amount of edge habitat, increase the risk of invasive species spread, and isolate some habitat types. The reduction in habitat connectivity can disrupt behavior and movement of species, alter population dynamics, reduce the chance of recolonization in extirpated island habitats, and decrease genetic diversity. Forest-nesting birds are particularly vulnerable to habitat fragmentation effects resulting from linear construction projects. Habitat fragmentation leads to increased predation, increased competition by generalist species, and changes in microclimate and vegetation which may result in extirpation and reduced reproductive success for area-sensitive species.

The Applicant's proposed project is co-located with other pipelines, utilities, or roads along most of its length. However, between Clearbrook and Carlton nine segments (between approximately MPs 215.0 and 352.0) are not co-located with other infrastructure. Within this span, 21 large-block forested and wetland habitats would be crossed and fragmented by construction of the Applicant's proposed project. This would occur along approximately 38 miles of the Applicant's proposed project, or approximately 11 percent of the route in Minnesota and 17 percent of the route between Clearbrook and Carlton. The habitat "patches" that would be crossed include primarily forested and woody wetland habitats, with the largest patch crossed approximately 4,500 acres over approximately 7 miles, and the smallest patch crossed is about 130 acres over less than 1 mile. Impacts on wildlife from habitat fragmentation would be indirect, permanent, and minor to major, depending on the habitat type and species present. If construction activities bisect interior habitats or remove additional existing edge habitat, thus reducing the habitat patch size, individuals of wildlife species with patch size requirements or sensitivities to habitat fragmentation could experience permanent and major habitat loss and displacement impacts. These impacts would be greatest in more remote, undisturbed areas.

Operations Impacts

The following sections describe the potential impacts of normal operation of the Applicant's proposed project. Impacts from an accidental release of crude oil during operation are addressed in Chapter 10.

Fisheries and Aquatic Habitat

Overall operations impacts on aquatic habitat (174 crossings), trout streams (6 crossings), LBS (1 lake), and AMAs (0.2 acres) would be short-term and negligible to minor. In areas where streambanks are cleared of forested or woody vegetation, thermal effects to trout habitat could occur resulting in long-term major impacts.

General Impacts

The pipeline right-of-way in upland areas would be maintained in an herbaceous vegetative state during operation to allow access for inspection, monitoring, and maintenance.

Alteration of riparian vegetation within the permanent right-of-way in areas adjacent to waterbody crossings would result in localized change in habitat, streambank stability loss and erosion, and the potential for increased sedimentation. The Applicant would conduct regular monitoring of the right-of-way and would be able to identify streambank areas where changes may occur to the topography or vegetation. If any such changes are identified, the Applicant would consult Minnesota DNR and Minnesota PCA and make repairs and improvements based on recommendations from these agencies. With implementation of these measures, localized changes to topography or vegetation would result in short-term minor impacts in the vicinity of the alteration.

Removal of riparian vegetation in areas adjacent to some waterbody crossings would allow more light to enter the waterbody and could cause long-term to permanent, negligible to minor increases in temperature at these locations. Trees and shrubs would not be allowed to reestablish within the permanent right-of-way. This could lead to long-term, major thermal effects on trout streams. During normal operation, no other measurable changes to water quality in surface waters would be expected, with no impacts on most fisheries or aquatic habitats.

Minor accidental fuel and lubricant leaks and spills could be released from maintenance and inspection vehicles using the permanent right-of-way and nearby areas. Any refueling, fuel storage, or vehicle maintenance would follow the Applicant-proposed measures set forth in the Environmental Protection

Plan (Appendix E). If minor leaks or spills during operations reach surface waters, negligible to minor changes to surface water quality would result, and the subsequent temporary impacts on fisheries and aquatic habitats would be negligible to minor.

Chemical control methods (i.e., herbicides) to control invasive vegetation species during operations could be used near waterbodies. The Applicant would implement its noxious weed plans that include methods to prevent and reduce the introduction and spread of noxious weeds and invasive species, and would implement BMPs for herbicide applications. Only herbicides and surfactants labeled for aquatic use would be used within 50 feet of any waterbody (Appendix E). In addition, herbicide use would be based on the invasive species present from monitoring and the minimum herbicide would be used the treat the species present. These actions would reduce potential impacts on aquatic species from herbicides reaching surface waters with runoff. As a result, the use of herbicides would result in temporary negligible impacts on fisheries and aquatic habitats.

Impacts from Integrity Management Digs

During operation, the Applicant would implement its Integrity Management Program, which has the potential to require excavation and repair or replacement of sections of the pipeline. In upland areas, these integrity digs could result in topographical changes and loss of vegetation in localized areas for relatively short periods of time. The Applicant would implement measures to minimize runoff to surface water during and after these activities, similar to the measures incorporated into the Project during construction. If pipe segments need to be repaired or replaced along surface water crossings, the wet open-cut or dry open-cut method would be used to access the pipe. These methods would be the same as those used for construction of the crossing as described above. The impacts on fisheries and aquatic habitat would be similar to those experienced during construction; for each integrity dig, the impacts would be temporary to short to long-term and minor, depending on the location, habitats affected, and whether repair or replacement are needed. These impacts would occur periodically over the life of the Project.

During repair or replacement of pipe as part of the Integrity Management Program, it may be necessary to withdraw and discharge water to hydrostatically test sections of pipe and for dust control during the integrity digs and backfilling activities. The frequency with which hydrostatic testing would occur, locations of testing, and amount of water needed for testing and dust control are not defined. As described for pipeline construction, the Applicant would be required to obtain water appropriation and NPDES permits for testing procedures, and the volume of water would be substantially less than for construction. With adherence to permits and implementation of BMPs to avoid the intake or entrainment of fish, the impacts associated with minor alterations in stream flows from water appropriation and discharge for each integrity dig would be temporary and negligible.

Wildlife and Wildlife Habitat

General Potential Impacts

During operation of the pipeline, the permanent right-of-way would be maintained to prevent woody vegetation from regrowing. Loss of tree and shrub habitats used by birds for cover, forage, and nesting would be permanent in the construction work area outside of the permanent right-of-way because of the long period of time required for forest habitat to regenerate. Within the permanent right-of-way, the impact would be permanent and minor to major, because the right-of-way would be maintained in an herbaceous state.

Differences in vegetation cover between the permanent right-of-way and the surrounding landscape can act as a barrier for some species, such as squirrels and small mammals, while acting as a travel corridor for others, such as raccoons and coyotes. Small mammals that do attempt to cross the cleared right-of-way in previously forested areas could be exposed to increased predation by coyotes, foxes, or birds. Trees and shrubs along rivers and creeks provide high-value wildlife habitat. Furbearers such as muskrats, mink, otter, weasels, and beaver use river edge habitats, and permanent removal of trees and large shrubs along the 50-foot-wide permanent right-of-way would create a break in cover that could increase exposure to terrestrial predators like foxes and coyotes as well as predatory birds. Losses of tree and shrub habitats used by small mammals and birds for cover, forage, and nesting would be a permanent and minor impact because the permanent right-of-way would be maintained free of trees and large shrubs.

Mowing and vegetation removal can result in injury or direct mortality of smaller species such as turtles, small mammals, and bird eggs and young, if conducted during the bird nesting season. This recurring impact would be localized to the permanent right-of-way and the areas around aboveground facilities, resulting in short-term minor impacts on common wildlife for each occurrence; but the mowing would be repeated periodically over the life of the Project.

The maintained permanent right-of-way may be used as travel corridors by some big game animals and humans. Increased human use could lead to disturbance and hunting pressure on game animals, resulting in minor permanent effects on wildlife (Hinkle et al. 2002).

The permanent right-of-way may become attractive to some small species as well. For example, during operations, there may be some warming of the soil above the pipeline, and that may attract rabbits, badgers, and burrowing rodents, especially during winter months. Small mammals attracted to the permanent right-of-way could be exposed to increased predation by coyotes, foxes, or birds. The pipeline right-of-way could also attract migratory waterfowl during early spring if it becomes snow free before surrounding habitats, which has been demonstrated during the early spring melt, when early vegetation emergence near roadways and the limited buried portions of the Trans Alaska Pipeline in Northern Alaska attracts waterfowl, shorebirds, and ptarmigan (*Lagopus* spp.; Trans Alaska Pipeline System Owners 2001). Migratory birds attracted to the permanent right-of-way could be exposed to increased predation by coyotes, foxes, or other predators. These effects would be permanent but minor.

Habitat in the permanent right-of-way could be degraded if native vegetation is replaced by noxious and invasive species. The use of chemical controls can adversely affect wildlife, particularly amphibians because of their sensitivity to chemical exposure. However, implementation of BMPs for use of herbicides that include measures such as only using herbicides when necessary and using aquatic formulations within 50 feet of water, and prevention of the spread of noxious species would minimize the potential for impacts, and the impact on wildlife and wildlife habitats is expected to be temporary to short term and minor.

Impacts on Management Units and Managed Species

The Applicant's proposed project would cross the McGregor IBA, permanently affecting about 25 acres. IBAs represent relatively intact areas that are important to birds. Maintenance of the permanent right-of-way could reduce populations of species sensitive to habitat disturbance and could indirectly result in a permanent and minor effect on breeding birds within the McGregor IBA.

Impacts from Habitat Fragmentation

During operation, the habitat fragmentation along the permanent right-of-way would continue, as described under construction impact, and could reduce populations of some forest interior species (e.g., birds, mammals, and amphibians). Forest-nesting birds are particularly vulnerable to habitat fragmentation effects of linear construction projects. Forest-nesting songbird abundance, diversity, and reproduction rates have been shown to become depressed from the fragmentation associated with linear developments (Jalkotzy et al. 1997). Linear corridors also increase songbird nest predation and parasitism (e.g., by brown-headed cowbirds), by fragmenting forest habitats and increasing access to nests. As a result, habitat fragmentation during operation of the Applicant's proposed project would cause permanent minor to major impacts on wildlife, depending on the location and species.

Impacts from Integrity Management Digs

The integrity management digs described above (see operations impacts for fisheries and aquatic habitat) would result in changes to the permanent right-of-way that would be similar to those during construction.

During operation, the Applicant would implement its Integrity Management Program, which could require excavation and repair or replacement of sections of the pipeline. In upland areas, these integrity digs would result in a loss of vegetation in localized areas for relatively short periods of time. The Applicant would restore the affected areas to conditions present prior to initiating the integrity dig. The impacts would be similar to those during construction of the pipeline, but over a substantially smaller area and without impacts on forested areas because the areas affected by integrity digs essentially would be limited to the permanent right-of-way. As a result, the impacts on wildlife and wildlife habitat would be short-term and negligible to minor but would occur periodically over the life of the Project.

5.2.4.3.2 Continued Use of Existing Line 3 Pipeline

Continued use of the existing Line 3 pipeline would involve continuing use of the existing Line 3 pipeline in Minnesota at its current operating capacity of approximately 390,000 barrels per day (bpd) (see Chapter 4 for further information).

Construction Impacts

Continued use of the existing Line 3 pipeline would not result in construction-related impacts on fisheries, aquatic habitat, wildlife, or wildlife habitat, because the pipeline is in place and operational.

Operations Impacts

Operations activities for the existing Line 3 pipeline would include continued vegetation maintenance along the permanent right-of-way to remove woody vegetation and maintain the right-of-way in an herbaceous vegetative state. All portions of the permanent right-of-way have been in place for decades, and the impacts of operation along the permanent right-of-way that are currently occurring would continue without substantial change.

The Applicant would continue to conduct regular monitoring of the right-of-way and would be able to identify streambank areas where changes may occur to the topography or vegetation. If any such changes are identified, the Applicant would consult Minnesota DNR and Minnesota PCA and make repairs and improvements following recommendations of these agencies. With implementation of these measures, localized changes to topography or vegetation would result in short-term minor impacts in the vicinity of the alteration.

Excavation and replacement of sections of the pipeline as part of the Applicant's ongoing Integrity Management Program and to allow visual inspection of the pipeline route would also continue. The impacts of these integrity digs on fisheries, aquatic habitats, wildlife, and wildlife habitats would be the same as currently experienced for each dig location. However, the need for integrity digs would increase as the pipe continues to age and require repair or replacement of pipe segments. Consequently, the impacts would occur over a wider area annually than currently takes place. The impacts associated with integrity digs range from short to long-term and are minor to major, depending on the location, habitats affected and whether repair or replacement are needed.

5.2.4.3.3 System Alternative SA-04

The methods implemented by the Applicant to avoid or minimize impacts during construction and operation of SA-04 would be the same as those described above for the Applicant's proposed project. The types of potential impacts on fisheries and aquatic resources and wildlife and wildlife habitat from construction and operation of SA-04 would also be similar as those described above for the Applicant's proposed project. Consequently, some discussions in this section refer to the impact analysis presented above for the Applicant's proposed project.

Construction Impacts

Fisheries and Aquatic Habitat

Construction of SA-04 would require 636 stream crossings in North Dakota, Minnesota, Iowa, and Illinois. The majority of crossings would occur in Iowa (Table 5.2.4-9). SA-04 would not cross any trout streams.

Surface water crossings would be designed as close to perpendicular to the axis of the stream channel as engineering and routing constraints allow to create the shortest possible crossing length. The Applicant would determine and obtain approval for specific crossing methods based on factors such as waterbody size, sensitivity, water levels, soil/sediment stability installation, and anticipated season of installation. See Appendix G for a complete discussion of crossing methods. Crossing methods have not yet been determined for the crossings associated with SA-04.

Table 5.2.4-9. Number of Stream Crossings by Crossing Type for System Alternative SA-04

Waterbody Type/Flow	North Dakota	Minnesota	Iowa	Illinois	Total
Artificial path	10	6	5	16	37
Canal/ditch	17	71	--	3	91
Connector	--	1	--	--	1
Lake/pond – intermittent	--	--	4	--	4
Lake/pond – perennial	5	3	4	1	13
Stream/river – intermittent	74	81	152	77	384
Stream/river – perennial	13	10	54	19	96
Swamp/marsh	2	--	4	4	10
TOTAL	**121**	**172**	**223**	**120**	**636**

Source: USGS 2017. Also see maps in Appendix A.

Notes:

An artificial path is a feature that represents flow through a two-dimensional feature, such as a lake or a double-banked stream. An artificial

Table 5.2.4-9. Number of Stream Crossings by Crossing Type for System Alternative SA-04

path represents the flow of water into, through, and out of features (channel, estuary, lake/pond, playa, reservoir, swamp, marsh). A canal ditch specifies that it is artificial and that it is used to transport water, to drain or irrigate land, to connect two or more water bodies, or to serve as a waterway for watercraft. A connector establishes a known, but non-specific connection between two non-adjacent network segments that have flow.

Perennial waterbodies are those that hold water at all times, except in cases of extreme drought. Intermittent waterbodies are those that are wet only during part of the year, usually in spring, when rain and snowmelt saturate the ground surface.

"--" = no occurrence

General Potential Impacts on Fisheries and Aquatic Habitat from Surface Water Crossings

SA-04 would cross 636 waterbodies. Construction of SA-04 would result in impacts similar to those identified for the Applicant's proposed project, including streambank alteration, removal of large in-stream structures, direct impacts on fish and fisheries, leaks or small spills of fuel or other hazardous liquids, unanticipated releases of drilling fluids, and risks associated with hydrostatic water withdrawal and discharge. Each of these impacts is discussed in detail above in Section 5.2.4.3.1. Impacts on aquatic habitat would generally be temporary to short-term and negligible to minor, unless a frac-out occurred and went undetected or was not quickly contained. In areas where streambanks are cleared of forested or woody vegetation, thermal effects could occur resulting in long-term minor to major impacts.

Impacts on Management Units and Managed Species

Construction of SA-04 would affect 0.2 acre of the Mayhew Creek FMA in Blue Earth County, Minnesota (Minnesota DNR 2016w). As for the Applicant's proposed project, the Applicant would incorporate BMPs into construction to avoid or minimize impacts; as a result, the impacts of construction of SA-04 from loss of habitat and reduction of habitat quality would be short-term and negligible to minor. The Applicant would implement BMPs to prevent the spread of invasive species, with the resultant impact expected to be at most short-term and negligible to minor.

Construction of SA-04 would affect a freshwater mussel bed site in the Minnesota River (Minnesota DNR 2016e). Impacts on AMAs and mussel beds from construction of SA-04 would depend on the type of waterbody crossing method used and could include introduction of invasive species, loss of habitat, and reduction of habitat quality. Wet open-cut construction through the Minnesota River could permanently destroy part of the mussel bed, expose mussels to increased turbidity and sedimentation, and result in mortality. These impacts are expected to be permanent and minor to major, depending on how much habitat would be lost in construction areas and the species present. BMPs would be in place to reduce impacts on fisheries and aquatic habitats, as described above for the Applicant's proposed project. Successful use of the HDD crossing method would avoid impacts on mussels and mussel beds, but see information about unintended drilling fluid releases in Section 5.2.4.3.1 above. If an HDD crossing is not an option, mussel surveys, collection, temporary storage, and replacement of mussels could be required, depending on the particular mussel bed.

No trout streams would be crossed by SA-04 in Minnesota, although two trout streams in Nicollet County, Minnesota, occur within 0.5 mile of this alternative (Seven Mile Creek [M-055-071.5] and an unnamed stream [M-055-071.5-002]) (Minnesota DNR 2015c). These trout streams would not be affected by construction of SA-04, as the streams would not be crossed by the pipeline route.

No Significant Wildlife Lakes would be impacted by SA-04.

Wildlife and Wildlife Habitat

General Potential Impacts

The majority of vegetative cover that would be affected by construction of SA-04 is hay/pasture and cultivated cropland. Construction activities on cultivated cropland would temporarily displace and disturb white-tailed deer, small mammals, and birds that typically forage in these areas. These areas would be reclaimed as hay/pasture and cultivated cropland following construction, resulting in temporary to permanent minor to major impacts on these habitats and individuals of the wildlife species that inhabit these areas. Mowing, ground disturbance, and vegetation removal for construction can result in injury or direct mortality of smaller species such as turtles, small mammals, and bird eggs and young, if conducted during the bird nesting season, resulting in short-term minor impacts on common wildlife.

Construction of SA-04 would result in the disturbance of 10,217 acres of cultivated crops, accounting for 95 percent of the land cover affected by construction. Additionally, 161 acres of forest would be disturbed during construction of SA-04 (Table 5.2.4-10). Most of this area is in the Dakota Tallgrass Prairie WMA in North Dakota (94 percent) (Table 5.2.4-11). Impacts on forest and prairie habitats would be similar to those described for the Applicant's proposed project, including the potential for introduction of invasive species, loss of habitat, and reduction of habitat quality. For the prairie habitats, BMPs would be in place to reduce impacts on wildlife and wildlife habitats, and construction areas would be revegetated using native seed mixes (e.g., Minnesota BWSR mixes) or as required by the land administrator. Consequently, impacts are expected to be temporary to short term and minor. Forested areas would be permanently removed from the permanent right-of-way but would be allowed to regenerate in portions of the temporary construction work area that are outside of the permanent-right-of-way. As a result, impacts on wildlife habitat and the wildlife using the forested habitat would be temporary to permanent and minor to major, depending on the specific area affected.

Table 5.2.4-10. Vegetation Cover Potentially Affected by System Alternative SA-04 (acres)

Vegetation Cover Class	Construction Work Area[a]	Permanent Right-of-Way[b]
Evergreen forest	9	0
Deciduous forest	98	41
Mixed forest	<0.1	<0.1
Shrub/scrub	<0.1	<0.1
Grassland/herbaceous	181	76
Hay/pasture	100	41
Cultivated crops	10,217	4,266
Woody wetlands	54	23
Emergent herbaceous wetlands	85	35
Barren land	20	9
TOTAL	**10,765**	**4,490**

Table 5.2.4-10. Vegetation Cover Potentially Affected by System Alternative SA-04 (acres)

Source: Homer et al. 2015.

[a] Estimated construction impact area in acres based on a 120-foot-wide construction work area centered on the pipeline route, including the 50-foot-wide permanent right-of-way.

[b] Estimated operations impact area in acres based on a 50-foot-wide permanent right-of-way centered on the pipeline route.

Notes:

Values in table may not sum to subtotals and totals due to rounding.

"--" = no occurrence

Table 5.2.4-11. Wildlife Conservation Lands Potentially Affected by System Alternative SA-04

Designation Type and Name	Construction Work Area[a]		Permanent Right-of-Way[b]	
	Acres	Number	Acres	Number
North Dakota				
Habitat or Species Management Areas				
Dakota Tallgrass Prairie Wildlife Management Area	794.8	1	331.1	1
Resource Management Areas				
Pembina County Waterfowl Production Area	10.4	3	4.7	3
Not Designated				
Pembina County Waterfowl Production Area	5.0	2	2.5	2
North Dakota subtotal	***810.2***	***6***	***338.3***	***6***
Minnesota				
Habitat or Species Management Areas				
Lyle-Austin Wildlife Management Area	0.3	1	0.1	1
Resource Management Areas				
Morris Wetland Management District Waterfowl Production Area	0.3	2	0.1	1
Private Conservation Lands				
Conservation Reserve Enhancement Program	26.0	8	10.8	8
Reinvest in Minnesota Wetlands Reserve Program	5.0	2	2.1	2
Minnesota subtotal	***31.6***	***13***	***13.1***	***12***
Illinois				
National Wildlife Refuges				
Upper Mississippi River Wildlife and Fish Refuge	0.2	1	0.1	1
Protective Management Areas				
Coon Creek	0.2	1	0.1	1
Mississippi River	4.1	1	1.7	1
State Parks				
Hennepin Canal	0.9	1	0.4	1

Table 5.2.4-11. Wildlife Conservation Lands Potentially Affected by System Alternative SA-04

Designation Type and Name	Construction Work Area[a]		Permanent Right-of-Way[b]	
	Acres	Number	Acres	Number
Illinois subtotal	***5.4***	***5***	***2.2***	***5***
TOTAL	**847.1**	**24**	**353.7**	**23**

Source: USGS GAP 2016.

[a] Estimated construction impact area in acres based on a 120-foot-wide construction work area centered on the route, including the 50-foot-wide permanent right-of-way.

[b] Estimated operations impact area in acres based on a 50-foot-wide right-of-way centered on the route.

Notes:

Values in table may not sum to subtotals and totals due to rounding.

Represents GAP Status 1, 2, and 3 only; these lands have permanent protection from conversion of natural land cover that provides wildlife habitat.

Potential Impacts on Management Units and Managed Species

Alternative SA-04 would affect 847 acres within 24 lands managed for conservation of wildlife, including WMAs in North Dakota, Minnesota, and Illinois (Table 5.2.4-11). SA-04 would primarily impact the Dakota Tallgrass Prairie Wildlife Management Area during construction, comprising 795 acres or 94 percent of all wildlife conservation lands potentially impacted during construction by SA-04. In addition, one state park (Hennepin Canal) would be crossed by SA-04. Impacts on these conservation areas would be short to long-term depending on the existing habitat types and minor to major depending on the landscape context of these public areas to areas around them.

Construction of SA-04 would affect lands within five IBAs. Each of these IBAs is described in Section 5.2.4.2.3. Construction would result in removal of habitats across or near these areas and could reduce populations of those species sensitive to habitat loss or alteration and species that rely on large, intact habitats. This could result in permanent and minor to major effects on breeding birds within the IBAs.

Potential Impacts from Habitat Fragmentation

System alternative SA-04 would be constructed along existing pipeline or utility corridors throughout its entire length and would not substantially contribute to fragmentation of large-block habitats.

Operations Impacts

Fisheries and Aquatic Habitat

Overall operations impacts on aquatic habitat (636 crossings) and AMAs (0.2 acres) would be short-term and negligible to minor. In areas where streambanks are cleared of forested or woody vegetation, thermal effects could occur resulting in long-term major impacts on aquatic areas.

General Impacts

The pipeline right-of-way in upland areas would be maintained in an herbaceous vegetative state during operation to allow access along the right-of-way for inspection, monitoring, and maintenance. Permanent removal of riparian vegetation within the permanent right-of-way in areas adjacent to waterbody crossings would result in localized alterations in habitat, streambank stability loss and erosion, and the potential for increased sedimentation. The Applicant would conduct regular monitoring of the right-of-way and would be able to identify streambank areas where changes may occur to the topography or vegetation. If any such changes are identified, the Applicant would consult Minnesota DNR and Minnesota PCA and make repairs and improvements following recommendations of these agencies. With implementation of these measures, localized changes to topography or vegetation would result in short-term minor impacts in the vicinity of the alteration.

Permanent removal of riparian vegetation in areas adjacent to some waterbody crossings would allow more light to enter the waterbody and could cause long-term, negligible to minor increases in temperature at these locations. Trees and shrubs would not be allowed to reestablish within the permanent right-of-way. During normal operation, no other measurable changes to water quality in surface waters would be expected, with no impacts on most fisheries or aquatic habitats from these other effects.

Minor accidental fuel and lubricant leaks and spills could be released from maintenance and inspection vehicles using the permanent right-of-way and nearby areas. Any refueling, fuel storage, or vehicle maintenance would follow the Applicant-proposed measures set forth in the Environmental Protection Plan (Appendix E). If minor leaks or spills during operations reach surface waters, negligible to minor changes to surface water quality would result, and the subsequent temporary impacts on fisheries and aquatic habitats would be negligible to minor.

Chemical methods (i.e., herbicides) to control invasive vegetation species during operations could be used near waterbodies. The Applicant would implement its noxious weed plans that include methods to prevent and reduce the introduction and spread of noxious weeds and invasive species, and would implement BMPs for herbicide applications. Only herbicides and surfactants labeled for aquatic use would be used within 50 feet of any waterbody (Appendix E). In addition, herbicide use would be based on the invasive species present from monitoring and the minimum herbicide would be used the treat the species present. These actions would reduce potential impacts on aquatic species from herbicides reaching surface waters with runoff. As a result, the use of herbicides would result in temporary and negligible impacts on fisheries and aquatic habitats.

Impacts on Management Units and Managed Species

Operation of SA-04 would permanently affect 0.2 acre of the Mayhew Creek FMA in Blue Earth County, Minnesota (Minnesota DNR 2016w). These impacts are expected to be short-term and negligible to minor as the pipeline would be subsurface and vegetation would recover outside of the permanent right-of-way.

Impacts from Integrity Management Digs

During operation, the Applicant would implement its Integrity Management Program, which could require excavation and repair or replacement of sections of the pipeline. In upland areas, these integrity digs could result in topographical changes and loss of vegetation in localized areas for relatively short periods of time. The Applicant would implement measures to minimize runoff to surface water during and after these activities, similar to the measures incorporated into the Project during construction. If pipe segments need to be repaired or replaced along surface water crossings, the wet open-cut or dry open-cut method would be used to access the pipe. These methods would be the same as those used for construction of the crossing, as described above. Impacts on fisheries and aquatic habitat would be similar to those experienced during construction; for each integrity dig, the impacts would be short to long-term and minor, depending on the location, habitats affected, and whether repair or replacement are needed. These impacts would occur periodically over the life of the Project.

During repair or replacement of pipe as part of the Integrity Management Program, it may be necessary to withdraw and discharge water to hydrostatically test sections of pipe and for dust control during the integrity digs and backfilling activities. The frequency with which hydrostatic testing would occur, locations of testing, and amount of water needed for testing and dust control would vary depending on the situation. As described for pipeline construction, the Applicant would be required to obtain water appropriation and NPDES permits for testing procedures, and the volume of water would be substantially less than for construction. With adherence to permits and implementation of BMPs to avoid the intake or entrainment of fish, the impacts associated with minor alterations in stream flows from water appropriation and discharge for each integrity dig would be temporary and negligible.

Wildlife and Wildlife Habitat

General Potential Impacts

During operation of the pipeline, the permanent right-of-way would be maintained to prevent woody vegetation from regrowing. Loss of tree and shrub habitats used by birds for cover, forage, and nesting would be permanent in the construction work area outside of the permanent right-of-way because of the long period of time required for forest habitat to regenerate. Within the permanent right-of-way, the impact would be temporary to permanent and minor to major, because the right-of-way would be maintained in an herbaceous state.

Differences in vegetation cover between the permanent right-of-way and the surrounding landscape can act as a barrier for some species, such as squirrels and small mammals, while acting as a travel corridor for others, such as raccoons and coyotes. Small mammals that do attempt to cross the cleared right-of-way in previously forested areas could be exposed to increased predation by coyotes, foxes, or birds. Trees and shrubs along rivers and creeks provide high-value wildlife habitat. Furbearers such as muskrats, mink, otter, weasels, and beaver use river edge habitats; and permanent removal of trees and large shrubs along the 50-foot-wide permanent right-of-way would create a break in cover that could increase exposure to terrestrial predators like foxes and coyotes as well as predatory birds. Losses of tree and shrub habitats used by small mammals and birds for cover, forage, and nesting would be a permanent and minor impact because the permanent right-of-way would be maintained free of trees and large shrubs.

Mowing and vegetation removal can result in injury or direct mortality of smaller species such as turtles, small mammals, and bird eggs and young, if conducted during the bird nesting season. This recurring impact would be localized to the permanent right-of-way and the areas around aboveground facilities, resulting in short-term minor impacts on common wildlife for each occurrence; but the mowing would be repeated periodically over the life of the Project.

The maintained permanent right-of-way may be used as travel corridors by some big game animals and humans. Increased human use could lead to disturbance and hunting pressure on game animals, resulting in minor permanent effects on wildlife (Hinkle et al. 2002).

The permanent right-of-way may become attractive to some small species as well. For example, during operations, there may be some warming of the soil above the pipeline, and that may attract rabbits, badgers, and other burrowing rodents, especially during winter months. Small mammals attracted to the permanent right-of-way could be exposed to increased predation by coyotes, foxes, or birds. The pipeline right-of-way could also attract migratory waterfowl during early spring if it becomes snow free before surrounding habitats, which has been demonstrated during the early spring melt, when early vegetation emergence near roadways and the buried portions of the Trans Alaska Pipeline in Northern Alaska attracts waterfowl, shorebirds, and ptarmigan (Trans Alaska Pipeline System Owners 2001). Migratory birds attracted to the permanent right-of-way could be exposed to increased predation by coyotes, foxes, or other predators. These effects would be permanent but minor.

Habitat in the permanent right-of-way could be degraded if native vegetation is replaced by noxious and invasive species. The use of chemical controls can adversely affect wildlife, particularly amphibians because of their sensitivity to chemical exposure. However, implementation of BMPs for use of herbicides, which include measures such as only using herbicides when necessary and using aquatic formulations within 50 feet of water, and prevention of the spread of noxious species would minimize the potential for impacts, and the impact on wildlife and wildlife habitats is expected to be temporary to short-term and minor.

Impacts on Management Units and Managed Species

Impacts of right-of-way maintenance within the several wildlife conservation areas crossed by SA-04, would be short-term to permanent and minor to major, depending on the type of habitat present. Maintenance of the permanent right-of-way could reduce populations of species sensitive to habitat disturbance, and could result in short-term to permanent, minor effects onto breeding birds within the IBAs.

Impacts from Habitat Fragmentation

Because SA-04 would be within or adjacent to existing utility corridors for all of its length, no impacts related to fragmentation of large tracts of wildlife habitat would occur.

Impacts from Integrity Management Digs

The integrity management digs described above (see operations impacts for fisheries and aquatic habitat) would result in changes to the permanent right-of-way that would be similar to those during construction.

During operation, the Applicant would implement its Integrity Management Program, which could require excavation and repair or replacement of sections of the pipeline. In upland areas, these integrity digs would result in loss of vegetation in localized areas for relatively short periods of time. The Applicant would restore the affected areas to conditions present prior to initiating the integrity dig. The impacts would be similar to those occurring during construction of the pipeline, but over a substantially smaller area, and without impacts on forested areas because the areas affected by the integrity digs would be limited to the permanent right-of-way. Consequently, impacts on wildlife and wildlife habitat would be short-term and negligible to minor but would occur periodically over the life of the Project.

5.2.4.3.4 Transportation by Rail

Near the existing Enbridge terminal at Clearbrook, the rail alternative would require as much as 200 acres to construct and operate an offloading facility and 60 acres to reactivate an abandoned rail line. Near the existing Enbridge terminal at Superior, Wisconsin, construction would require as much as 100 acres for offloading facilities and an additional 3 acres to establish a new rail spur.

Construction Impacts

Fisheries and Aquatic Habitat

Aquatic species and aquatic habitat would be affected by clearing and grading activities for development of the offloading facilities in both Clearbrook and Superior. The direct and indirect potential impacts would be similar to those described above for construction of the Applicant's proposed project, including the potential for habitat degradation from increases in stormwater runoff, erosion, and sedimentation, and the potential for injury or mortality of individual fish and other aquatic species. Degradation of water quality also could occur from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities. A SWPPP and a stormwater NPDES permit would be required for construction of facilities. Adhering to stipulations of the permit and the SWPPP, along with implementation of other BMPs, would minimize the potential for stormwater to carry eroded materials or contaminants into nearby surface waters and therefore minimize impacts on fisheries and aquatic habitats. The prevention and management of spills during construction would be managed according to SPCC plans that would be required for each facility. As a result, potential impacts on fisheries and aquatic habitats from construction of rail offloading facilities would be temporary to short-term and negligible.

Development of rail facilities likely would require water for common construction purposes, such as dust control, but large volumes would not be needed (e.g., for hydrostatic testing) because the existing tanks at the terminals likely would be used to store the delivered crude oil. Although the source of construction water is not known, it is anticipated that construction water could be obtained from sources other than surface waters (e.g., from a public water supply). Consequently, impacts on aquatic habitat and species from appropriation and discharge of large amounts of water are not expected to occur.

Wildlife and Wildlife Habitat

The habitat around the Clearbrook, Minnesota terminal includes deciduous and evergreen forests, woody and emergent wetlands and hay/pasture and cultivated croplands that provides habitat for white-tailed deer, small mammals, and birds. Vegetation cover near the Superior terminal is primarily deciduous forest and scrub/shrub wetlands. Wildlife and wildlife habitat would be affected by clearing and grading activities for development of offloading facilities at both locations. The loss of habitat would be permanent where the offloading facilities and new rail spur are sited. Larger species would be able to re-locate to nearby areas but may not survive if those areas are at habitat-carrying capacity. The loss of wildlife habitat would result in permanent but minor impacts based on the relatively large area of similar habitat in the areas surrounding the facilities.

Clearing of vegetation and downed woody debris in deciduous habitats could have temporary minor impacts on species with small home ranges or are slow to recover after disturbance, such as salamanders, because it could result in mortality of these small species or reduce prey availability to bird and mammal species that rely on these small species for food.

Operations Impacts

Fisheries and Aquatic Habitat

New facilities would create permanent impervious surfaces that would affect stormwater runoff at these locations. However, the offloading facilities would be designed to comply with NPDES permits and other permitting requirements that control runoff from industrial sites. Although the increase in impermeable surfaces would alter runoff patterns, with adherence to permitting requirements, a substantial increase in stormwater runoff and erosion would not be anticipated and would not be expected to carry eroded materials or contaminants to nearby surface waters. Consequently, the potential impacts on the associated fisheries and aquatic habitats would be permanent but negligible to minor.

Although the route that would be traveled by the unit trains exists, operation of unit trains would increase the amount of materials dropping from the trains to the railroad bed above the current level. Material reaching the railroad bed could include materials from brake pad consumption, lubrication, and fuel drips and leaks. The increase above current conditions is expected to be minor and typical of transport of cargo by rail. If petrochemicals reach areas of the railroad bed adjacent to surface waters, it is possible that the petrochemicals could migrate to the surface water. However, the quantity of materials leaking during normal operation would be small, and the associated impact on surface water quality likely would be temporary and minor. As a result, the impacts on fisheries and aquatic habitats would be temporary to permanent and negligible to minor.

Potential impacts on fisheries and aquatic habitat from an unanticipated release of crude oil are discussed in Chapter 10.

Wildlife and Wildlife Habitat

The principle impact of the rail transport alternative on wildlife during operation would be collisions with trains. This would be a permanent minor to major impact on common highly mobile wildlife such as white-tailed deer, mid-sized mammals, and birds. Major impacts could occur if collision deaths affect population management of species such as white-tailed deer. The train route currently passes through and near WMAs, including IBAs. No changes in impacts on wildlife habitats or wildlife management units are anticipated from operation of trains on the existing rail lines but the operation of the terminal would result in permanent minor impacts on wildlife habitat because the area would be maintained free of vegetation.

Potential impacts on wildlife and wildlife habitat from an unanticipated release of crude oil from a unit train are discussed in Chapter 10.

5.2.4.3.5 Transportation by Truck

Transportation of crude oil by truck would require development of offloading facilities and new road access. In the United States, truck offloading facilities would require approximately 50-acre sites at the existing terminals in Clearbrook, Minnesota, and in Superior, Wisconsin. New road access would require permanent conversion of approximately 5 acres of agricultural land, semi-disturbed land, and wetlands at the Clearbrook terminal; and 34 acres of semi-disturbed land at the Superior terminal.

The truck alternative would also require construction of a new loading facility and a new access road near Gretna, Canada. This EIS does not address construction or operation of those facilities.

Construction Impacts

Fisheries and Aquatic Habitat

Aquatic species and aquatic habitat would be affected by clearing and grading activities for development of the offloading facilities in both Clearbrook and Superior. Direct and indirect potential impacts would be similar to those described above for construction of the Applicant's proposed project, including the potential for habitat degradation from increases in stormwater runoff, erosion, and sedimentation, and the potential for injury or mortality of individual fish and other aquatic species. Degradation of water quality also could occur from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities. A SWPPP and a stormwater NPDES permit would be required for construction of facilities. Adhering to stipulations of the permit and the SWPPP, along with implementation of other BMPs would minimize the potential for stormwater to carry eroded materials or contaminants into nearby surface waters and therefore minimize impacts on fisheries and aquatic habitats. The prevention and management of spills during construction would be managed according to SPCC plans that would be required for each facility. As a result, potential impacts on fisheries and aquatic habitats from construction of truck offloading facilities would be temporary to short-term and negligible.

Development of the truck offloading facilities would likely require water for common construction purposes, such as dust control, but large volumes would not be needed (e.g., for hydrostatic testing) because the existing tanks at the terminals likely would be used to store the delivered crude oil. Although the source of construction water is not known, it is anticipated that construction water could be obtained from sources other than surface waters (e.g., from a public water supply). Consequently, impacts on aquatic habitat and species from appropriation and discharge of large amounts of water are not expected to occur.

Wildlife and Wildlife Habitat

The habitat around the Clearbrook, Minnesota terminal includes deciduous and evergreen forests, woody and emergent wetlands and hay/pasture and cultivated croplands that provides habitat for white-tailed deer, small mammals, and birds. Vegetation cover near the Superior terminal is primarily deciduous forest and scrub/shrub wetlands. Wildlife and wildlife habitat would be affected by clearing and grading activities for development of truck offloading facilities at both locations. Clearing of vegetation and downed woody debris in deciduous habitats could negatively affect species with small home ranges such as salamanders resulting in minor impacts including mortality of common species. The loss of habitat would be permanent where the offloading facilities and new roadway are sited. Larger species would be able to re-locate to nearby areas but may not survive if those areas are at habitat-carrying capacity. The loss of wildlife habitat would result in impacts that would be permanent but minor based on the relatively large area of similar habitat in the areas surrounding the facilities.

Operations Impacts

Fisheries and Aquatic Habitat

New facilities would create permanent impervious surfaces that would affect stormwater runoff at these locations. However, the offloading facilities would be designed to comply with NPDES permits and other permitting requirements that control runoff from industrial sites. Although the increase in impermeable surfaces would alter runoff patterns, with adherence to permitting requirements, a substantial increase in stormwater runoff and erosion would not be anticipated and would not be expected to carry eroded materials or contaminants to nearby surface waters. Consequently, the potential impacts on the associated fisheries and aquatic habitats would be permanent but negligible to minor.

Although the trucks would transport crude oil along existing highways that are currently used by trucks and other vehicles, operation of the truck alternative would increase the amount of materials dropping from the trucks to the roadway above the current level. Materials dropping from the trucks to the roadway could include materials from brakepad consumption, lubrication, and fuel drips and leaks. The increase above current conditions is expected to be minor and typical of transport of cargo by truck. If petrochemicals reach areas of the roadway adjacent to surface waters, it is possible that the petrochemicals could migrate to the surface water. However, the quantity of materials leaking during normal operation would be small, and the associated impact on surface water quality likely would be temporary and minor. As a result, impacts on fisheries and aquatic habitats would be temporary to permanent and negligible to minor.

Potential impacts on fisheries and aquatic habitat from an unanticipated release of crude oil are discussed in Chapter 10.

Wildlife and Wildlife Habitat

The principle impact of operation of the truck transport alternative on wildlife would be collisions with trucks. This would be a permanent minor to major impact on common highly mobile wildlife such as white-tailed deer, mid-sized mammals, and birds. Major impacts could occur if collision deaths affect population management of species such as white-tailed deer. The highways used by the trucks route currently pass through and near WMAs, including IBAs. No changes in impacts on wildlife habitats or wildlife management units are anticipated from operation of trucks on the existing roadways, but the operation of the terminal would result in permanent minor impacts on wildlife habitat because the area would be maintained free of vegetation.

Potential impacts on wildlife and wildlife habitat from an unanticipated release of crude oil from trucks are discussed in Chapter 10.

5.2.4.3.6 Existing Line 3 Supplemented by Rail

Impacts on fisheries, aquatic habitat, wildlife, and wildlife habitat from the combined used of the existing Line 3 infrastructure and the rail alternative would be the same as described above for continued use of existing Line 3 plus those of the rail alternative. Because fewer trains would be required for transport, potential impacts on wildlife from collisions with trains could be reduced. No changes in impacts, beyond those already addressed in this section, would be expected by using a combination of these alternatives.

5.2.4.3.7 Existing Line 3 Supplemented by Truck

Impacts on fisheries, aquatic habitat, wildlife, and wildlife habitat from the combined used of the existing Line 3 infrastructure and the truck alternative would be the same as described above for continued use of existing Line 3 in addition to those of the truck alternative. Because fewer trucks would be required for transport, potential impacts on wildlife from collisions with trucks would be reduced. No changes in impacts, beyond those already addressed in this section, would be expected by using a combination of these alternatives.

5.2.4.4 Summary and Mitigation

5.2.4.4.1 Summary

Construction and operation of the Applicant’s proposed project or any of the CN Alternatives could result in impacts on aquatic habitat, fish, wildlife habitat, and wildlife, ranging from no impact to permanent major impacts. Impacts would likely occur in forested areas and wetlands where habitat fragmentation would be most noticeable as well as in areas where large trees are permanently removed along stream banks resulting in thermal changes and habitat loss. Impacts would also occur where colonial waterbird nesting trees are removed or where freshwater mussel beds are destroyed. Table 5.2.4-12 presents a summary of construction- and operations-related impacts on aquatic habitat, fish, wildlife habitat, and wildlife for the Applicant’s proposed project and CN Alternatives.

Avoidance and impact minimization measures that would influence the duration and magnitude of impacts include Applicant-proposed measures, measures proposed by Minnesota DNR, and measures that would be included in state and federal permits. All stream crossings and measureable disturbance to wildlife (e.g., beaver dams, colonial nesting waterbirds, raptor nests) or aquatic species (e.g., fish, mussels) would be reviewed and approved by the authorizing agency prior to construction and may include requirements for further surveys or additional mitigation. Many of the avoidance and mitigation measures and the standard BMPs described for the Applicant's proposed project would be applicable to the CN Alternatives. Because the existing Line 3 pipeline was constructed previously and is operating, it was not considered under construction impacts.

Fisheries and Aquatic Habitat

Construction Impacts

A large potential impact on aquatic habitat due to construction would result from clearing vegetation along stream banks, in-water disturbance from construction of the Applicant's proposed project or SA-04 pipelines across surface water where the wet or dry open-cut crossing methods are used, and if a frac-out occurred during the HDD method in sensitive or impaired waters. In comparison, the rail alternative, truck alternative, and combination alternatives would have temporary to short-term and negligible to minor effects on aquatic habitats due to creation of new impervious surfaces and altered runoff.

Table 5.2.4-12. Summary of Potential Impacts on Fish and Wildlife for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Aquatic habitat loss or reduction of aquatic habitat quality from construction activities, including hydrostatic testing	Temporary to short-term/ negligible to minor impacts Long-term/minor to major impacts *(where streambanks are cleared of forested or woody vegetation)* • 174 stream crossings	No impact	Temporary to short-term/negligible to minor impacts Long-term/minor to major impacts *(where streambanks are cleared of forested or woody vegetation)* • 636 stream crossings	Temporary to short-term/negligible impacts	Temporary to short-term/negligible impacts	Temporary to short-term/negligible impacts	Temporary to short-term/negligible impacts
Trout stream habitat loss or reduction of aquatic habitat quality from surface water crossings	Short-term/minor impacts Long-term/major thermal impacts *(where streambanks are cleared of forested or woody vegetation)* • 6 trout stream crossings	No impact	No impact	No impact	No impact	No impact	No impact
Loss of habitat and reduction of habitat quality in Minnesota Lakes of Biological Significance	Short-term/ negligible to minor impacts • 1 MN Lake of Biological Significance	No impact	No impact	No impact	No impact	No impact	No impact

Table 5.2.4-12. Summary of Potential Impacts on Fish and Wildlife for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Loss of habitat and reduction of habitat quality in Aquatic Management Areas (AMAs) or Fisheries Management Areas (FMAs)	Short-term/ negligible to minor impacts • 0.4 acre of AMA disturbance	No impact	Short-term/ negligible to minor impacts • 0.2 acre of FMA disturbance	No impact	No impact	No impact	No impact
Loss of habitat and reduction of habitat quality of freshwater mussel bed; mortality of mussels	No impact	No impact	Permanent minor to major impacts, depending on crossing method • 1 freshwater mussel bed disturbed	No impact	No impact	No impact	No impact
Potential for injury, mortality, or disturbance of aquatic species affecting fisheries	Temporary/minor to major impacts	No impact	Temporary/minor to major impacts	Temporary to short-term/negligible impacts	Temporary to short-term/negligible impacts	Temporary to short-term/negligible impacts	Temporary to short-term/negligible impacts

Table 5.2.4-12. Summary of Potential Impacts on Fish and Wildlife for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Loss of habitat or reduction of wildlife habitat quality from construction activities and vegetation clearing	Temporary to permanent/minor to major impacts from clearing of the right-of-way • 5,617 acres of habitat, primarily cultivated crops and forest (75%)	No impact	Temporary to permanent/minor to major impacts from clearing of the right-of-way • 10,765 acres of habitat, primarily cultivated crops (95%)	Permanent/minor impacts • Approximately 363 acres of habitat cleared for offloading facility, reactivation of abandoned line, and building new rail spur	Permanent/minor impacts from clearing • Approximately 100 acres of habitat • Approximately 40 acres of new roads	Permanent/ minor impacts • Approximately 363 acres of habitat cleared for offloading facility, reactivation of abandoned line, and building new rail spur	Permanent/minor impacts from clearing • Approximately 100 acres of habitat • Approximately 40 acres of new roads
Loss of habitat or reduction of wildlife habitat quality in wildlife conservation areas from vegetation clearing	Short-term to long-term/minor to major impacts from clearing of the right-of-way • 512.9 acres of wildlife conservation areas	No impact	Long-term/minor impacts from clearing of the right-of-way • 847 acres of wildlife conservation areas	No impact	No impact	No impact	No impact
Disturbance or loss of colonial waterbird nesting sites	Temporary to long-term/minor to major impacts on the Mahtowa rookery depending on season	No Impact	Impact unknown	No impact	No impact	No impact	No impact

Table 5.2.4-12. Summary of Potential Impacts on Fish and Wildlife for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Loss of habitat or reduction of wildlife habitat quality from habitat fragmentation	Permanent/major impacts on primarily forests and wetlands • 38 miles of habitat fragmented • 21 large-block habitats (>100 acres) crossed	No impact	No impact Pipeline would be co-located with existing corridors	No impact	No impact	No impact	No impact
Potential for injury, mortality, or disturbance of wildlife species	Temporary to short-term/minor impacts	No impact	Temporary minor impacts	Temporary minor impacts	Temporary minor impacts	Temporary minor impacts	Temporary minor impacts
Operations Impacts							
Aquatic habitat loss or reduction of aquatic habitat quality from maintenance activities, integrity digs, or small leaks and spills	Short-term to long-term/ negligible to minor to major impacts Long-term/major thermal effects (*where streambanks are cleared of forested or woody vegetation*) • 174 stream crossings	Short-term to long-term, /minor to major impacts	Short-term to long-term/ major to minor impacts Long-term/major thermal effects (where streambanks are cleared of forested or woody vegetation) • 636 stream crossings	Temporary to permanent/ negligible to minor impacts	Temporary to permanent/ negligible to minor impacts	Temporary to permanent/ negligible to minor impacts	Temporary to permanent/ negligible to minor impacts

Table 5.2.4-12. Summary of Potential Impacts on Fish and Wildlife for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Trout stream habitat loss or reduction of aquatic habitat quality from right-of-way maintenance at surface water crossings	Short-term/negligible to minor impacts Long-term/major thermal effects (*where streambanks are cleared of forested or woody vegetation*) • 6 trout stream crossings	No impact	No impact	No impact	No impact	No impact	No impact
Loss of habitat and reduction of habitat quality in Minnesota Lakes of Biological Significance	Short-term/ negligible to minor impacts • 1 MN Lake of Biological Significance	No impact	No impact	No impact	No impact	No impact	No impact
Loss of habitat and reduction of habitat quality in Aquatic Management Areas (AMAs) or Fisheries Management Areas (FMAs)	Short-term/ negligible to minor impacts • 0.2 acre of AMA disturbance	No impact	Short-term/ negligible to minor impacts • 0.2 acre of FMA disturbance	No impact	No impact	No impact	No impact
Potential for injury, mortality, or disturbance of aquatic species affecting fisheries	Temporary to long-term/minor impacts	Short-term/minor impacts	Temporary to permanent and long-term/minor impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts

Table 5.2.4-12. Summary of Potential Impacts on Fish and Wildlife for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Loss of habitat or reduction of wildlife habitat quality from maintenance of cleared vegetation	Permanent/minor to major impacts from maintenance of the right-of-way • 2,197 acres of habitat	Short-term/minor impacts	Permanent/minor to major impacts from maintenance of the right-of-way • 4,431 acres of habitat	Permanent/minor impacts • Approximately 363 acres of habitat cleared for offloading facility, reactivation of abandoned line, and building new rail spur	Permanent/minor impacts from clearing • Approximately 100 acres of habitat • Approximately 40 acres of new roads	Permanent/minor impacts • Approximately 363 acres of habitat cleared for offloading facility, reactivation of abandoned line, and building new rail spur	Permanent/minor impacts from clearing • Approximately 100 acres of habitat • Approximately 40 acres of new roads
Loss of habitat or reduction of wildlife habitat quality in wildlife conservation areas from vegetation clearing	Short-term to long-term/minor impacts from maintenance of the right-of-way • 234.3 acres of wildlife conservation areas	No impact	Permanent to short-term/minor to major impacts from maintenance of the right-of-way • 354 acres of wildlife conservation areas	No impact	No impact	No impact	No impact
Loss of habitat or reduction of wildlife habitat quality from habitat fragmentation	Permanent/minor to major impacts on primarily forests and wetlands • 21 large-block habitats (>100 acres) crossed	No impact	No impact • Pipeline would be co-located with existing corridors	No impact	No impact	No impact	No impact

Table 5.2.4-12. Summary of Potential Impacts on Fish and Wildlife for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Potential for injury, mortality, or disturbance of wildlife species	Short-term/minor impacts from habitat loss or fragmentation and mortality of common species during mowing and other maintenance activities	Temporary/minor impacts	Short-term/minor impacts from habitat loss and mortality of common species during mowing and other maintenance activities	Permanent/minor to major impacts from noise and collisions with wildlife	Permanent/minor to major impacts from collisions with wildlife	Permanent/minor to major impacts from noise and collisions with wildlife	Permanent/minor to major impacts from collisions with wildlife

[a] No single dataset in this summary table provides a complete indication of all relevant impacts to fish and wildlife. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, stream crossing counts provide a broad understanding of the types potential for impacts to aquatic habitat. However, information from other datasets, like the Sentinel Lakes LBS and datasets, helps to define the extent of potential impacts on high quality habitats. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-263 through 5-292. This table, for example provides numbers of streams crossed by the route and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to stream habitats is contained in the text of this section.

[c] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-263 to 5-280. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on pages 5-280 to 5-281. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-281 to 5-288. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-288 to 5-290. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-290 to 5-292. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

The Applicant's proposed project would cross fewer surface waters (174) than SA-04 (558), but would cross sensitive trout streams whereas SA-04 would not. In addition, the Applicant's proposed project would pass through substantially more forested habitat (2,022 acres) than SA-04 (161 acres), which would require removal of woody vegetation that provides shade and stability along some streams. This could result in long-term, major impacts on trout streams due to the potential for thermal changes. However, impacts on aquatic habitat, including trout streams, could be temporary to short-term and minor if the crossing method with least disturbance is used and BMPs are in place to reduce impacts. Proper restoration of stream banks after construction of stream crossings, which includes restoring the channel longitudinal profile, channel cross sections, and bankfull elevations as well as revegetating the banks are recommended by permitting agencies, would prevent additional sedimentation as well as changes to the width, depth, and temperature of all streams, including trout streams. Improper restoration of stream crossings could result in sedimentation that leads to wider, shallower, warmer streams. Stream restoration should include the restoration of pre-construction dimension, pattern and profile to the stream channel as well as restoration of the vegetative boundary condition of the streambanks to ensure channel stability and stability of the pipeline crossing. Floodplain connectivity should not be altered by the stream crossing. Ecological processes of a healthy riparian corridor, such as the recruitment of large woody debris for in-stream habitat should be restored to pre-construction conditions or enhanced when possible.

SA-04 would traverse predominantly agricultural land and grasslands. Bank stability and temperature at stream crossings would be affected less by vegetation removal in areas such as these where streams and species have adapted to a more open canopy than the canopies along the Applicant's proposed project. One known freshwater mussel bed occurs within the Minnesota River along SA-04 and could be permanently destroyed or damaged by construction if one of the open-cut crossing methods is used. The magnitude of the effects would depend on how much habitat would be lost and the species present.

The waters within the ROIs of the two new pipeline routes provide habitat for species of fish specific to those waters, including important managed recreational species such as muskellunge and trout. Trout streams are particularly sensitive to erosion, sedimentation, and changes to the riparian corridor. Any changes in groundwater connectivity or flow as a result of a pipeline crossing can result in warming of the stream, which may negatively affect habitat suitability for trout and the ecology of invertebrate insects, which form the base of the food web. Fish in the vicinity of surface water crossings along both routes likely would respond to the increased in-stream activities by leaving the construction area and avoiding direct impacts; however, injuries or mortality could occur resulting in temporary and minor impacts for common species in the area. The construction of the rail, truck, and combined alternatives would not require in-stream construction and therefore would have temporary to short-term and negligible impacts on common fish species, primarily due to increased runoff, and no impact on trout streams.

With adherence to water appropriation and NPDES permit conditions and implementation of Applicant-proposed measures, impacts on fisheries and aquatic habitats from water appropriation and discharge during pipeline construction would be temporary and minor for the Applicant's proposed project and SA-04. Water used for construction of the offloading and access facilities for the rail and truck alternatives may not be obtained from surface waters; if it is, the withdrawals and discharges are expected to be temporary and minor.

Operations Impacts

The continued use of the existing Line 3 pipeline would not result in changes to the basic existing vegetation management activities for the permanent right-of-way of Line 3 or changes to most other right-of-way maintenance activities. Except for the increase in impacts resulting from the substantial increase in integrity management excavations that would be required for the Line 3 pipeline as addressed below, the impacts of right-of-way maintenance during operation would not be expected to change from the current level.

Vegetation maintenance during operations would require removal of riparian vegetation from the permanent right-of-way of each of the three pipeline alternatives, including areas adjacent to waterbody crossings. The resultant impacts on aquatic habitat would be greatest for the Applicant's proposed project and SA-04 because they would require new stream crossings; there would be no change in the conditions within the streams crossed by the Line 3 pipeline due to vegetation maintenance. The impacts for the new pipelines would be long-term to permanent and minor to major at heavily wooded crossing locations, and short- to long-term and minor to major at crossings within grasslands or croplands. The Applicant's proposed project has substantially fewer stream crossings than SA-04, a fact that can be attributed to the length of the route included in the analysis. Total impact would be additive, resulting in more extensive impacts to surface waterbodies throughout multiple watersheds, and distributed along the route. Where alternatives cross trout streams the impact during operation would be permanent and major due to the increase in temperature; vegetation maintenance of the CN Alternatives would not affect trout streams.

The primary impacts on fisheries and aquatic habitat during operation of the truck or rail offloading facilities in Clearbrook and Superior would be associated with minor changes to stormwater runoff that could reach nearby surface waters. However, the implementation of BMPs and the measures stipulated in the required permits would minimize the potential for stormwater to carry eroded materials or contaminants into nearby surface waters and would therefore minimize impacts on fisheries and aquatic habitats. As a result, the potential impacts would be permanent but negligible to minor, and would affect fewer streams than the new pipeline alternatives.

If minor leaks or spills occur during normal operations for the Applicant's proposed project or SA-04 reach surface waters, there would be negligible to minor changes to surface water quality, and the resultant impacts on fisheries and aquatic habitats would be temporary and negligible to minor. Similarly, normal operation of the rail and truck alternatives would result in a minor increase of the amount of materials dropping from the train or truck engines to the railbed or roadway above the current level. The increase is expected to be typical of the increased number of trains and trucks transporting cargo, with the resultant impacts likely to be temporary and negligible to minor.

For all route options, the Applicant would implement noxious weed plans that include methods to prevent and reduce the introduction and spread of noxious weeds and invasive species, and would implement BMPs for herbicide applications to minimize impact on aquatic and terrestrial resources. As a result, the use of herbicides would result in temporary negligible impacts on fisheries and aquatic habitats. No additional impact would be associated with the continued use of the existing Line 3 pipeline because all portions of the permanent right-of-way have been in place for decades, and the impacts of operation along the permanent right-of-way that are currently occurring would continue without substantial change.

During operation of the pipeline route options, the Applicant would implement its Integrity Management Program, which could require excavation and repair or replacement of sections of the pipeline at surface water crossings using the wet open-cut or dry open-cut method to access the pipe. For each integrity dig, impacts would be short-term and minor, and would occur periodically over the life of the Project. Continued use of the existing Line 3 would require substantially more integrity digs than the two new pipeline routes due to its advanced age. If pipe segments within surface water crossings need repair or replacement, the pipe may be removed using one of the open-cut methods, which would result in impacts similar to those of construction within surface waters. Because the pipelines for both the Applicant's proposed project and SA-04 would be new, these pipelines would likely require substantially fewer excavations than the Line 3 pipeline.

Wildlife and Wildlife Habitat

Construction Impacts

Construction of SA-04 would affect substantially more than the Applicant's proposed project, with about 10,585 acres of land affected by the former and 4,917 acres of land affected by the latter, but note that the footprint was analyzed for the Applicant's proposed project and that only the Neche to Superior portion of the Applicant's proposed project were analyzed for the CN. Both of these routes would affect land within wildlife management units and Audubon IBAs. Clearing and grading during construction of the offloading facilities for the rail and truck alternatives would affect substantially less wildlife habitat than either of the new pipeline alternatives.

The Applicant's proposed project would pass through habitats that are mainly forested uplands and woody wetlands. In comparison, the majority of habitats affected by construction of SA-04 would have vegetative cover of hay/pasture and cultivated cropland. The impacts of altering or removing these habitats would range from temporary to permanent and minor to major, depending on the specific areas crossed.

Because SA-04 would be co-located with existing pipelines for much of its length, construction of the route would result in less habitat fragmentation compared to the Applicant's proposed project. A total of 38 miles of the Applicant's proposed project permanently fragments 21 large-block habitats.

Construction of the Applicant's proposed project or SA-04 could affect colonial nesting waterbirds if nesting trees need to be removed. No colonial waterbird nesting sites are known to be present in the vicinity of the rail or truck alternative facilities.

For all CN Alternatives, clearing, grading, trenching (for pipelines), and use of construction vehicles and equipment would directly affect some animals, particularly small and mid-sized mammals, reptiles, amphibians, and invertebrates. Members of these species would be affected more than large wildlife because of their relative lack of mobility compared to that of larger animals (e.g., deer and coyotes). The impact of these activities on common wildlife species would be temporary to short-term and minor.

Many animals would be temporarily displaced from the construction work areas and adjacent areas for all CN Alternatives except for the alternative of continued use of the existing Line 3 pipeline. Nearby habitat may provide cover and suitable escape habitat for many of the displaced species, and the more mobile animals could return to the construction work areas after completion of construction and restoration activities, if appropriate habitats are available. These displacements would result in impacts that would generally be temporary to short-term, although permanent at aboveground facilities.

Operations Impacts

The types of impacts associated with operations of the pipeline alternatives differ substantially from those associated with the rail and truck alternatives and the combination alternatives. While the rail and truck alternatives would require substantially fewer acres of permanent vegetation removal compared to the Applicant's proposed project and SA-04, the large number of trains or trucks required would result in increased wildlife mortality from collisions with trains and trucks. This would be a permanent minor to major impact on common highly mobile wildlife such as white-tailed deer, mid-sized mammals, and birds.

For the Applicant's proposed project and SA-04, impacts of right-of-way maintenance within general wildlife habitat, conservation lands, and IBAs would be short-term to permanent and minor to major, depending on the type of habitat present. Maintenance activities could reduce populations of species sensitive to habitat disturbance and could result in permanent, minor effects on breeding birds. These impacts would occur along greater distances for SA-04 based on its greater length compared to the Applicant's proposed project. The routes that would be used by the trains and trucks currently pass through and near WMAs, including IBAs, and no changes in impacts on wildlife habitats or wildlife management units are anticipated from operation of trains or trucks along the existing rail lines and highways.

The maintained permanent rights-of-way may be used as travel corridors by some big game animals and humans and may become attractive to some small species. This could result in permanent and minor effects on common wildlife. Implementation of BMPs to prevent the spread of noxious weeds and invasive species would minimize colonization of these species within or near the rights-of-way with invasive plants.

Continued use of the existing Line 3 would require substantially more integrity digs each year than the two new pipelines due to the advanced age of the Line 3 pipeline. Because of the greater length of SA-04 compared to that of the Applicant's proposed project, the probability of the need for integrity digs would be greater for that route. The impacts of excavations would be similar to those occurring during construction of the pipeline but would affect a substantially smaller area.

5.2.4.4.2 Mitigation

In addition to the measures the Applicant would incorporate into the Project to avoid or minimize impacts, including stipulations in the permits required for the Project, Minnesota DNR identified the following measures to reduce impacts on fisheries and wildlife:

- Use the HDD method or a method appropriate for the individual crossing at all crossings of tributaries that are upstream of trout streams.
- Cover open-vent pipe ends with screens at cathodic protection systems to prevent birds and small mammals from becoming trapped in the pipe.
- During maintenance mowing of the permanent right-of-way, the mower blade height should be set at 6 to 8 inches above the ground to reduce injury and mortality impacts on small animals and to prevent erosion.
- If construction activities occur within the recommended buffer distance of 984 feet from the Mahtowa or other heron rookeries during the nesting season from April through August, the Applicant must consult with Minnesota DNR and USFWS to develop BMPs to reduce potential disturbance and impacts.

- Wider vegetated buffers during construction near trout streams (100 feet vs. the standard 50 feet).
- Reducing construction work area width.

5.2.4.5 References

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5.2.5 Unique Natural Resources

This section describes potential effects on animals and plants that are protected under federal and state regulations (termed “unique natural resources”) from construction and operation of the Applicant’s proposed project and the CN Alternatives. General impacts to *individual* state and federally protected animals and plants would be comparable to those described for common animals and plants presented in Sections 5.2.3 and 5.2.4. However, the magnitude of impacts on state- and federally protected *populations* may be more severe than on more common species because of their limited population size, distribution, and life history, which may warrant consideration of additional conservation measures to avoid or minimize impacts.

The analysis of impacts on unique natural resources from construction and operation of the Applicant’s proposed project and CN Alternatives considered the potential for injury, mortality, or disturbance to the following:

- Federally listed threatened and endangered species;
- State-listed threatened, endangered, and special concern species;
- SGCN;
- MBS Sites; and
- SNAs.

The potential Project-related impacts on these resources due to construction and operation of the Applicant’s proposed project are then described, along with conservation measures the Applicant would implement to avoid or minimize impacts. Next, the potential impact of unique natural resources due to construction and operation are addressed for each CN Alternative (continued use of the existing Line 3, system alternative SA-04, transportation by rail, transportation by truck, and existing Line 3 supplemented by rail or truck). A summary and comparison of potential Project-related impacts are included, along with potential mitigation measures to be considered. Potential impacts on unique natural resources from an unanticipated crude oil release are addressed in Chapter 10.

5.2.5.1 Regulatory Context and Methodology

5.2.5.1.1 Regulatory Context

The regulatory context for evaluating unique natural resources includes the federal ESA and state-level rules and regulations, including state endangered species acts and protections afforded SGCNs, MBS Sites, and SNAs. Birds protected under the MBTA and BGEPA are discussed in Section 5.2.4. This section provides information for regulatory agencies to assess potential impacts on unique natural resources.

Federally Listed Species

The federal ESA (16 U.S. Code 1531 et seq.; 50 CFR Parts 17 and 222) includes provisions for protection and management of species that are federally listed as threatened or endangered and their designated critical habitat[13]. "Endangered species" are species that are in danger of extinction throughout all or a significant portion of their range. "Threatened species" are species that are likely to become endangered throughout all or a significant portion of their range. A "proposed species" is any species that is proposed for listing as a threatened or endangered species under the ESA. A "candidate species" is any species for which the USFWS has sufficient information on biological status and threats to propose the species for listing as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Candidate species receive no statutory protection under the ESA. Section 7 of the ESA directs federal departments and agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any threatened, endangered, or proposed species—or result in the destruction or adverse modification of their designated critical habitat.

According to the federal ESA, it is illegal to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct" with regard to an endangered or threatened species. In addition, the body parts and products of endangered or threatened species cannot be imported, exported, or sold.

Under Section 7 of the ESA, the federal lead agency must consult with the USFWS when any action may affect a federally listed species. If the agencies determine that the action may affect a federally listed species, a Biological Assessment would be prepared to assist the agencies in making a formal determination on whether the action is likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of their critical habitat. USACE is currently preparing a Biological Assessment for the Line 3 Project in response to Enbridge's application for a CWA 404 Individual Permit (i.e., the federal action). Thus, the USFWS' formal determination on whether the Project would jeopardize the continued existence of any federally listed species or would result in destruction or adverse modification of their critical habitat has yet to be made.

If any federally listed species is likely to be adversely affected, but the project does not jeopardize the existence of a species or adversely modify critical habitat, USFWS will develop a Biological Opinion (BO) identifying the proposed project activities, action area, anticipated impacts, and Reasonable and Prudent Measures (RPMs). RPMs are the actions USFWS believes are necessary to minimize the proposed project's effect on federally listed species. The Applicant would comply with RPMs identified by USFWS to protect federally listed species.

State-Listed Species

The states that would be crossed by the Applicant's proposed project or any of the CN Alternatives are North Dakota, Minnesota, Illinois, Iowa, and Wisconsin. Minnesota, Iowa, Illinois, and Wisconsin each administer a state-level ESA (Table 5.2.5-1). North Dakota defers to species listed under the federal ESA. The state-level ESAs allow for state-level identification and classification of native species with a need for protection or management to ensure their survival as free-ranging populations and to define the process by which listing, management, recovery, and de-listing of a species can be achieved.

[13] "Critical habitat" is a term defined and used in the federal ESA. It is a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery (https://www.fws.gov/sacramento/es/critical-habitat/Home/es_critical-habitat.htm).

Table 5.2.5-1. State Regulations Concerning Endangered Species

State	Administering Agency	Regulation
North Dakota (no state mandate)	U.S. Fish and Wildlife Service	Federal Endangered Species Act
Minnesota	Minnesota Department of Natural Resources	Minnesota's Endangered Species Statute
Iowa	Iowa Department of Natural Resources	Threatened and Endangered Species Program
Illinois	Illinois Department of Natural Resources/ Endangered Species Protection Board	Illinois Endangered Species Protection Act
Wisconsin	Wisconsin Department of Natural Resources	Wisconsin's Endangered Species Laws

Under the state ESAs, "endangered species" are those species that are native to the state and are seriously threatened with extinction throughout all or a significant portion of their range within the state. "Threatened species" are species native to the state that are likely to become endangered species in the foreseeable future throughout a significant portion of their range within the state without cooperative management or removal of threats. "Species of special concern" are any species native to the state that are not endangered or threatened but are extremely uncommon, or have unique or highly specific habitat requirements and deserve careful monitoring of their status.

State-listed endangered and threatened species are protected under state law. Similar to federal species, formal determinations on the level of impact and appropriate conservation measures to adequately protect state-listed species will be finalized by the applicable state agencies (Table 5.2.5-1).

Species of Greatest Conservation Need

Individual State Wildlife Action Plans identify SGCN. While each State's definition varies, SGCN generally includes species whose populations are rare, declining, or vulnerable to decline, and are in need of conservation action to ensure their long-term health and stability. SCGN may include those species that are also listed as threatened or endangered, or species whose populations in a particular state are stable, but may be at risk range-wide. Threats to these species also are described in the plans and include such factors as habitat loss or fragmentation, competition from non-native species, and stressors related to climate change. The action plans identify the habitats and actions needed to restore or maintain viable populations of these species. The designation of SGCN applies only to animals; plants are not included in this designation.

Minnesota's Wildlife Action Plan includes a habitat-based approach that focuses on sustaining and enhancing terrestrial and aquatic habitats for SGCN in the context of larger landscapes. To facilitate implementation of this approach, the plan identifies a Wildlife Action Network (WAN). The WAN represents the diversity of quality habitats, including terrestrial and aquatic habitats that support SGCN. Areas within the Wildlife Action Network are given an overall score from Low to High based on SGCN richness, SGCN population viability scores, prioritized Sites of Biodiversity Significance, LBS, and Stream Indices of Biological Integrity. Areas ranked high are those where multiple high-scoring metrics overlap.

Minnesota Biological Survey Sites of Biodiversity Significance

The MBS (part of Minnesota DNR), surveys for rare species and native plant communities throughout the state. After fieldwork, MBS ecologists assign a biodiversity significance rank to each survey site to assist with guiding conservation and management. MBS Sites have no legal protection within Minnesota. However, they may contain state-listed species and rare wetlands that are protected under the state ESA and the Minnesota WCA, respectively. The MBS Sites data were used to describe occurrences of high-diversity habitats, which are likely to support rare animals and plants (Minnesota DNR 2016h). The rankings used by the MBS (outstanding, high, moderate, and below) are based on the size and condition of the native plant communities, the presence of rare species, and the landscape context for the site (Minnesota DNR 2016b).

Scientific and Natural Areas

Minnesota's SNAs are state lands that preserve ecological and geological diversity, including rare species, native plants, and significant geological features (Minnesota DNR 2016d). These natural areas are given the highest level of protection and the utmost consideration in assessing potential impacts from nearby projects. Given the ecological significance of these SNAs in Minnesota, most of these areas likely are also identified as MBS Sites. Multiple SNAs in each landscape region are protected in order to capture genetic diversity and prevent the loss of important species, communities, and features (Minnesota DNR 2016d).

5.2.5.1.2 Methodology

Impacts were evaluated by considering the areas directly and indirectly affected by construction and operation of the Applicant's proposed project and the CN Alternatives. The potential for effects on rare animals and plants was evaluated (1) directly through a review of available NHIS elemental occurrence locations and species-specific survey data; and (2) indirectly through a review of species' geographic ranges from publicly available sources such as the USFWS' Information for Planning and Consultation (IPaC) system, USFWS County Distribution Species Lists and critical habitat designations, and habitat assessments such as the USGS GAP, the WAN, the MBS Sites, and state SNAs. These data sources and analysis methods are described below.

No single one of these datasets provides a complete indication of all relevant impacts to unique natural resources, but together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, the individual NHIS elemental occurances provide information about past sitings, but the absence of past sitings does not necessarily mean a species does not or could not inhabit a certain area. Because of this, NHIS data is used together with habitat information from the GAP and WAN datasets to get a better idea of the potential for impacts.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with the qualitative descriptions of impacts that are contained in the text. Tables in this section provide acreages, for example, of habitat types crossed and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to critical habitat is contained in the text of this section.

Federally Listed Species

For federally listed species, the initial review was conducted at the county level, to identify federally listed species and their critical habitat that could be present within the counties crossed by the

Applicant's proposed project, existing Line 3, SA-04, and truck and rail routes. The ROI for federally listed species was established as:

- The area within the 50-foot-wide permanent right-of-way, a 120-foot-wide construction work area, and to a distance of 1 mile on both sides of the permanent right-of-way for the Applicant's proposed project, existing Line 3, and SA-04; and

- Within a 1 mile distance from the centerline of the rail and truck routes, offloading facilities, and new access rails and roads at the Clearbrook and Superior terminals.

Alternatives that cross counties in North Dakota, South Dakota, Iowa, Illinois, or Wisconsin maintain a county wide ROI. The ROI is reduced in Minnesota to provide more detailed and specific review, which is possible because of the availability of NHIS data within the State.

- Federally listed species with the potential to be affected by construction and operations activities were identified within the ROI based on data from IPaC, USFWS County Distribution Species Lists, and NHIS data for the pipeline alternatives, new facilities and new access roads for the rail and truck alternatives, and the rail and truck routes. IPaC identifies USFWS-listed endangered, threatened, candidate, and proposed species that may occur within a specified project area or county, and therefore could potentially be impacted by the proposed project.

In addition, species-specific surveys collected by Merjent, Inc. on behalf of the Applicant were reviewed to determine the presence or absence of federally listed species along the Applicant's proposed project. Those data, as well as some information on state-listed species, are presented in the following reports:

- 2013–2016 Dakota Skipper and Poweshiek Skipperling Habitat Assessment (Merjent 2016a),
- 2013–2016 Minnesota Protected Flora Field Survey (Merjent 2016b),
- 2013-2015 Western Prairie Fringed Orchid Field Survey (Merjent 2015e),
- 2014 Dakota Skipper Survey (Merjent 2014a),
- 2014 Northern Long-Eared Bat Acoustic Survey (Merjent 2014b),
- 2014 Northern Long-Eared Bat Mist-Net and Telemetry Survey (Merjent 2014c),
- 2015 Northern Long-Eared Bat Acoustic Survey (Merjent 2015c),
- 2015 Northern Long-Eared Bat Mist-Net and Telemetry Survey (Merjent 2015d),
- 2015 Butterfly[14] Survey Report (Merjent 2015a),
- 2016 Northern Long-Eared Bat Acoustic Survey (Merjent 2016c),
- Minnesota Protected Mussel Desktop Habitat Assessment (Merjent 2014d), and
- 2014 Minnesota Protected Mussel Field Survey Report (Rev 0) (Merjent 2015b).

Information on critical habitat for federally listed species within 1 mile of each alternative was developed based on GIS analysis of USFWS Critical Habitat database.

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[14] Dakota skipper and Poweshiek skipperling.

State-Listed Species

Known occurrences of state-listed animals and plants within the ROIs were identified from natural heritage inventory data provided by each state. The ROI encompassed the area within a distance of 0.5 mile from the centerline of the Applicant's proposed project, SA-04, and existing Line 3. In addition to the desktop search, for the Applicant's proposed project, habitat assessments and field surveys for state-listed butterflies, bats, mussels, and plants were conducted (Merjent 2014a, 2014b, 2014c, 2014d, 2015 a, 2015b, 2015c, 2015d, 2015e, 2016a, 2016b, 2016c). Field surveys were not conducted for the other alternatives.

For assessment of construction impacts, state-listed animal species documented within 0.5 mile of either side of the Applicant's proposed project and the CN Alternatives were considered potentially affected by project activities. Because site specific surveys were conducted for state-listed mussels and plants along the Applicant's proposed project, potential construction impacts on individuals of these species were assessed only if they had been documented within the proposed construction footprint including construction work area, ATWS, access roads, pipe yards, pipeline permanent right-of-way, valve pads and driveways, and pump stations. For the SA-04 alternative and the portions of the Applicant's proposed project in North Dakota and Wisconsin, construction impacts on plants were assessed using a 120-foot-wide construction work area centered on the routes.

For comparison between the Applicant's proposed project and the CN Alternatives, operation impacts were assessed using a 50-foot-wide permanent right-of-way centered on the routes. Because portions of the existing Line 3 overlaps with other route alternatives the same species lists were used for operation impacts of existing Line 3 for the following routes/segments: the Applicant's proposed project from the North Dakota border to Clearbrook, Minnesota; route Alternative RA-07 from Clearbrook to Carlton, Minnesota; and the Applicant's proposed project from Carlton, Minnesota, to the terminal at Superior, Wisconsin.

A discrete ROI was not established for the rail and truck alternatives because specific locations of new facilities were not available. Instead, the expected locations for new construction of rail or truck infrastructure (e.g., offloading facilities, new spur roads, and new rail access) were evaluated qualitatively for occurrences of state-listed species by reviewing (1) the areas within the existing boundaries of the Clearbrook and Superior terminals; (2) undeveloped sites near the existing terminals that could be impacted by construction and operation of new infrastructure; and (3) a desktop review of NHIS data for Minnesota and Wisconsin for an area out to approximately 1 mile around the Clearbrook and Superior terminals. Site-specific NHIS data were not used to analyze potential operations impacts from increased rail and truck traffic to the Clearbrook and Superior terminals. Train and truck transportation routes were evaluated for potential increases in collision mortality effects on those species identified as occurring within the vicinity of the new rail and truck infrastructure.

Species of Greatest Conservation Need

Gap Analysis Program Species Models

GAP species distribution models identify suitable habitat for individual species within the species' known distribution range. GAP species models use a national wildlife habitat relational database based on habitat associations described in published literature (USGS GAP 2016b). The models are created at 30-meter resolution using core habitat datasets, including detailed land cover, elevation, and hydrological characteristics (e.g., salinity, water type, and water velocity). Birds of conservation concern

(BCCs)[15] identified from IPaC searches were used to select the GAP bird species models that were included in this analysis. Protected or rare species lists were compiled for each state that would be crossed by the Applicant's proposed project, existing Line 3, SA-04, and the rail and truck alternatives based on the state lists for threatened, endangered, and special concern species to identify amphibian, reptile, and mammal species models to be included in this analysis. These lists then were compared to species' GAP ranges (USGS GAP 2016a) to identify species that could occur within the regions crossed by the Applicant's proposed project and the CN Alternatives. Then the selected GAP species distribution models were combined to identify habitats used by one or more of the identified species within the ROI. The combined GAP species models identify used habitats and species richness hotspots within the ROIs for the Applicant's proposed project, existing Line 3, SA-04, and rail and truck alternatives in North Dakota, Minnesota, Iowa, Illinois, and Wisconsin.

Project-specific GAP species models were completed for birds, mammals, amphibians, and reptiles. Of the SGCN list generated for the ROI, models were available for 47 bird species,[16] 15 mammal species, and 21 combined amphibian and reptile species (herptiles). GAP species models used in the analyses are listed in Appendix M (Table M-4). Separate summaries were generated for mammals, birds, and herptiles. The areas rated medium and high by the GAP species models have an increased potential to be used by more SGCN, and impacts on these areas could affect habitats used by multiple protected or rare species. This indirectly indicates the potential for an alternative to affect multiple protected or rare species. Based on the modeling, areas affected by the Applicant's proposed project and the CN Alternatives were summarized according to the area of GAP habitat rated as low, medium, and high use by each vertebrate group, as provided in Table 5.2.5-2.

Table 5.2.5-2. GAP Protected or Rare Vertebrate Species Ranges for Determining Low, Medium, and High Species Occurrence

Vertebrate Groups	Range of Species at Risk		
	Low	Medium	High
Mammals	1 to 3	4 to 6	7 to 9
Birds	1 to 6	7 to 12	13 to 19
Amphibians and reptiles (herptiles)	1 to 2	3 to 6	7 to 11

Sources: Cardno modeling based on USGS GAP 2016a, 2016b.

Note:

Categories determined roughly by proportion of species: Low = 33% of total number, Medium = 33% of total number, and High = 33% of total number.

[15] Executive Order 13186 requires prioritization of BCC when considering impacts on migratory birds. BCCs are a subset of MBTA-protected species identified by the USFWS as those in the greatest need of additional conservation action to avoid future listing under the ESA. The USFWS designated BCCs at three distinct geographic scales: national, USFWS regions, and Bird Conservation Regions (BCRs). BCRs are the smallest geographic scale at which the USFWS identified BCCs, and the USFWS expects BCR-level BCC species to be the most useful for resource management agencies to comply with the MBTA and EO 13186. The Applicants proposed project occurs within BCRs II, 12, and 23.

[16] The state list of birds includes over 130 species that could occur in the state. However, inclusion on these lists did not ensure occurrence within the ROI. Therefore, IPaC data were used to identify the occurrence of federally listed BCCs (USFWS 2008) to select habitat-based models for the GAP bird model (Appendix M, Table M-5).

The combined GAP models indicate habitat areas potentially used by one or more protected or rare vertebrate species. The areas rated medium and high have an increased potential to affect habitats used by multiple protected or rare species. This indirectly indicates the potential for the Applicant's proposed project and CN Alternatives to affect multiple protected or rare species.

Minnesota's Wildlife Action Network

To document existing conditions, WAN habitats were identified within 0.5 mile of the pipeline route centerlines and around new rail and truck access and offloading facilities.

For comparison purposes between the Applicant's proposed project and the SA-04 alternative, construction impacts were assessed using a 120-foot-wide construction work area centered on the routes. As more detailed information is available for the Applicant's proposed project within Minnesota, construction impacts within Minnesota were also assessed based on footprints provided by the Applicant that delineate the construction work area, ATWS, access roads, pipe yards, pipeline permanent right-of-way, valve pads and driveways, and pump stations.

For comparison purposes between the Applicant's proposed project and the CN Alternatives, operations impacts were assessed using a 50-foot-wide permanent right-of-way centered on the routes.

The proportion of WAN habitats in the areas affected by the pipeline routes then were compared to the proportion of WAN habitats present within the ROIs.

New rail and truck access and offloading facilities were qualitatively evaluated based on review of likely locations for these facilities with GAP species models and WAN habitats where available within the United States or Minnesota, respectively.

Minnesota Biological Survey Sites of Biodiversity Significance

MBS Sites have not been finalized for northern Minnesota within regions that would be crossed by the Applicant's proposed project. To fill this gap, the Minnesota DNR provided a GIS layer of Preliminary MBS Sites in Minnesota. Native plant communities with conservation status ranks are also discussed in Section 5.2.3. MBS Sites were evaluated based on the areas of direct construction and operation impacts identified through overlay of Project data on this map. Direct impacts for the Applicant's proposed project were based on refined footprints provided by the Applicant that identify the construction work area, ATWS, access roads, pipe yards, pipeline permanent right-of-way, valve pads and driveways, and pump stations within Minnesota. Because portions of the existing Line 3 overlaps with other route alternatives the Line 3 impacts were estimated by combining the operations permanent right-of-way for the Applicant's proposed project from the North Dakota border to Clearbrook, RA-07 from Clearbrook to Carlton, and the Applicant's proposed project from Carlton to the Wisconsin border in Minnesota. Construction impacts for SA-04 (and the Applicant's proposed project in North Dakota and Wisconsin) were estimated by overlaying a standardized 120-foot-wide construction work area centered on the routes. Operations impacts were estimated by overlaying a standardized 50-foot-wide permanent right-of-way on the MBS Sites map. The affected areas were quantified and the proportion of affected areas with MBS Sites then were compared to the proportion of available MBS Sites within 0.5 mile from the route centerlines. New rail and truck access and offloading facilities were qualitatively evaluated based on an onscreen review of likely locations for these facilities at Clearbrook in relation to MBS Sites in Minnesota.

Scientific and Natural Areas

SNAs were identified using Minnesota SNA data and areas analogous to SNAs using The Protected Areas Database of the United States (PAD-US) (USGS GAP 2016c). The PAD-US is a national inventory of protected open space (USGS GAP 2016c). Lands designated as Research Educational Lands or Research Natural Areas within PAD-US were considered analogous to Minnesota SNAs for comparison purposes with the other states crossed by the CN Alternatives.

5.2.5.2 Existing Conditions

5.2.5.2.1 Applicant's Proposed Project

Federally Listed Species

Twelve federally listed threatened and endangered species may occur within the ROI for the Applicant's proposed project and are presented in Table 5.2.5-3. These species include three mammals - the Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), and northern long-eared bat; four birds – the whooping crane (*Grus americana*), piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), and Kirtland's warbler (*Setophaga kirtlandii*); three invertebrates- the Dakota skipper (*Hesperia dacotae*), Poweshiek skipperling (*Oarisma poweshiek*), and rusty patched bumble bee (*Bombus affinis*); and two plants—the western praire fringed orchid (*Platanthera praeclara*) and Fassett's locoweed (*Oxytropis campestris* var. *chartacea*). The northern long-eared bat has been documented within the ROI of the Applicant's proposed project. No critical habitat occurs within the ROI for the Applicant's proposed project.

Table 5.2.5-3. Potential Occurrences of Federally Protected Species within the Region of Interest for the Applicant's Proposed Project

Listed Species (Common and Scientific Names)	Federal Status	Potential Locations of Occurrence		NHIS Records of Occurrence within One Mile ROI (Minnesota Counties Only)
		State	Counties	
Mammals				
Gray wolf (*Canis lupus*)	Endangered (North Dakota, Wisconsin)	North Dakota	Pembina	NA
		Wisconsin	Douglas	NA
	Threatened (Minnesota)	Minnesota	Kittson, Marshall, Pennington, Red Lake, Polk, Clearwater, Hubbard, Wadena, Cass, Crow Wing, Aitkin, Carlton	Not tracked in NHIS
Northern long-eared bat (*Myotis septentrionalis*)	Threatened	North Dakota	Pembina	NA
		Minnesota	Kittson, Marshall, Pennington, Red Lake, Polk, Clearwater, Hubbard,	22 records consisting of individuals and roost trees

Table 5.2.5-3. Potential Occurrences of Federally Protected Species within the Region of Interest for the Applicant's Proposed Project

Listed Species (Common and Scientific Names)	Federal Status	Potential Locations of Occurrence		NHIS Records of Occurrence within One Mile ROI (Minnesota Counties Only)
		State	Counties	
			Wadena, Cass, Crow Wing, Aitkin, Carlton	
		Wisconsin	Douglas	NA
Canada lynx (*Lynx canadensis*)	Threatened	Minnesota	Marshall, Clearwater, Cass, Aitkin, Carlton	Not tracked in NHIS
		Wisconsin	Douglas	NA
Birds				
Whooping crane (*Grus americana*)	Endangered	North Dakota	Pembina	NA
Piping plover (*Charadrius melodus*)	Endangered	Wisconsin	Douglas	NA
Rufa red knot (*Calidris canutus rufa*)	Threatened	Wisconsin	Douglas	NA
Kirtland's warbler (*Setophaga kirtlandii*)	Endangered	Wisconsin	Douglas	NA
Invertebrates				
Dakota skipper (*Hesperia dacotae*)	Threatened	Minnesota	Kittson, Polk	No Records
Poweshiek skipperling (*Oarisma poweshiek*)	Endangered	Minnesota	Kittson, Marshall, Pennington, Red Lake, Polk,	No Records
Rusty patched bumble bee (*Bombus affinis*)	Endangered	Minnesota	Cass, Clearwater	No Records
Plants				
Western prairie fringed orchid (*Platanthera praeclara*)	Threatened	Minnesota	Kittson, Pennington, Red Lake, Polk	No Records
Fassett's locoweed (*Oxytropis campestris var. chartacea*)	Threatened	Wisconsin	Douglas	NA

NA = not applicable

State-Listed Species

Endangered and Threatened Species

State-listed animal species documented within the ROI of the Applicant's proposed project include the northern long-eared bat, wood turtle (*Glyptemys insculpta*), pugnose shiner (*Notropis anogenus*), and fluted shell mussel (*Lasmigona costata*) (Table 5.2.5-4). The documented occurrences of the northern long-eared bat were in Minnesota, where the species is listed as a state species of special concern. The

Applicant completed mussel field surveys in 2014 at 16 sites along the Applicant's proposed project in Minnesota (including the known fluted shell mussel location), and no state-listed threatened or endangered mussels were found (Merjent 2015b).

Twenty-one state-listed endangered or threatened plants have been documented within the ROI, with 13 of these plants identified as potentially occurring within construction work areas (Table 5.2.5-5).

Table 5.2.5-4. Known Occurrences of State-Protected Animal Species within the Region of Interest for the Applicant's Proposed Project

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences[b]		
			Con	Op	Within 0.5 Mile
Mammals					
Northern long-eared bat (*Myotis septentrionalis*)	Suitable summer habitat occurs in the ROI. In summer, bats roost underneath bark, in cavities, or in crevices of both live trees and snags. Mates in fall near their hibernacula (August and September) and gives birth in summer (May to July). Bats spend their winters in suitable caves and mines (October to April).	WI/T[c]	16	15	27
Amphibians and Reptiles					
Wood turtle (*Glyptemys insculpta*)	Found in moderate- to fast-flowing clear streams or rivers associated with forested riparian corridors, which provide primary overwintering, courtship, basking, and foraging habitat. Typically, inhabited waterways possess a sand, gravel, or cobble substrate with limited silt or muck. Nesting occurs in well-drained open or sparsely vegetated sandy soils, typically within 200 feet of suitable aquatic habitat. Nesting habitat includes native dry prairies, moderately sloughing sand banks, sandbars, agricultural fields, or areas of disturbed sandy soils that support no or sparse ground layer vegetation.	WI/T MN/T	--	--	1
Fish					
Pugnose shiner (*Notropis anogenus*)	Found in glacial lakes and streams with an abundance of submerged vegetation. Prefers low-velocity waters with a substrate of sand, mud, or gravel. Shallow waters in warm months and deeper waters in cold months.	MN/T	1	1	1
Mollusks					
Fluted-shell mussel (*Lasmigona costata*)	Streams or river beds. Likely spawns from June to July.	MN/T	1	1	1

Sources: Minnesota DNR 2016e; North Dakota GFP 2016; Wisconsin DNR 2016.

[a] State/Status: T = Threatened, MN = Minnesota, IA = Iowa, IL = Illinois, WI = Wisconsin

[b] Minnesota only: Con = sum of pipeline construction work area, ATWS, and temporary access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, pump stations, and valves.

North Dakota and Wisconsin: Con = occurrences based on 120-foot-wide construction work area centered on the pipeline. Op = occurrences based on 50-foot-wide permanent right-of-way centered on the pipeline.

[c] Occurrences are within Minnesota where northern long-eared bats are listed as a Species of Concern

Table 5.2.5-4. Known Occurrences of State-Protected Animal Species within the Region of Interest for the Applicant's Proposed Project

Notes:

An occurrence can consist of one or more observations of one or more individuals temporally and spatially.

"--" = no occurrence

Table 5.2.5-5. Known Occurrences of State-Protected Plant Species within the Region of Interest for the Applicant's Proposed Project

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences[b]		
			Con	Op	Within 0.5 Mile
Nonvascular Plants					
A species of liverwort [Woollywort] (*Trichocolea tomentella*)	Damp, shaded rocks in forested rich peatland and wet forest. May through September, or anytime ground is not covered by snow.	MN/T	--	--	1
Vascular Plants					
Beaked spikerush (*Eleocharis rostellata*)	Coastal salt marshes and inland in saline, alkaline, or strongly calcareous habitats (e.g., around hot springs). Fruits during summer to fall in the north.	MN/T	1	1	2
Bog bluegrass (*Poa paludigena*)	Perched upon wet substrates (e.g., moss, fallen trees) in spring-fed swamps. Specifically, occurs within *Fraxinus nigra-Betula lutea* swamps along the base of steep bluffs and at the head of the spring that feeds into the swamp. Blooms in late May to early June.	MN/T	1	1	1
Bristle-berry (*Rubus fuller*)	Open sandy sites with a high water table. Blooms mid-June to mid-July; fruits in August.	MN/T	--	--	1
Butternut (*Juglans cinerea*)	Full sunlight on well-drained soils of bottomlands and floodplains.	MN/E	1	1	1
Clinton's bulrush (*Trichophorum clintonii*)	Rocky river ledges, argillaceous soils, clearings of fir forests, and prairie and open woods. Reproductive structures are present from early May through the end of June in southern Minnesota, and in late May through June in northern Minnesota.	MN/T	--	--	1
Clustered bur-reed (*Sparganium glomeratum*)	Cold ditches and pools within sedge meadows, willow-alder thickets and, occasionally, tamarack stands on the Lake Superior clay plain. Blooms late June through late July, and fruits late July through early September.	WI/T	1	1	4
Gray ragwort (*Packera cana*)	Northern plains, including the upper slopes of dry prairie remnant hills in sandy or gravelly soil. Flowers from May to June.	MN/E	--	--	1
Hair-like beak rush (*Rhynchospora capillacea*)	Calcareous fens, especially along the margins, and spring fens. Germinates in spring, and flowers mid-summer.	MN/T	1	1	1

Table 5.2.5-5. Known Occurrences of State-Protected Plant Species within the Region of Interest for the Applicant's Proposed Project

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences[b]		
			Con	Op	Within 0.5 Mile
Handsome sedge (*Carex formosa*)	Typically occurs in or at the edge of limey swamps, seeps, or bottomland forests but known to occur in moist, rich upland forests. Also can occur in disturbed habitats such as road edges and disturbed prairies. Blooms throughout June and fruits throughout July.	MN/E	1	--	2
Marsh-grass-of-Parnassus (*Parnassia palustris*)	Rich or spring fens; calcareous fens, wet meadows, clay seepage bluffs. Blooms August to September.	WI/T	--	--	1
Narrow triangle moonwort (*Botrychium lanceolatum* ssp. *angustisegmentum*)	In woods and on hummocks in swamps, and in cool to warm, mostly rich, subacid soils. May be found in open fields at the northern end of its range. Site elevations range from near sea level to 3,600 feet.	MN/T	3	2	5
Neat spike-rush (*Eleocharis nitida*)	Occurs only near Superior on wet exposed clay in ditches and openings in alder thickets and marshes. Blooms in June, and fruits in late June through early September.	WI/E	2	2	5
Purple-flowered bladderwort (*Utricularia purpurea*)	Adjacent to boggy shorelines in small- to medium-size lakes with high water quality. Flowers from mid-July to September.	MN/E	--	--	1
Red saltwort (*Salicornia rubra*)	Salt flats, saline swales, alkaline depressions, and exposed shores of alkaline lakes. Flowers from late July into August.	MN/T	1	--	1
Seaside crowfoot [Alkali buttercup] (*Ranunculus cymbalaria*)	Salted roadsides near Superior; and sandy or muddy shores, marshes, ditches, and harbors along Lake Michigan. Blooms May to August.	WI/T	2	2	4
Small yellow water crowfoot (*Ranunculus gmelinii*)	Creeks, streams, ponds associated with cool forested swamps, marshes, or groundwater seeps. Blooms July to August.	WI/E	2	2	3
Sterile sedge (*Carex sterilis*)	Mineral-rich calcareous fens of the prairie region. Mature perigynia are present from early June to late July.	MN/T	2	2	6
Sweet colt's foot (*Petasites sagittatus*)	Cold marshes and swamp openings. Blooming occurs throughout May; fruiting occurs throughout June.	WI/T	5	5	8
Tea-leaved willow (*Salix planifolia* ssp. *planifolia*)	Near Lake Superior, including on bedrock shorelines in the Apostle Islands. Blooming occurs throughout May; fruiting occurs throughout June.	WI/T	--	--	1
Whorled nutrush (Scleria verticillata)	Restricted to the least disturbed calcareous fens in the prairie region. Blooms late June through late July.	MN/T	--	--	1

Sources: Minnesota DNR 2016e; Wisconsin DNR 2016; North Dakota GFP 2016; Merjent 2016b.

[a] State/Status: E = Endangered, T = Threatened, MN = Minnesota, IA = Iowa, IL = Illinois, WI = Wisconsin

Table 5.2.5-5. Known Occurrences of State-Protected Plant Species within the Region of Interest for the Applicant's Proposed Project

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences[b]		
			Con	Op	Within 0.5 Mile

[b] Minnesota only: Con = sum of pipeline construction work area, ATWS, and temporary access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, pump stations, and valves;

North Dakota and Wisconsin: Con = occurrences based on 120-foot-wide construction work area; Op = occurrences based on 50-foot-wide permanent right-of-way

Notes:

An occurrence can consist of one or more observations of one or more individuals temporally and spatially.

"--" = no occurrence

Occurrences of state-listed threatened and endangered species based on NHIS database locations and rare plant surveys for the Applicant's proposed project are summarized in Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants). State-listed species that also are federally listed are included in these tables when they have been documented as elemental occurrences within NHIS data.

Special Concern Species

The number of state-listed special concern species with occurrences within the ROI include five invertebrates, 9 vertebrates, and 14 plants. Occurrences of state-listed special concern species based on NHIS database locations are summarized in Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants).

Species of Greatest Conservation Need

Gap Analysis Program Species Models

The combined GAP models indicate habitat areas potentially used by one or more protected or rare vertebrate species; habitat areas that would experience the greatest impact are depicted in Figures 5.2.5-1 to 5.2.5-3. The areas rated medium and high have an increased potential to affect habitats used by multiple protected or rare species. Much of the area within the ROI is rated medium and high for mammals (41 percent, 4 to 7 species); while little is rated medium and high for birds (15 percent, 7 to 19 species), or amphibians and reptiles (less than 1 percent, 3 to 11 species). This indirectly indicates the potential for the Applicant's proposed project to affect multiple protected or rare species.

Minnesota's Wildlife Action Network

The WAN shows viable or persistent populations and richness hotspots for the regions in Minnesota crossed by the Applicant's proposed project (Minnesota DNR 2016f). As shown in Figure 5.2.5-4, the Applicant's proposed project would cross through habitats within the WAN that could be used by multiple SGCNs. Approximately 30 percent of the area within the ROI is within the WAN.

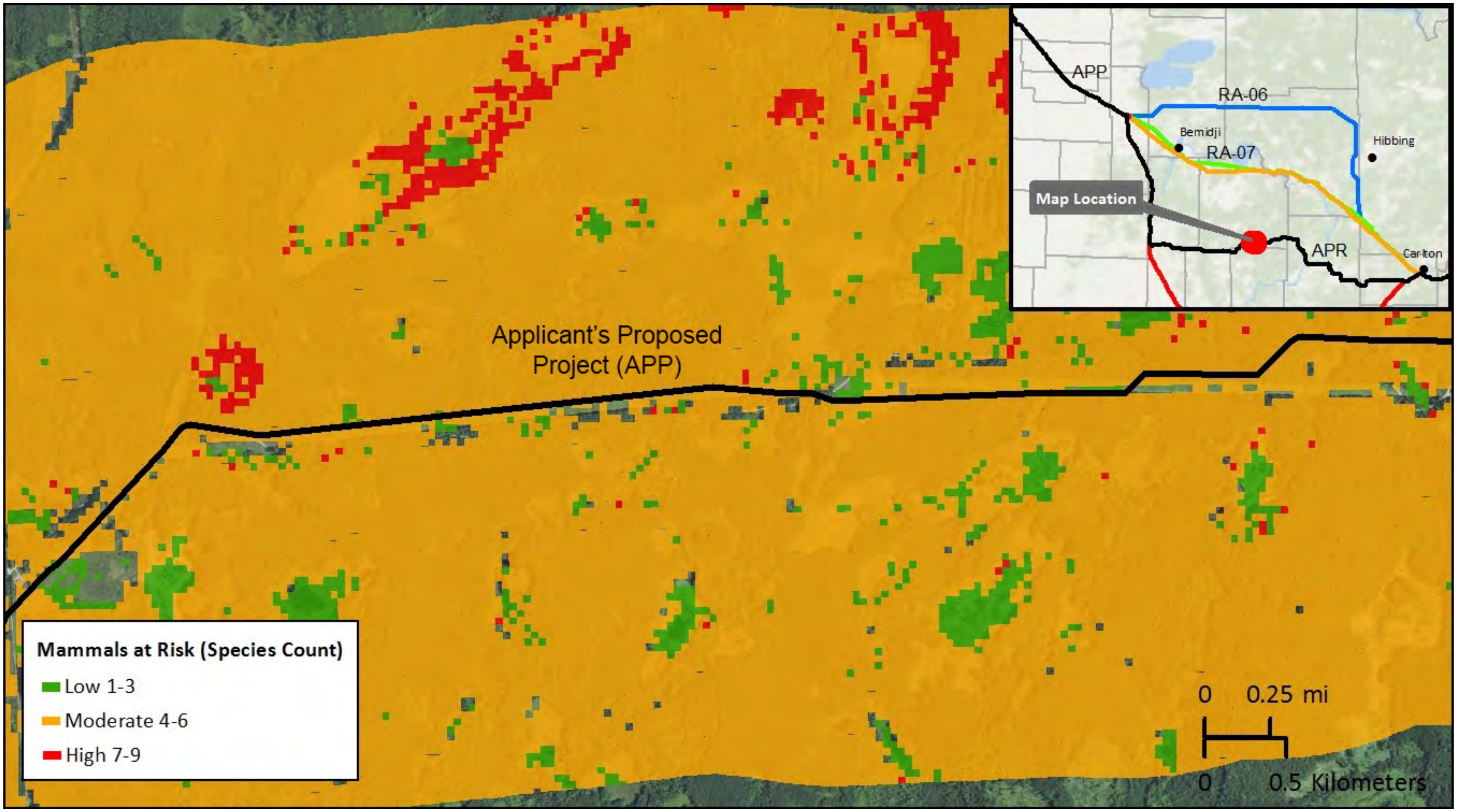
Minnesota Biological Survey Sites of Biodiversity Significance

The Applicant's proposed project would cross through areas with MBS Sites (Figure 5.2.5-5); areas scoring outstanding, high, and moderate could include habitats used by rare animals and plants.

Approximately 21 percent of the area within the ROI is rated as an outstanding (less than 1 percent), high (3 percent), or moderate (17 percent) MBS Site.

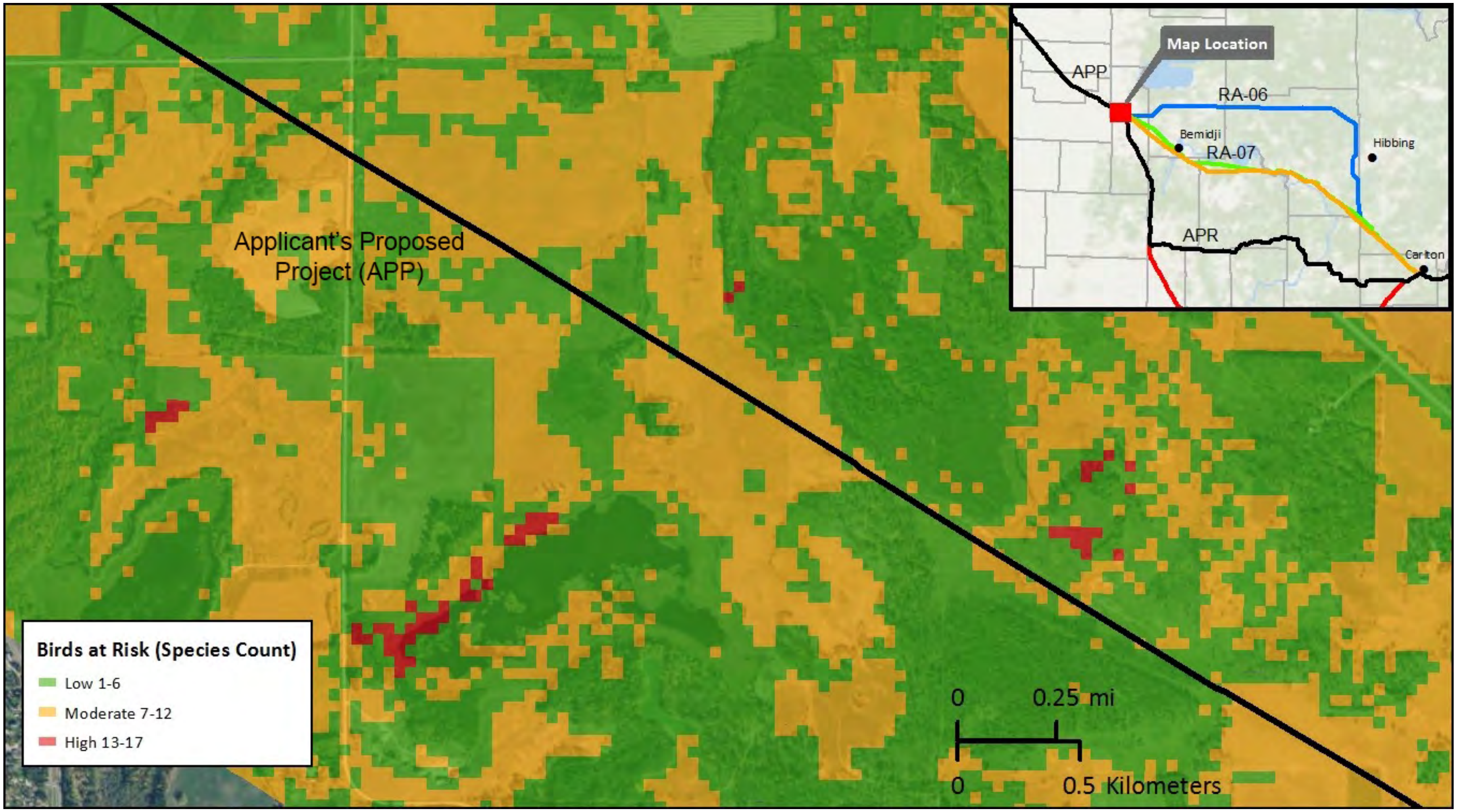
Scientific and Natural Areas

A review of PAD-US and Minnesota's SNAs indicated that no SNAs are located within the ROI.



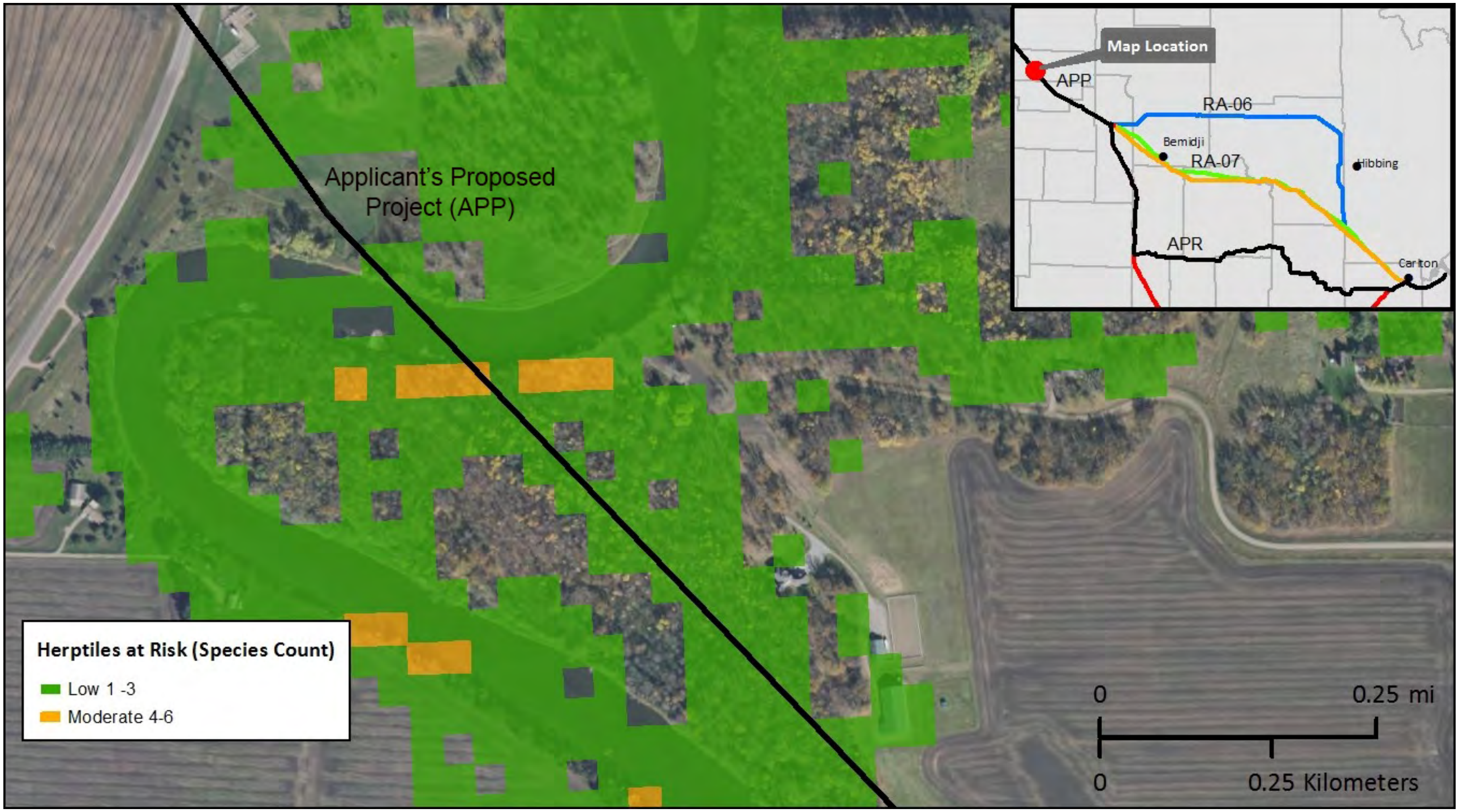
Source: Cardno analysis based on USGS GAP 2016a, 2016b.

Figure 5.2.5-1. GAP Analysis Program – Representative Protected or Rare Mammal Habitat along a Portion of the Applicant's Proposed Project



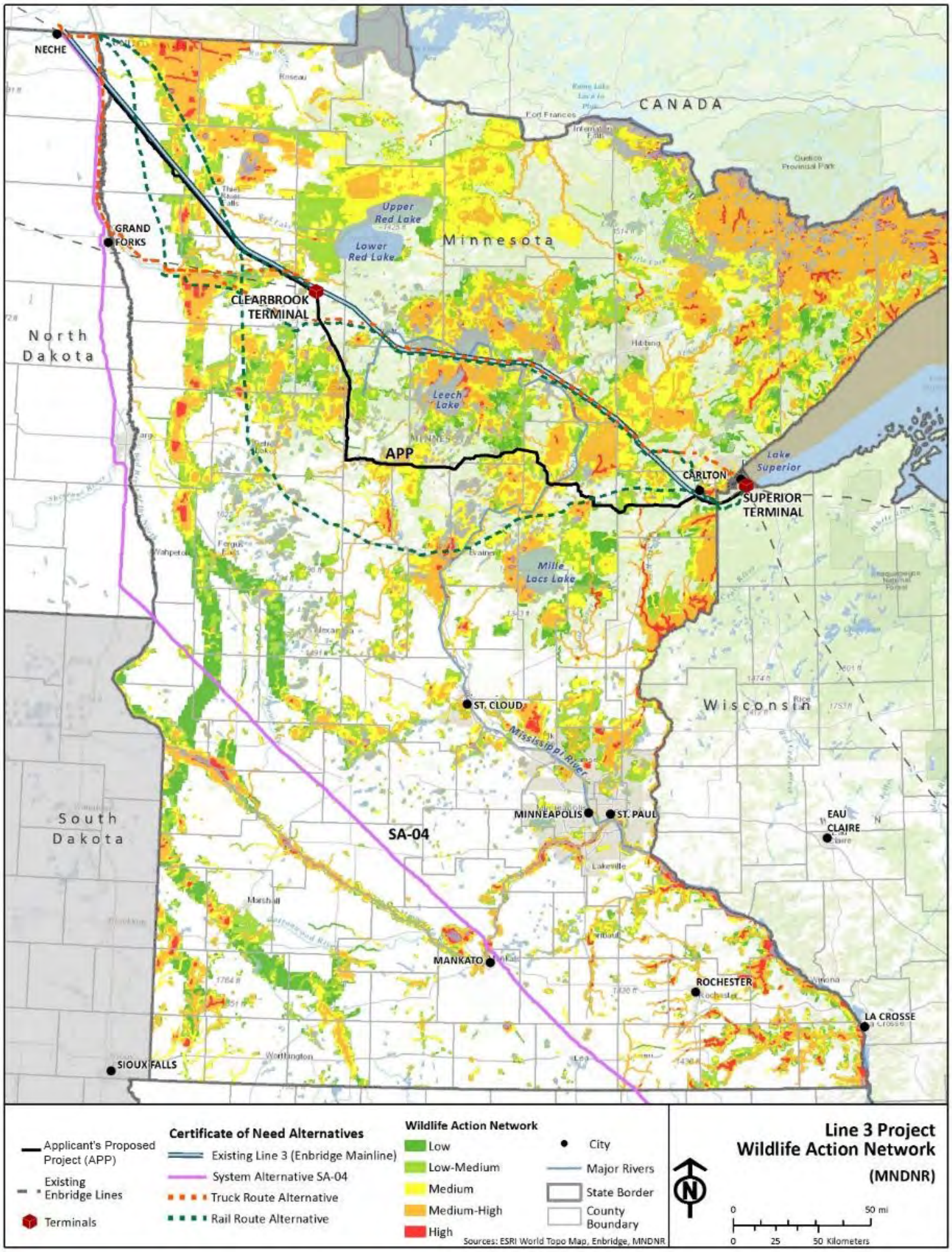
Source: Cardno analysis based on USGS GAP 2016a, 2016b.

Figure 5.2.5-2. GAP Analysis Program – Representative Protected or Rare Bird Habitat along a Portion of the Applicant's Proposed Project



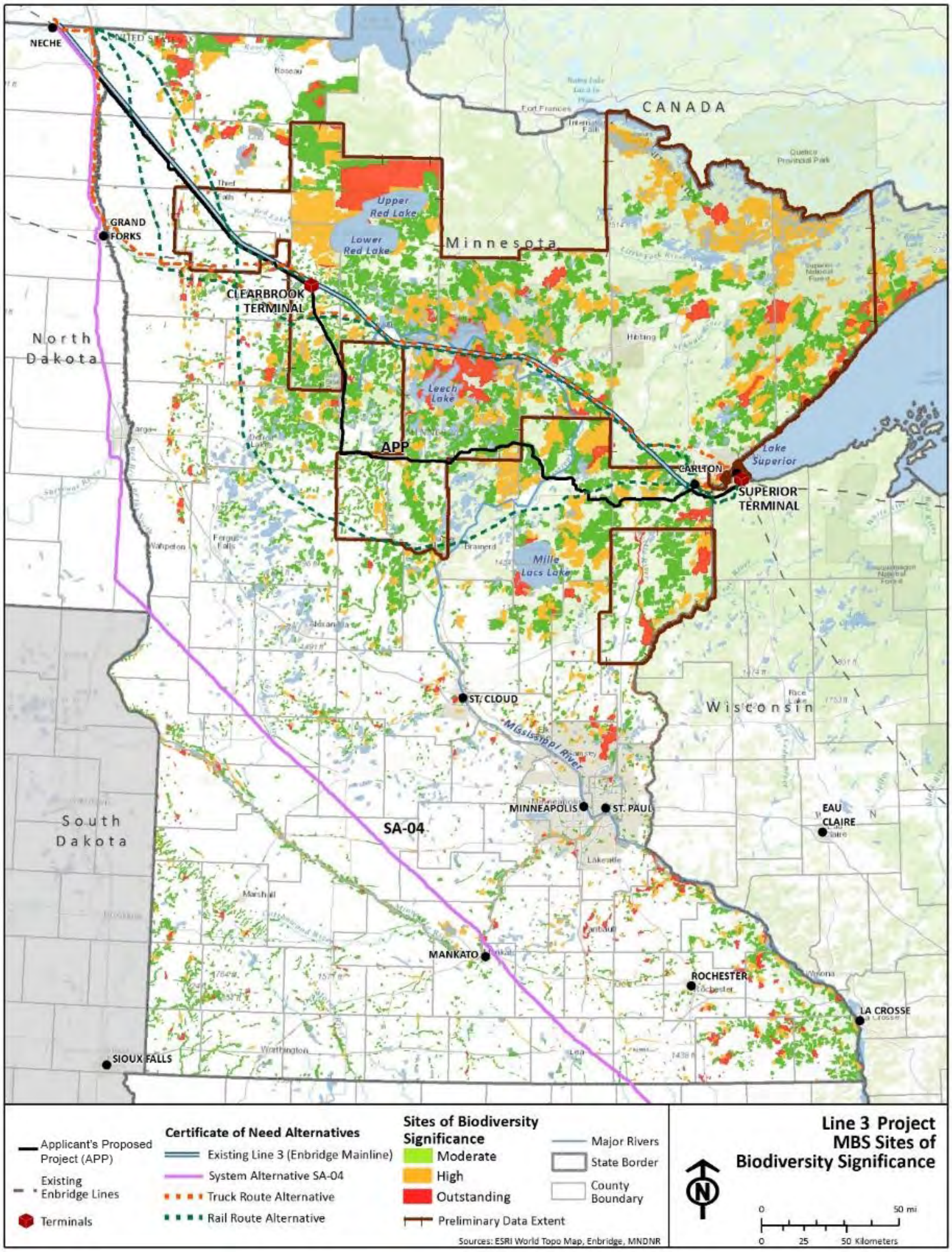
Source: Cardno analysis based on USGS GAP 2016a, 2016b.

Figure 5.2.5-3. GAP Analysis Program – Representative Protected or Rare Amphibian and Reptile (Herptile) Habitat along a Portion of the Applicant's Proposed Project



Source: Minnesota DNR 2016f.

Figure 5.2.5-4. Minnesota Wildlife Action Network Habitats



Source: Minnesota DNR 2016b.

Figure 5.2.5-5. Minnesota Biological Survey Sites of Biodiversity Significance

5.2.5.2.2 Continued Use of Existing Line 3

Federally Listed Species

Twelve federally listed threatened and endangered species are likely to occur within the ROI for the existing Line 3 pipeline route. No federal candidate species are likely to occur along the existing Line 3 pipeline. No critical habitat occurs within the ROI for the existing Line 3 pipeline.

State-Listed Species

Endangered and Threatened Species

State-listed endangered or threatened animals that have been documented within the ROI for the existing Line 3 pipeline include the northern long-eared bat, wood turtle, and fluted-shell mussel (Table 5.2.5-6). The northern long-eared bat occurrences are located within Minnesota, where this bat is considered a species of special concern.

A total of 15 state-listed threatened and 3 state-listed endangered plants have been documented within the ROI (Table 5.2.5-7). Eight of the 18 state-listed threatened and endangered plants occurring within the ROI also are known to occur within the permanent pipeline right-of-way (three in Minnesota – beaked spikerush [*Eleocharis rostellata*], hair-like beak rush [*Rhynchospora capillacea*], and sterile sedge [*Carex sterilis*]; and five in Wisconsin – clustered bur-reed [*Sparganium glomeratum*], neat spike-rush [*Eleocharis nitida*], seaside crowfoot [*Ranunculus cymbalaria*], small yellow-water crowfoot [*Ranunculus gmelinii*], and sweet colt's foot [*Petasites sagittatus*]) (Table 5.2.5-7). Occurrences of state-listed threatened and endangered animals and plants based on NHIS database locations are summarized in Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants). State-listed species that are also federally listed are included in these tables when they have been documented as elemental occurrences within NHIS data.

Special Concern Species

State-listed special concern species with occurrences within the ROI for the existing Line 3 pipeline include four invertebrates and nine vertebrates. The invertebrates include a caddisfly (*Anabolia ozburni*), and three mussels – black sandshell (*Ligumia recta*), creek heelsplitter (*Lasmigona compressa*), and pink heelsplitter (*Potamilus alatus*). The vertebrates include three bats – big brown bat, little brown bat, and northern long-eared bat; and six birds – Connecticut warbler (*Oporornis agilis*), Le Conte's sparrow, Nelson's sparrow (*Ammodramus nelsoni*), short-eared owl (*Asio flammeus*), trumpeter swan, and yellow rail. Twelve of the 17 state special concern plants occurring within the ROI also are known to occur within the permanent pipeline right-of-way (10 in Minnesota – barren strawberry *[Waldsteinia fragarioides* var. *fragarioides*], blunt sedge [*Carex obtusata*], false mountain willow [*Salix pseudomonticola*], few-flowered spiderush [*Eleocharis quinqueflora*], least moonwort [*Botrychium simplex*], Mingan moonwort [*Botrychium minganense*], northern single-spike sedge [*Carex scirpoidea*], pale moonwort [*Botrychium pallidum*], small white lady's-slipper [*Cypripedium candidum*], and St. Lawrence grapefern [*Botrychium rugulosum*]; and 2 in Wisconsin – mamillate spike-rush [*Eleocharis mamillata*], and Vasey's rush [*Juncus vaseyi*]). Occurrences of state special concern species based on NHIS database locations are summarized in Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants).

Table 5.2.5-6. Known Occurrences of State-Protected Animals within the Region of Interest and Permanent Right-of-Way for the Existing Line 3 Pipeline

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences	
			Operations[b]	Within 0.5 Mile
Mammals				
Northern long-eared bat (*Myotis septentrionalis*)	Suitable habitat occurs in the ROI. In summer, bats roost underneath bark, in cavities, or in crevices of both live trees and snags. Mates in fall and gives birth in summer (May to July). Caves and mines are winter hibernacula (October to April).	WI/T[c]	1	3
Amphibians and Reptiles				
Wood turtle (*Glyptemys insculpta*)	Found in moderate- to fast-flowing clear streams or rivers associated with forested riparian corridors, which provide primary overwintering, courtship, basking, and foraging habitat. Typically, inhabited waterways possess a sand, gravel, or cobble substrate with limited silt or muck. Nesting occurs in well-drained open or sparsely vegetated sandy soils, typically within 200 feet of suitable aquatic habitat. Nesting habitat includes native dry prairies, moderately sloughing sand banks, sandbars, agricultural fields, or areas of disturbed sandy soils that support no or sparse ground layer vegetation.	WI/T	--	1
Mollusks				
Fluted-shell mussel (*Lasmigona costata*)	Streams or river beds. Likely spawns from June to July.	MN/T	1	1

Sources: Minnesota DNR 2016e; Wisconsin DNR 2016; Merjent 2016c.

[a] State/Status: T = Threatened, MN = Minnesota, WI = Wisconsin

[b] Operations: occurrence based on 50-foot-wide permanent right-of-way centered on the pipeline.

[c] Occurrences are within Minnesota where northern long-eared bats are listed as a Species of Concern

"--" = no occurrence

Table 5.2.5-7. Known Occurrences of State-Protected Plants along the Existing Line 3 Pipeline

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences	
			Operations[b]	Within 0.5 Mile
Vascular Plants				
Beaked spikerush (*Eleocharis rostellata*)	Coastal salt marshes and inland in saline, alkaline, or strongly calcareous habitats (e.g., around hot springs). Fruits during summer to fall in the north.	MN/T	1	2
Clustered bur-reed (*Sparganium glomeratum*)	Cold ditches and pools within sedge meadows, willow-alder thickets and, occasionally, tamarack stands on the Lake Superior clay plain. Blooms late June through late July, and fruits late July through early September.	WI/T	1	4
Goblin fern (*Botrychium mormo*)	Rich leaf mold on shaded forest floors in mature maple-basswood and maple-basswood-beech forests. Plants emerge from the ground in June, and sporangia open in late September.	MN/T	--	1
Gray ragwort (*Packera cana*)	Northern plains, including the upper slopes of dry prairie remnant hills in sandy or gravelly soil. Flowers from May to June.	MN/E	--	1
Hair-like beak rush (*Rhynchospora capillacea*)	Calcareous fens, especially along the margins, and spring fens. Germinates in spring, and flowers mid-summer.	MN/T	1	2
Handsome sedge (*Carex formosa*)	Typically occurs in or at the edge of limey swamps, seeps, or bottomland forests but known to occur in moist, rich upland forests. Also can occur in disturbed habitats such as road edges and disturbed prairies. Blooms throughout June and fruits throughout July.	MN/E	--	2
Hidden-fruited bladderwort (*Utricularia geminiscapa*)	Wetlands, including bogs, fens, lakes, ponds, and river or lake shores. Blooms July through August.	MN/T	--	1
Marsh-grass-of-Parnassus (*Parnassia palustris*)	Rich or spring fens; calcareous fens, wet meadows, clay seepage bluffs. Blooms August to September.	WI/T	--	1
Narrow triangle moonwort (*Botrychium lanceolatum* ssp. *angustisegmentum*)	In woods and on hummocks in swamps, and in cool to warm, mostly rich, sub-acid soils. May be found in open fields at the northern end of its range. Site elevations range from near sea level to 3,600 feet.	MN/T	--	1
Neat spike-rush (*Eleocharis nitida*)	Occurs only near Superior on wet exposed clay in ditches and openings in alder thickets and marshes. Blooms in June, and fruits in late June through early September.	WI/E	2	5

Table 5.2.5-7. Known Occurrences of State-Protected Plants along the Existing Line 3 Pipeline

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences	
			Operations[b]	Within 0.5 Mile
Ram's head orchid (*Cypripedium arietinum*)	Cool, dense white cedar, balsam, and spruce swamps; nearly pure sand over limestone beach cobble or bedrock, mulched with conifer needles; and in mesic soil of sandy loam or clay under the partial shade of conifer or mixed forest. Prefers cool, sub-acid or neutral soil, loam, or sand in upland sites and nutrient-poor peat in lowland sites. Flowers from late May through mid-June.	MN/T	--	1
Red saltwort (*Salicornia rubra*)	Salt flats, saline swales, alkaline depressions, and exposed shores of alkaline lakes. Flowers from late July into August.	MN/T	--	1
Seaside crowfoot (*Ranunculus cymbalaria*)	Salted roadsides near Superior; and sandy or muddy shores, marshes, ditches, and harbors along Lake Michigan. Blooms May to August.	WI/T	2	4
Small yellow-water crowfoot (*Ranunculus gmelinii*)	Cold brooks and springs; and shallow water and muddy shores of ditches, streams, and lakes.	WI/T	2	3
Sterile sedge (*Carex sterilis*)	Mineral-rich calcareous fens of the prairie region. Mature perigynia are present from early June to late July.	MN/T	2	6
Sweet-colt's foot (*Petasites sagittatus*)	Cold marshes and swamp openings. Blooming occurs throughout May; fruiting occurs throughout June.	WI/T	5	8
Tea-leaved willow (*Salix planifolia* ssp. *planifolia*)	Near Lake Superior, including on bedrock shorelines in the Apostle Islands. Blooming occurs throughout May; fruiting occurs throughout June.	WI/T	--	1
Whorled nutrush (*Scleria verticillata*)	Restricted to the least disturbed calcareous fens in the prairie region. Blooms late June through late July.	MN/T	--	1

Sources: Minnesota DNR 2016e; Wisconsin DNR 2016; North Dakota GFP 2016; Merjent 2016b.

[a] State/Status: E = Endangered, T = Threatened, MN = Minnesota, WI = Wisconsin.

[b] Minnesota Only: Operations = sum of pipeline permanent right-of-way, permanent access roads, pump stations, and valves.
Wisconsin: Operations = occurrences based on 50-foot-wide permanent right-of-way centered on the pipeline.

Notes:

An occurrence can consist of one or more observations of one or more individuals temporally and spatially.

"--" = no occurrence

Species of Greatest Conservation Need

<u>Gap Analysis Program Species Models</u>

The combined GAP models indicate habitat areas potentially used by one or more protected or rare vertebrate species. The areas rated medium and high have an increased potential to affect habitats used by multiple protected or rare species. Much of the area within the ROI for the existing Line 3 is rated medium and high for mammals (49 percent, 4 to 9 species); while little is rated medium and high for birds (12 percent, 7 to 19 species) or amphibians and reptiles (less than 1 percent, 3 to 11 species). This indirectly indicates the potential for continued use of existing Line 3 to affect multiple protected or rare species.

<u>Minnesota's Wildlife Action Network</u>

The WAN shows viable or persistent populations and richness hotspots for the regions in Minnesota crossed by the existing Line 3 pipeline (Minnesota DNR 2016f). As shown in Figure 5.2.5-4, the existing Line 3 pipeline crosses habitats within the WAN that could be used by multiple SGCNs. Approximately 32 percent of the area within the ROI is within the WAN.

Minnesota Biological Survey Sites of Biodiversity Significance

The existing Line 3 pipeline crosses areas with MBS Sites (Figure 5.2.5-5); areas scoring outstanding, high, and moderate could include habitats used by rare animals and plants. Approximately 19 percent of the area within the ROI is identified as an outstanding (2 percent), high (4 percent), or moderate (13 percent) rated MBS Site.

Minnesota Scientific and Natural Areas

Review of PAD-US indicated that no SNAs are located within the ROI of the existing Line 3 pipeline (USGS GAP 2016c). Review of Minnesota's SNAs identified one SNA that occurs within ROI, the Wawina Peatland SNA (Minnesota DNR 2016d, 2016g). Natural areas are distinguished by undisturbed plant communities, rare or endangered species habitat, seasonal habitat, natural geologic formations and features, and plant communities undergoing natural succession (Minnesota DNR 2016d). The Wawina Peatland SNA is a large patterned peatland complex with ovoid island patterns, a featureless water track, raised bog, and crested raised bog (Minnesota DNR 2016g). This SNA is located approximately 0.4 mile northeast of the existing Line 3 pipeline. A Burlington Northern Santa Fe (BNSF) rail line lies between the SNA and the existing Line 3 pipeline.

5.2.5.2.3 System Alternative SA-04

Federally Listed Species

Six federally listed species, three threatened and three endangered, are known to occur in the North Dakota counties crossed by SA-04. Five federally listed species, four threatened and one endangered, are known to occur within the Minnesota Counties transected by SA-04. Thirteen federally listed species, six threatened and seven endangered, are known to occur within the Iowa Counties crossed by SA-04. Fifteen federally listed species, one candidate, seven threatened, and seven endangered, are known to occur within the Illinois counties crossed by SA-04. A number of the federally listed species are found in multiple states and counties along the ROI for SA-04. A total of twenty three federally listed plant and animal species, 11 threatened, 11 endangered, and one candidate, are known to occur within counties transected by SA-04 (Table 5.2.5-8). No critical habitat occurs within the ROI for the SA-04 alternative.

Table 5.2.5-8. Potential Occurrences of Federally Protected Species within the Counties and One Mile Region of Interest for SA-04

Listed Species (Common and Scientific Names)	Federal Status	SA-04 (Listed Species State and County Occurrence) State	Counties	NHIS Records of Occurrence within One Mile ROI (Minnesota Counties Only)
Whooping crane (*Grus americana*)	Endangered	North Dakota	Cass, Grand Forks, Pembina, Richland, Traill, Walsh	NA
Gray wolf (*Canis lupus*)	Endangered	North Dakota	Cass, Grand Forks, Pembina, Richland, Traill, Walsh	NA
Northern long-eared bat (*Myotis septentrionalis*)	Threatened	North Dakota	Cass, Grand Forks, Pembina, Richland, Traill, Walsh	NA
		Minnesota	Traverse, Stevens, Swift, Kandiyohi, Chippewa, Renville, Sibley, Le Sueur, Nicollet, Blue Earth, Waseca, Freeborn, Mower	No Records
		Iowa	Winneshiek, Howard, Mitchell, Worth, Cerro Gordo, Chickasaw, Floyd, Clayton, Fayette, Bremer, Dubuque, Delaware, Buchanan, Black Hawk, Jackson, Jones, Linn, Clinton, Cedar, Scott, Muscatine	NA
		Illinois	Carroll, Whiteside, Rock Island, Henry, Lee, Bureau, La Salle, Grundy, Will	NA
Indiana bat (*Myotis sodalis*)	Endangered	Iowa	Cedar, Muscatine, Scott	NA
		Illinois	Bureau, Carroll, Grundy, Henry, La Salle, Lee, Rock Island, Whiteside,	NA
Eastern massasauga (*Sistrurus catenatus*)	Threatened	Iowa	Muscatine	NA
		Illinois	Will	NA

Table 5.2.5-8. Potential Occurrences of Federally Protected Species within the Counties and One Mile Region of Interest for SA-04

Listed Species (Common and Scientific Names)	Federal Status	SA-04 (Listed Species State and County Occurrence)		NHIS Records of Occurrence within One Mile ROI (Minnesota Counties Only)
		State	Counties	
Higgins eye pearlymussel (*Lampsilis higginsii*)	Endangered	Iowa	Clayton, Clinton, Jackson, Jones, Linn, Muscatine, Scott, Dubuque	NA
		Illinois	Carroll, Rock Island, Whiteside	NA
Spectaclecase mussel (*Cumerlandia monodonta*)	Threatened	Iowa	Muscatine, Scott	NA
		Illinois	Rock Island	NA
Sheepnose mussel (*Plethobasus cyphyus*)	Endangered	Iowa	Muscatine, Scott	NA
		Illinois	Rock Island, Whiteside, Will	NA
Scaleshell (*Leptodea leptodon*)	Endangered	Illinois	Grundy	NA
Iowa Pleistocene snail (*Discus macclintocki*)	Endangered	Iowa	Jackson, Fayette, Dubuque, Clinton, Clayton	NA
Dakota skipper (*Hesperia dacotae*)	Threatened	North Dakota	Richland	NA
		Minnesota	Chippewa	No Records
Poweshiek skipperling (*Oarisma poweshiek*)	Endangered	North Dakota	Richland	NA
		Minnesota	Chippewa	No Records
		Iowa	Howard, Cerro Gordo	NA
Rusty patched bumble bee (*Bombus affinis*)	Endangered	Iowa	Clayton, Black Hawk, Winneshiek	NA
Hine's emerald dragonfly (*Somatochlora hineana*)	Endangered	Illinois	Will	NA
Rattlesnake-master borer moth (*Papaipema eryngii*)	Candidate	Illinois	Grundy, Will	NA

Table 5.2.5-8. Potential Occurrences of Federally Protected Species within the Counties and One Mile Region of Interest for SA-04

Listed Species (Common and Scientific Names)	Federal Status	SA-04 (Listed Species State and County Occurrence)		NHIS Records of Occurrence within One Mile ROI (Minnesota Counties Only)
		State	Counties	
Western prairie fringed orchid (*Platanthera praeclara*)	Threatened	North Dakota	Richland	NA
		Minnesota	Mower	No Record
		Iowa	Winneshiek, Howard, Mitchell, Worth, Cerro Gordo, Chickasaw, Floyd, Clayton, Fayette, Bremer, Dubuque, Delaware, Buchanan, Black Hawk, Jackson, Jones, Linn, Clinton, Cedar, Scott, Muscatine	NA
Prairie bush clover (*Lespedeza leptostachya*)	Threatened	Minnesota	Renville, Mower	No Records
		Iowa	Winneshiek, Howard, Mitchell, Worth, Cerro Gordo, Chickasaw, Floyd, Clayton, Fayette, Bremer, Dubuque, Delaware, Buchanan, Black Hawk, Jackson, Jones, Linn, Clinton, Cedar, Scott, Muscatine	NA
		Illinois	Lee	NA
Northern wild monkshood (*Aconitum noveboracensel*)	Threatened	Iowa	Jackson, Dubuque, Delaware, Clayton	NA
Eastern prairie fringed orchid (*Platanthera leucophaea*)	Threatened	Iowa	Jackson, Jones	NA
		Illinois	Carroll, Bureau, Grundy, Henry, Lee, Rock Island, Whiteside, Will	NA
Decurrent false aster (*Boltonia decurrens*)	Threatened	Illinois	Bureau, La Salle	NA
Lakeside daisy (*Hymenopsis herbacea*)	Threatened	Illinois	Will	NA
Mead's milkweed (*Asclepias meadii*)	Threatened	Illinois	Will	NA

Table 5.2.5-8. Potential Occurrences of Federally Protected Species within the Counties and One Mile Region of Interest for SA-04

Listed Species (Common and Scientific Names)	Federal Status	SA-04 (Listed Species State and County Occurrence)		NHIS Records of Occurrence within One Mile ROI (Minnesota Counties Only)
		State	Counties	
Leafy-prairie clover (*Dalea foliosa*)	Endangered	Illinois	Will, La Salle	NA

NA = not applicable

State-Listed Species

Endangered and Threatened Species

State-listed endangered or threatened animals and plants that have been documented within the ROI for SA-04 include 13 invertebrates – 2 arthropods and 11 mussels; 17 vertebrates – 1 bat, 5 birds, 3 reptiles, and 8 fish; and 22 plants (Tables 5.2.5-9 and 5.2.5-10). Of the 22 state-listed plants occurring within the ROI, three endangered plants – false mallow (*Malvastrum hispidum*), plains sedge (*Carex heliophila*), and quillwort (*Isoetes butleri*); and one threatened plant – broomrape (*Orobanche ludoviciana*) occur within the construction work area in Illinois (Table 5.2.5-10). Occurrences of state-listed threatened and endangered species based on NHIS database locations are summarized in Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants). State-listed species that are also federally listed are included in these tables when they have been documented as elemental occurrences within NHIS data.

Special Concern Species

State-listed special concern species that occur within the ROI for SA-04 include 9 invertebrates – 6 arthropods, and 3 mussels; 12 vertebrates – 6 birds, 2 reptiles, and 4 fish; and 20 plants. Of the 20 special concern plants within the ROI, 3 plants – buffalo grass (*Buchloe dactyloides*), plains wild indigo (*Baptisia bracteata* var. *glabrescens*), and small white lady's-slipper occur within construction work areas. State special concern species that are also federally listed are included in tables when they have been documented by state NHIS data. Occurrences of state special concern species based on NHIS database locations are summarized in Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants).

Species of Greatest Conservation Need

Gap Analysis Program Species Models

The combined GAP models indicate habitat areas potentially used by one or more protected or rare vertebrate species. The areas rated medium and high have an increased potential to affect habitats used by multiple protected or rare species. Little of the area within the ROI is rated medium and high for mammals (1 percent, 4 to 9 species), birds (6 percent, 7 to 19 species), or amphibians and reptiles (16 percent, 3 to 11 species). This indirectly indicates the potential for SA-04 to affect multiple protected or rare species.

Minnesota's Wildlife Action Network

The WAN shows viable or persistent populations and richness hotspots for the regions in Minnesota crossed by SA-04 (Minnesota DNR 2016f). As shown in Figure 5.2.5-4, the route would cross through habitats within the WAN that could be used by multiple SGCNs. Approximately 1 percent of the area within the ROI is within the WAN (much of SA-04 crosses through states other than Minnesota).

Table 5.2.5-9. Known Occurrences of State-Protected Animal Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences		
			Con[b]	Op[c]	Within 0.5 Mile
Mammals					
Northern long-eared bat (*Myotis septentrionalis*)	Suitable habitat occurs in the ROI. In summer, bats roost underneath bark, in cavities, or in crevices of both live trees and snags. Mates in fall and gives birth in summer (May to July). Caves and mines are winter hibernacula (October to April).	IL/T	1	1	2
Birds					
Burrowing owl (*Athene cunicularia*)	Nests and lives underground in gently sloping open, treeless areas, with low, sparse vegetation. Breeds in spring.	MN/E	1	1	1
Chestnut –collared longspur (*Calcarius ornatus*)	Occurs almost exclusively in relatively dry, moderately grazed prairie. Nests are constructed in a depression on the ground, usually under a clump of grass, and lined with soft grasses and animal hair.	MN/E	--	--	1
King rail (*Rallus elegans*)	Generally associated with freshwater marshes but can adapt to a variety of habitats that support vegetation and are frequently wet. Nesting begins first week of May, and hatching occurs by the end of July (approx.).	IL/E	--	--	1
Loggerhead shrike (*Lanius ludovicianus*)	Associated with open areas containing shrub/brush and scattered thorny plant species. Eggs are laid from late March through mid-April; however, it may continue through early July.	MN/E IL/E	--	--	3
Upland sandpiper (*Batramia longicauda*)	Prefers hayfields and pastures, but are found in open grasslands in the absence of preferred habitat. Nesting begins in May, and hatching occurs mid-June to July.	IL/E	--	--	1
Amphibians and Reptiles					
Blanding's turtle (*Emydoidea blandingii*)	Found in productive, clean, shallow waters with abundant aquatic vegetation and soft, muddy bottoms over firm substrates. Extensive marshes bordering rivers provide excellent habitat. Nests in grasses and sedge close to water. Females nest in late May and June, and hatching occurs 2 to 4 months later.	MNT IA/T IL/E	1	1	5
Ornate box turtle (*Terrapene ornata*)	Underground burrows of grasslands. Breeds between April and October, and nesting occurs mainly in July.	IA/T IL/T	1	1	3

Table 5.2.5-9. Known Occurrences of State-Protected Animal Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences		
			Con[b]	Op[c]	Within 0.5 Mile
Plains hog-nosed snake (*Heterodon nasicus*)	Habitat includes areas with sandy or gravelly soils, such as prairies, sandhills, and river floodplains. Females lay eggs from May to August (mainly in June and July), and hatching occurs approximately 2 months later.	IL/T	--	--	1
Fish					
American brook lamprey (*Lampetra appendix*)	Gravel-sand riffles, runs of creeks, and small to medium rivers with strong flow. Spawns in spring.	IA/T	--	--	1
Banded killifish (*Fundulus diaphanous*)	Quiet waters of lakes, ponds, and sluggish streams, usually over sand, gravel, or detritus-covered bottoms where there are patches of submerged aquatic plants. Spawns in late spring and summer.	IL/T	--	--	1
Black buffalo (*Ictiobus niger*)	Freshwater streams, rivers, and lakes that possess strong currents and deep waters. Spawns from April through mid-June.	MN/T	1	1	1
Blacknose shiner (*Notropis heterolepis*)	Runs and pools of creeks and small to medium, shallow flowing rivers with variable bottom, including sand, gravel, mud, rubble, and occasionally boulders. Spawns in June or July.	IL/E	1	1	1
Greater redhorse (*Moxostoma valenciennesi*)	Moderate to fast-flowing, medium-sized to large rivers. May also occur in river reservoirs and large lakes. Prefers clear water with substrates of clean sand, gravel, or boulders; cannot tolerate siltation. Spawns in May or June.	IL/E	--	--	2
Pallid shiner (*Hybopsis amnis*)	Quiet waters over sandy-silty bottoms in medium to large rivers. Often found at ends of sand and gravel bars. Spawns in late May through July.	IL/E	--	--	1
River redhorse (*Moxostoma carinatum*)	Found in deep pools with moderate current over bedrock or gravel substrate; cannot tolerate siltation. Spawns in April and May.	IL/T	--	--	1
Slender madtom (*Noturus exilis*)	Riffles of small- to medium-sized, permanent, spring-fed creeks, with moderate to swift currents and bottoms of rock or gravel interspersed with sand. Spawns in spring and summer.	MN/E	--	--	1

Table 5.2.5-9. Known Occurrences of State-Protected Animal Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences		
			Con[b]	Op[c]	Within 0.5 Mile
Arthropods					
Redveined (Red-tailed) prairie leafhopper (*Aflexia rubranura*)	Dry to mesic prairies where the host plant, prairie dropseed, is found. Females insert their eggs into the stems of prairie dropseed in late summer, and eggs likely hatch in late May.	IL/T			1
Regal fritillary (*Speyeria idalia*)	Grassland habitats, including moist tallgrass prairies, wet fields and meadows, virgin grasslands, old fields, and floodplain forest openings and edges. Mate in mid-June through early July. Eggs are laid in late summer through early fall.	IL/T	1	1	1
Mollusks					
Black sandshell (*Ligumia recta*)	Rivers, lakes, and large streams with a good current and sandy mud, firm sand, or gravel substrates. Likely spawns mid-July through August.	IL/T	1	1	2
Butterfly (*Ellipsaria lineolata*)	Large rivers with swift currents in sand or gravel substrates. Females brood their young long-term from August through July before they are released as glochidia.	MNT IA/T	--	--	1
Creeper (*Strophitus undulatus*)	Small to medium-sized streams and occasionally large rivers in mud, sand, or gravel. Females brood their young long term, with eggs fertilized in summer and glochidia released the following spring.	IA/T	--	--	2
Ellipse (*Venustaconcha ellipsiformis*)	Headwater reaches of rivers in gravel riffles and silty areas along streambanks. Females brood their young long term before they are released as glochidia in mid-summer.	MNT IA/T	--	--	2
Fluted-shell mussel (*Lasmigona costata*)	Streams or river beds. Likely spawns from June to July.	MN/T	--	--	1
Higgins eye (*Lampsilis higginsii*)	Only occurs in the Mississippi River and the lower portion of some of its large tributaries, where it occupies stable substrates varying from sand to boulders. Females are gravid in May and September.	IL/E	1	1	1
Monkeyface (*Quadrula metanevra*)	Medium to large rivers and streams with mixed sand and gravel or gravel areas. Spawns in spring.	MN/T	1	1	1
Mucket (*Actinonaias ligamentina*)	Medium to large rivers with coarse sand and gravel substrates.	MN/T	2	2	4

Table 5.2.5-9. Known Occurrences of State-Protected Animal Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences		
			Con[b]	Op[c]	Within 0.5 Mile
Pistolgrip (*Tritogonia verrucosa*)	Medium or large-sized rivers with sand and gravel substrates for burrowing. Spawns in spring and releases larvae in summer.	MN/E	1	1	1
Spike (*Elliptio dilatata*)	Small to large rivers, reservoirs, and lakes with sand and gravel substrates. Usually associated with outlet habitats dominated by swift currents when found in lakes. Spawns in early to mid-May.	MN/T	1	1	3
Yellow sandshell (*Lampsilis teres*)	Occupies a variety of aquatic habitats; however, the preferred habitat is along the banks of muddy or silty rivers. Spawns in summer and release larvae the following spring.	MN/E IA/E	1	1	4

Sources: Minnesota DNR 2016e; Illinois DNR 2016; Iowa DNR 2016a; North Dakota GFP 2016.

[a] State/Status: E = Endangered, T = Threatened, MN = Minnesota, IA = Iowa, IL = Illinois

[b] Con = occurrences based on 120-foot-wide construction work area centered on the pipeline

[c] Op = occurrences based on 50-foot-wide permanent right-of-way centered on the pipeline

"--" = no occurrence

Table 5.2.5-10. Known Occurrences of State-Protected Plant Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences		
			Con[b]	Op[c]	Within 0.5 Mile
Vascular Plants					
Blue sage (*Salvia azurea*)	Dry soils in black soil and gravel prairie habitats, limestone glades, and roadsides. Spiked inflorescent flowers bloom in the late summer and fall. Avoided as a food source by mammals it is a pollen and nectar source for insects.	IL/T	--	--	1
Bog birch (*Betula pumila*)	Calcareous fens and moist prairies habitats that have a low elevation, high moisture regime and are mostly sunny. Plant flowers in the springtime with colorful foliage in the autumn.	IA/T	--	--	1
Broomrape (*Orobanche ludoviciana)*	Sandy soil in prairie habitats. Parasitic on members of the aster family.	IL/T	1	--	1
Dwarf grape fern (*Botrychium simplex*)	Grassy meadow habitat. Succulent stem and single leaf are similar to other grape fern varieties so species is typically identified from its large spores.	IL/E	--	--	1
Edible valerian (*Valeriana edulis var. ciliate*)	Calcareous fens, wet meadows, and moist prairies habitats that have a high moisture regime and are mostly sunny. Propagation through seed dispersal via wind or mammals; flowers from May to September.	MN/T	--	--	2
Flax-leaved aster (*Aster linariifolius*)	Sandy and rocky soils in prairies, savannas, stable sand dunes, sandstone glades, and woodland habitats with sparse groundcover. Blooms in mid-fall for approximately one month.	IA/T	--	--	2
False mallow (*Malvastrum hispidum*)	Dry soil in prairies and rocky and gravelly barrens, usually near limestone outcrops, occasionally in open alluvial ground in valleys and along gravel bars, and flowers in the summer.	IL/E	1	1	1
Hair-like beak rush (Beakrush) (*Rhynchospora capillacea*)	Calcareous fens, especially along the margins, and spring fens. Germinates in the spring, and flowers mid-summer.	IA/T	--	--	1
Hedge hyssop (*Gratiola quartermaniae*)	High moisture regime areas such as floodplain forests, soggy meadows, gravelly seeps, and mud depressions in woodland habitats. Annual plant that blooms in late spring and propagates through reseeding to form colonies.	IL/E	--	--	1
Leafy prairie-clover (*Dalea foliosa*)	Prefers prairie remnant sites with thin soils over limestone substrate, wet spring and fall seasons, and dry summers. Blooms in mid- to late summer.	IL/E	--	--	1
Meadow beauty (*Rhexia virginica*)	Prefers moist sandy soils in wet prairies and fen habitats. Typically blooms in mid-July through August.	IA/T	--	--	2

Table 5.2.5-10. Known Occurrences of State-Protected Plant Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences		
			Con[b]	Op[c]	Within 0.5 Mile
Pale green orchid (*Platanthera flava*)	Prefers wet meadows or swales in savannas habitats along transitional edges with direct sunlight. Can also be found on margins of shallow marshy lakes. Orchid blooms in spring but germination requires specific conditions.	IA/E	--	--	3
Plains sedge (*Carex heliophila*)	On slopes and hilltops of dry to dry-mesic prairies with well-drained soils formed in glacial till.	IL/E	1	1	1
Quillwort (*Isoetes butleri*)	Seasonally wet calcareous soils of limestone glades, barrens, sandstone outcrops, and shallow depressions in dolomite prairie that are wet in spring and dry in summer. Species is visible/identifiable from May to June.	IL/E	2	1	3
Richardson's rush (*Juncus alpinoarticulatus*)	Prefers moist sandy soils in sandbar and swale habitats along the Missouri River. It is an obligatory wetland rush.	IL/T	--	--	1
Slender arrow grass (*Triglochin palustris*)	Primarily located in fens and some wet prairie habitats, this grass produces hydrocyanic acid and can be poisonous if ingested.	IA/T	--	--	1
Slender sandwort (*Minuartia patula*)	Found in wet dolomite prairie habitat. These prairies have high magnesium soils due to dolomite bedrock near the soil surface. Blooms in the spring.	IL/T	--	--	1
Sterile sedge (*Carex sterilis*)	Mineral-rich calcareous fens of the prairie region. Mature perigynia are present from early June to late July.	MN/T	--	--	1
Sullivant's milkweed (*Asclepias sullivantii*)	Solely found in mesic tallgrass prairie habitats. Blooms in mid-July and is an important food source for pollinators. Fruits in August.	MN/T	--	--	1
Tuberous Indian-plantain (*Arnoglossum plantagineum*)	Prefer moist prairies but can be found in few bluff prairies where the soil is drier. Blooms in the summer. Germination through seed only.	MN/T	--	--	1
Whorled nutrush [Low nut rush] (*Scleria verticillata*)	Restricted to the least disturbed calcareous fens in the prairie region. Blooms late June through late July.	IA/T	--	--	1

Table 5.2.5-10. Known Occurrences of State-Protected Plant Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04

Common and Scientific Name	Preferred Habitat	State/ Status[a]	Occurrences		
			Con[b]	Op[c]	Within 0.5 Mile
Wild quinine (*Parthenium integrifolium*)	Located in remnant prairie and savanna habitats with a moderate moisture regime. This long-lived, herbaceous perennial blooms from June to September. Propagation through seed dispersal via wind or mammals.	MN/E	--	--	1

Sources: Minnesota DNR 2016e; Illinois DNR 2016; Iowa DNR 2016a; North Dakota GFP 2016.

[a] State/Status: E = Endangered, T = Threatened, MN = Minnesota, IA = Iowa, IL = Illinois

[b] Con = occurrences based on 120-foot-wide construction work area centered on the pipeline

[c] Op = occurrences based on 50-foot-wide permanent right-of-way centered on the pipeline

Notes:

An occurrence can consist of one or more observations of one or more individuals temporally and spatially.

"--" = no occurrence

Minnesota Biological Survey Sites of Biodiversity Significance

SA-04 would cross through areas with MBS Sites (Figure 5.2.5-5); areas scoring outstanding, high, and moderate could include habitats used by rare animals and plants. Approximately 1 percent of the area within the ROI is identified as an outstanding (0.2 percent), high (0.3 percent), or moderate (0.5 percent) rated MBS Site (most of SA-04 crosses through habitats outside of Minnesota).

Minnesota Scientific and Natural Areas

A review of PAD-US and Minnesota's SNAs indicated that no SNAs are located within the ROI.

5.2.5.2.4 Transportation by Rail

This section addresses the existing conditions along the rail routes and in the general area near the Clearbrook and Superior terminals where rail offloading facilities and new rail access likely would be constructed.

Federally Listed Species

Ten federally listed plant and animal species are known to occur within the Minnesota and Wisconsin counties included in the Transportation by Rail alternative. The Transportation by Rail alternative consisted of three distinct segments, North Dakota Border to Clearbrook terminal, North Dakota Border to Superior South, and North Dakota Border to Superior North. NHIS data identified three occurrences of Poweshiek skipperling (endangered) within the 1-mile ROI for North Dakota Border to Clearbrook terminal. NHIS data (Minnesota counties only) identified three occurrences of Poweshiek skipperling and eight occurrences of northern long-eared bat within 1-mile ROI for North Dakota Border to Superior South. Within the 1-mile ROI for the rail route from the North Dakota Border to Superior North (Minnesota counties only) there are document occurrences of two Poweshiek skipperlings, two Dakota skippers, 36 western prairie fringed orchids, and one northern long-eared bat in the NHIS database. Gray wolf and Canada lynx occurrence data are not available in the NHIS database. However, because individuals of both species are wide-ranging, if they are known to occur within a county crossed by a Transportation by Rail segment they would likely occur within 1-mile of the route on occasion.

Critical habitat for the Dakota skipper and Poweshiek skippering occurs within 1 mile of the Transportation by Rail alternatives to Superior North (Polk County) and Superior South (Mahnomen County), respectively, but neither alternative directly crosses critical habitat for any federally listed species.

State-Listed Species

<u>Endangered and Threatened Species</u>

No state-listed endangered or threatened animals are likely to occur within the general locations of rail offloading facilities and new access facilities in Clearbrook and Superior (Minnesota DNR 2016e; North Dakota GFP 2016; Wisconsin DNR 2016). Four state-listed plants are likely to occur in the general area where new offloading and access facilities would be constructed (Table 5.2.5-11). Occurrences of state-listed threatened and endangered species based on NHIS database locations are summarized in Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants).

Table 5.2.5-11. Potential Occurrences of State-Protected Plants within the Region of Interest for the Transportation by Rail Alternative

Common and Scientific Name	Preferred Habitat	State/Status[a]
Vascular Plants		
Beaked spikerush (*Eleocharis rostellata*)	Coastal salt marshes and inland in saline, alkaline, or strongly calcareous habitats (e.g., around hot springs). Fruits during summer to fall in the north.	MN/T
Hair-like beak rush (*Rhynchospora capillacea*)	Calcareous fens, especially along the margins, and spring fens. Germinates in spring, and flowers mid-summer.	MN/T
Sterile sedge (*Carex sterilis*)	Mineral-rich calcareous fens of the prairie region.	MN/T
Sweet colt's-foot (*Petasites sagittatus*)	Cold marshes and swamp openings.	WI/T

Sources: Minnesota DNR 2016e; Wisconsin DNR 2016.

[a] State/Status: T = Threatened, MN = Minnesota, WI = Wisconsin.

Note:

An occurrence can consist of one or more observations of one or more individuals temporally and spatially.

Special Concern Species

Based on a review of available presence/probable absence information, no special concern animals are likely to occur within the general location of rail offloading and new access facilities for the rail alternative (Minnesota DNR 2016e; North Dakota GFP 2016; Wisconsin DNR 2016). Three Minnesota special concern plants – few-flowered spikerush (*Eleocharis quinqueflora*), McCalla's willow (*Salix maccalliana*), and twig rush (*Cladium mariscoides*) are potentially present within the likely construction area for the rail alternative facilities (Appendix M, Table M-3).

Species of Greatest Conservation Need

Gap Analysis Program Species Models

The combined GAP models indicate habitat areas potentially used by one or more protected or rare vertebrate species. The areas rated medium and high have an increased potential to affect habitats used by multiple protected or rare species. According to the models, much of the area in the vicinity of the Clearbrook terminal, where new rail facilities and access likely would be constructed, is rated low for all species. However, about 10 to 20 percent of the area is rated medium for mammals (1 to 6 species) and birds (1 to 12 species); and about 10 percent is rated low for amphibians and reptiles (1 to 2 species). A larger proportion of the area surrounding the new rail access between Clearbrook and Gully is rated medium for birds (7 to 12 species). The area in the vicinity of the Superior terminal where new rail facilities and access would be constructed is rated primarily high and medium for mammals (4 to 9 species), low for birds (1 to 6 species), and low for amphibians and reptiles (1 to 2 species).

Minnesota's Wildlife Action Network

The WAN shows viable or persistent populations and richness hotspots for the regions in Minnesota within or near access routes and offloading facilities for the rail alternative (Minnesota DNR 2016f). The WAN applies only to facilities at Clearbrook, Minnesota; and no WAN habitats occur in the vicinity of the Clearbrook terminal. Approximately 2.5 miles of the approximately 10 mile new rail access route between Clearbrook and Gully crosses through WAN habitats, with 56 percent in low-medium and 44 percent in medium ranked WAN habitats.

Minnesota Biological Survey Sites of Biodiversity Significance

Three unnamed MBS Sites preliminarily ranked as moderate occur near the Clearbrook terminal in the general location where rail facilities are likely to be constructed. These sites include a 48-acre forested area with a pond north of the terminal, a 144-acre site that includes Steenerson and Deep Lake just east of the terminal, and a 319-acre forested and wetland area south of the terminal. The new rail access between Clearbrook and Gully would cross near three additional moderate ranked MBS Sites: the 501-acre Gully 36 site north of the route near Gully; a 65-acre unnamed site south of the route crossed by the Lost River near Gonvick; and a 164-acre wetland and wooded unnamed site north of the route, west of Clearbrook.

Minnesota Scientific and Natural Areas

A review of PAD-US and Minnesota's SNAs indicated that no SNAs occur in the area around the Clearbrook or Superior terminals where new rail facilities are likely to be constructed.

5.2.5.2.5 Transportation by Truck

Federally Listed Species

The Transportation by Truck alternative consisted of two distinct segments—Gretna, North Dakota, to the Clearbrook terminal and Gretna to the Superior terminal. Eight federally listed plant and animal species, four threatened (Canada lynx, gray wolf, northern long-eared bat, and Fassett's locoweed) and four endangered (Kirtland's warbler, piping plover, and whooping crane [*Grus americana*], rusty patched bumble bee), are known to occur within the North Dakota and Minnesota counties included in the Transportation by Truck segment from Gretna to the Clearbrook terminal. Twelve federally listed plant and animal species, seven threatened and five endangered, are known to occur within the North Dakota, Minnesota, and Wisconsin counties included in the Transportation by Truck segment from Gretna to the Superior terminal. Gray wolf and Canada lynx occurrence data are not available in the NHIS database, and due to the size and mobility of individuals of both species, if they are known to occur within a county crossed by a Transportation by Truck segment they would be considered to be within the 1-mile ROI. No critical habitat occurs within the ROI for the Truck alternative.

State-Listed Species

<u>Endangered and Threatened Species</u>

No state-listed endangered or threatened animals are likely to occur within the general locations for truck offloading facilities and new access roads at Clearbrook or Superior (Minnesota DNR 2016e; North Dakota GFP 2016; Wisconsin DNR 2016). Four state-listed plants are likely to occur in the area where new offloading and the access roads would be constructed (Table 5.2.5-12). Occurrences of state-listed threatened and endangered species based on NHIS database locations are summarized in Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants). State-listed species that are also federally listed are included in these tables when they have been documented as elemental occurrences within NHIS data.

Table 5.2.5-12. Potential Occurrences of State-Protected Plants within the Region of Interest for the Transportation by Truck Alternative

Common and Scientific Name	Preferred Habitat	State / Status[a]
Vascular Plants		
Beaked spikerush (*Eleocharis rostellata*)	Coastal salt marshes and inland in saline, alkaline, or strongly calcareous habitats (e.g., around hot springs). Fruits during summer to fall in the north.	MN/T
Hair-like beak rush (*Rhynchospora capillacea*)	Calcareous fens, especially along the margins, and spring fens. Germinates in the spring, and flowers mid-summer.	MN/T
Sterile sedge (*Carex sterilis*)	Mineral-rich calcareous fens of the prairie region.	MN/T
Sweet colt's-foot (*Petasites sagittatus*)	Cold marshes and swamp openings.	WI/T

Sources: Minnesota DNR 2016e; Wisconsin DNR 2016; North Dakota GFP 2016.

[a] State/Status: T = Threatened, MN = Minnesota, WI = Wisconsin.

Note:

An occurrence can consist of one or more observations of one or more individuals temporally and spatially.

Special Concern Species

Based on a review of available presence/absence information, no special concern animals are likely to occur within the general location of truck offloading and new access facilities for the truck alternative (Minnesota DNR 2016e; North Dakota GFP 2016; Wisconsin DNR 2016). Three Minnesota special concern plants—few-flowered spikerush, McCalla's willow, and twig rush—potentially are present within the construction area for the truck alternative facilities (Appendix M, Table M-3).

Species of Greatest Conservation Need

Gap Analysis Program Species Models

The combined GAP models indicate habitat areas potentially used by one or more protected or rare vertebrate species. The areas rated medium and high have an increased potential to affect habitats used by multiple protected or rare species. According to the models, much of the area in the vicinity of the Clearbrook terminal, where new truck facilities and access roads likely would be constructed, is rated low for all species. However, about 10 to 20 percent of the area is rated medium for mammals (1 to 6 species) and birds (1 to 12 species); and about 10 percent is rated low for amphibians and reptiles (1 to 2 species). The area in the vicinity the Superior terminal where new truck facilities and access roads likely would be constructed is rated primarily high and medium for mammals (4 to 9 species), low for birds (1 to 6 species), and low for amphibians and reptiles (1 to 2 species).

Minnesota's Wildlife Action Network

The WAN shows viable or persistent populations and richness hotspots for the regions in Minnesota within or near access routes and offloading facilities for the truck alternative (Minnesota DNR 2016f). The WAN applies only to facilities at Clearbrook, Minnesota; and no WAN habitats are present in the vicinity of the Clearbrook terminal.

Minnesota Biological Survey Sites of Biodiversity Significance

Three unnamed MBS Sites preliminarily ranked moderate occur near the Clearbrook terminal where truck facilities are likely to be constructed. These sites include a 48-acre forested area with a pond north of the terminal, a 144-acre site that includes Steenerson and Deep Lake just east of the terminal, and a 319-acre forested and wetland area south of the terminal.

Minnesota Scientific and Natural Areas

A review of PAD-US and Minnesota's SNAs indicated that no SNAs occur in the area around the Clearbrook and Superior terminals where new truck facilities are likely to be constructed.

5.2.5.2.6 Existing Line 3 Supplemented by Rail

Existing conditions for continued use of the existing Line 3 pipeline supplemented by rail transport are similar to those described above for continued use of the existing Line 3 pipeline and the transportation by rail alternative.

5.2.5.2.7 Existing Line 3 Supplemented by Truck

Existing conditions for continued use of the existing Line 3 pipeline supplemented by truck transport are similar to those described above for continued use of the existing Line 3 pipeline and the transportation by truck alternative.

5.2.5.3 Impact Assessment

Potential impacts on unique natural resources from construction of the Applicant's proposed project, SA-04, and transportation by rail and truck include the following:

- Injury or loss of aquatic invertebrates and fish from waterbody crossing construction;
- Injury or loss of terrestrial invertebrates, small mammals, bird and reptile eggs and young, and plants from vegetation clearing, trench excavation, and vehicle operations;
- Loss or alteration of forage and cover habitats during vegetation clearing, site grading, and trenching;
- Disturbance from construction noise and activity; and
- Exposure to small leaks and drips from construction equipment and vehicles.

Potential impacts on unique natural resources from operation of the Applicant's proposed project and the CN Alternatives include the following:

- Habitat loss or continued disturbance from pipeline right-of-way vegetation management,
- Continued habitat loss or alteration during excavation for pipeline inspection and repair,
- Continued disturbance from noise and activity at facilities, and
- Collision injury or mortality during rail and truck transits.
- Potential barrier effects created by increased rail and truck transit.

The potential for effects on unique natural resources depends on whether the protected unique natural resources occur near facilities, infrastructure, activities, and habitat changes associated with the Applicant's proposed project and CN Alternatives; and whether these conditions may result in injury, harm, or disturbance.

5.2.5.3.1 Applicant's Proposed Project (from Neche to Superior)

Federally Listed Species

Federally listed threatened and endangered species that could occur within the North Dakota, Minnesota, and Wisconsin counties crossed by the Applicant's proposed project and could be affected by construction and operation include three mammals – Canada lynx, gray wolf, and northern long-eared bat; three birds – Kirtland's warbler, piping plover, and whooping crane; three invertebrates – Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee; and two plants – Fassett's locoweed and western prairie fringed orchid (Table 5.2.5-3).

<u>Construction Impacts</u>

If present, individual Canada lynx could be disturbed by construction noise and activity that likely would cause them to move to other areas, possibly returning after construction activities stop. Disturbance effects likely would be minor and temporary, unless den sites are disturbed. Most den sites, which are used from April to June, are unlikely to occur within the cleared work area because den sites usually are located around downed logs and windfall trees in the forest interior. Most tree clearing for pipeline construction, ATWS, access roads, and facility sites would occur next to previously cleared utility corridors that are not likely to support den sites. The habitat fragmentation analysis in Section 6.3.4 identifies 17 forested large-block habitats between MPs 215.0 and 352.0 that could support Canada lynx and den sites.

Foraging and reproductive activities for gray wolves could be affected by exposure to Project-related noise and increased human activity. Construction of a pipeline likely would displace a few gray wolves and alter used habitats, especially if packs currently use the existing pipeline rights-of-way in the area as travel corridors. If dens are present in the vicinity of the construction work area, construction-related disturbance could reduce pup survival. In addition, wolf-vehicle collisions continue to be a major contributor to wolf mortality. Typical conservation measures to reduce impacts on the gray wolf include:

- Observe vehicular speed limits during construction. Stop construction activities if the contractor or EI observes a gray wolf or possible den site within the construction corridor, or if USFWS notifies the Applicant of a gray wolf sighting within 1 mile of the construction work area; the stop work order for that area of construction should continue until the wolves leave the area.
- Report any wolf sightings immediately to USFWS, USACE, and state resource agencies (e.g., Minnesota DNR).

Minnesota NHIS reported 13 occurrences of the northern long-eared bat within the construction work area for the Applicant's proposed project (Minnesota DNR 2016e). Current use of the Applicant's proposed project by northern long-eared bats was confirmed by surveys performed by Merjent from 2014 to 2016 (2014b, 2014c, 2015c, 2015d, and 2016c). The Applicant conducted acoustic, mist-net, and telemetry surveys within forested areas that contain suitable habitat for northern long-eared bats during 2014 and 2015 to determine the summer presence or probable absence of northern long-eared bats, and if found, identify locations of maternity and/or roost trees used by northern long-eared bats. Northern long-eared bats were confirmed acoustically at survey sites in Aitkin, Carlton, Cass, Crow Wing, Hubbard, and Wadena counties in Minnesota, and in Douglas County in Wisconsin (Merjent 2014b, 2015c). In 2014 and 2015, mist-net surveys were completed at 85 sites along the Applicant's proposed project. In 2014, northern long-eared bats were captured at 54 sites in Aitkin, Carlton, Cass, Crow Wing, and Hubbard counties in Minnesota, and Douglas County in Wisconsin. Similarly, in 2015 northern long-eared bats were captured at nine sites in Aitkin, Carlton, Cass, and Wadena counties in Minnesota. A total of 23 roosts, including 9 maternity roost trees and 14 triangulated roosts on inaccessible land, were identified (5 trees in Carlton County, 10 in Cass County, 7 in Aitkin County, and 1 in Wadena County) (Merjent 2014c, 2015d). In 2016, acoustic surveys were conducted at six sites along the Applicant's proposed project in Aitkin, Clearwater, Polk, and Red Lake counties, Minnesota. No confirmed acoustic northern long-eared bats calls were recorded at the six survey sites (Merjent 2016c).

Impacts on individuals or colonies of bats may occur if clearing or construction occurs when bats are using summer roosts. Northern long-eared bats could be disturbed by noise or human presence, causing them to abandon occupied tree roosts. Bats could be directly injured or killed if occupied trees are cut down or disturbed. Impacts could be substantial if trees with maternity colonies are destroyed or abandoned. Because the population of northern long-eared bats is declining from white-nose syndrome and destruction of habitat among other factors, the protection of these bats—and particularly of groups of female and juvenile bats in maternity colonies—is of critical importance.

Conservation measures were included in the ESA 4(d) rule[17] to reduce potential impacts on northern long-eared bats. Under the final 4(d) rule, incidental take involving tree removal in the mapped white nose syndrome zone, which includes the Applicant's proposed project, is not prohibited if the following two conservation measures are followed:

- Maintain a year-round 0.25-mile-radius buffer (which is equivalent to 125.7 acres) around known northern long-eared bat hibernacula.
- Protect known, occupied maternity roost trees. Incidental take is prohibited if the activity cuts or destroys a known, occupied maternity roost tree, or any other trees within a 150-foot radius around a known maternity roost tree, equivalent to 1.6 acres, during the pup season from June 1 to July 31.

Kirtland's warblers nest in jack pine forests in Wisconsin and Michigan, and they migrate along the southeast coast of the United States to overwinter in the Bahamas. No critical habitat has been designated for the species. Kirtland's warblers have been known to occur during the breeding season in Douglas County, Wisconsin. As part of the ongoing recovery effort, five jack pine stands were censused by the USFWS in Douglas County during the 2016 breeding season; however, no signing males were documented (USFWS 2016). Five occurrences of jack pine woodlands occur within the construction work area of the Applicant's proposed project (Table 5.2.5-3). However, it is unknown whether these woodlands are the same five stands surveyed by the USFWS in 2016, or if they provide suitable breeding habitat for Kirtland's warblers. If Kirtland's warblers were to nest in the construction work area and vegetation clearing occurred during the nesting season loss of eggs or young could occur. Construction

[17] Regulations identified by USFWS that are deemed "necessary and advisable" for protection and conservation of a federally threatened species.

activities and presence of construction personnel could also cause disturbance and displacement of adult birds, should they occur in the vicinity of the activity.

Piping plovers which breed in the Great Lakes region inhabit shorelines of the Great Lakes. They nest on open, sparsely vegetated sandy habitats such as sand spits or sand beaches found on Great Lakes islands and mainland shorelines. Critical habitat for this species has been designated in Douglas County, Wisconsin, and is defined as lands 500 meters (1,640 feet) from the normal high water line from the mouth of Dutchman Creek west-northwest along the Lake Superior shoreline to the breakwall forming the Superior Front Channel opening to Lake Superior (USFWS 2001). The Applicant's proposed project would end at the Superior terminal in Douglas County, approximately 4,000 meters (13,100 feet) west of the opening to Lake Superior. Because of the distance from the Lake Superior shoreline and highly developed nature of the Superior terminal, it is unlikely that any piping plovers would occur in the vicinity of the Applicant's proposed project.

Whooping cranes from the non-essential, experimental eastern population that winters in Florida migrate to breeding areas in Wisconsin and could occur in the ROI for the Applicant's proposed project during spring and fall migrations. Noise and activity during construction can displace whooping cranes from stopover habitats during foraging or in in wetlands or riverine habitats during roosting. Whooping cranes generally depart from wintering grounds during late March to mid-April and return from breeding grounds beginning in mid-September. The eastern population travels north through Georgia, Tennessee, Kentucky, Indiana, and Illinois to Wisconsin. During migration, whooping cranes use croplands and shallow wetlands for stop-over foraging and roosting habitats. The Aransas-Wood Buffalo Park whooping crane population migrates between wintering grounds in Aransas NWR to breeding grounds in Wood Buffalo National Park in northern Alberta. The migration corridor for this population crosses through central Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota and is generally west of the Applicant's proposed project in North Dakota. If construction occurs during the migration period, individuals may avoid active construction areas, or if already present when construction begins for the day, foraging or roosting birds may be flushed (USFWS 2009).

If present, the Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee could be affected by construction activities that disturb native vegetation. These activities would disrupt egg laying and foraging during spring and summer, and could crush dormant larvae or hibernating queens during fall and winter. These prairie-dependent insects depend on high-quality native grasslands and tallgrass prairies to provide food from flower pollen and nectar. Vegetation clearing and replacement with non-native ground covers could injure or kill these butterflies and bees, and remove forage plants.

The Applicant completed a desktop and field assessment of potentially suitable native prairie habitat for the Dakota skipper and Poweshiek skipperling along the Applicant's proposed project. Dakota skippers and Poweshiek skipperling are not currently known to occur in Pembina County, North Dakota, and the desktop review did not identify any suitable habitats along the Applicant's proposed project in North Dakota. Potentially suitable Dakota skipper and Poweshiek skipperling habitat identified as part of the desktop review was documented at one location along the proposed project in Polk County, and at two locations in Pennington County, Minnesota. Suitable habitats were found in small, isolated pockets that ranged in size from 0.4 to 1.8 acres. Presence/probable absence field surveys were conducted in 2015, and did not identify the presence of Dakota skipper or Poweshiek skipperling at the three potentially suitable habitat locations in Pennington and Polk counties (Merjent 2015a). Presence/ probable absence surveys have not been performed based on the revised 2016 habitat assessment (Merjent 2016a). While it is possible that the Dakota skipper and Poweshiek skipperling could occur within the ROI, based on the results of the habitat survey and earlier presence/probable absence survey, it is unlikely that these prairie-dependent insects would be affected by construction activities.

The Applicant's proposed project would not cross any current high use areas for rusty patched bumble bee, and construction is not likely to directly or indirectly affect any individuals or current high use areas. The Applicant's proposed project crosses through current potential low use areas where rusty patched bumble bees may disperse from current high use areas or where their occurrence is uncertain. The rusty patched bumble bee may benefit from opportunities to conserve the species within the dispersal area, and USFWS may recommend surveys.

Applicable conservation measures that would benefit the rusty patched bumble bee within this dispersal area include restoration and maintenance of high-quality habitat through control of invasive species and restoration, including a high diversity and abundance of wildflowers appropriate for the region and local characteristics (USFWS 2017).

Fassett's locoweed and western prairie fringed orchids have the potential to occur within the Applicant's proposed project; however, there are no known occurrences of either species within the construction work area. If these plants were to occur, direct impacts could include trampling and destruction during construction from clearing and grubbing, grading, and trenching. Indirect effects from construction could include conversion of shoreline habitat (for locoweed) and already fragmented prairie habitat (orchid) into other habitat types and the spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction.

Impacts on prairie soils from construction would be long term and could require a substantial amount of recovery time, which could affect any western prairie fringed orchids present. Surveys were not performed for Fassett's locoweed, but based on known habitat types, there is limited potential for them to occur within the construction work area. If they were to occur, effects could include trampling, destruction, or conversion of shoreline habitats. From 2013 to 2016, the Applicant completed habitat analyses and field surveys of potentially suitable western prairie fringed orchid habitat, and no orchids were located during these surveys (Merjent 2016e). Potentially suitable habitat was identified at one location, but no western prairie fringed orchids were found. Environmental inspectors and construction personnel will be trained to identify these plant species should they occur in the area in the future. However, it is unlikely that western prairie fringed orchids would be affected by construction of the Applicant's proposed project, because none are likely to occur in the construction area.

Summary

Measures to avoid or reduce construction impacts on the federally listed animals and plants that could occur along the Applicant's proposed project would be developed in consultation with USFWS to ensure that any unavoidable impacts would not jeopardize the continued existence of species protected by the ESA. The Canada lynx and gray wolf could experience temporary minor disturbance associated with construction activities. Northern long-eared bats and occupied bat maternity roots are known to occur in the ROI. With implementation of BMPs and general conservation measures associated with the ESA 4(d) rule, impacts from construction would be temporary and minor. Given the limited distribution within the ROI of Dakota skipper, Kirtland's warbler, piping plover, whooping crane, Poweshiek skipperling, and rusty patched bumble bee, construction impacts likely would be temporary to short term and negligible. Effects on federally listed plants are not likely because of the scarcity of appropriate habitat and/or species presence.

Operations Impacts

Operations and maintenance activities of the Applicant's proposed project would result in periodic noise and human/equipment activity associated with inspection overflights, ground surveillance, and maintenance and repairs. Impacts on individual Canada lynx and gray wolves would be limited to temporary disturbance or displacement. Lynx and wolves would be expected to resume use of the area following the disturbance. Disturbance could also be caused by public and private use of all-terrain vehicles and snow machines along the permanent right-of-way. Operation of vehicles along the right-of-way could result in collisions with individual lynx or wolves. Minimization measures to reduce the potential for collisions could include operating equipment at speeds suitable for the driving conditions or posted speed limits. Use of the right-of-way for recreational purposes could potentially be reduced by limiting access through use of gates and posting of no trespassing signs, where appropriate. The probability of collisions with work vehicles during operations would be low. Therefore, no adverse impacts are expected as a result of collisions. Impacts to Canada lynx and gray wolf would be limited to periodic disturbance. Therefore, only temporary minor impacts on individuals of these species would be expected over the life of the project.

Operational impacts on the northern long-eared bat could include continued habitat loss or alteration (i.e., if trees are allowed to grow larger than 3 inch in diameter at breast height between tree maintenance events) and disturbance from noise and activity at aboveground facilities during pipeline inspection overflights or ground surveillance and during right-of-way maintenance activities. Human activities during operations typically would occur during daylight hours; therefore, operations activities would not interrupt nighttime foraging activities. However, each incident would result in a temporary minor impact that would occur periodically over the life of the Project. Operation of pipeline pump stations would increase nearby noise levels over existing ambient levels. As described in Section 6.2.2, however, sound level increases would comply with Minnesota Noise Standards and would decrease over distance. Pump station footprints would be devoid of trees; while bats could forage in the vicinity, they would not roost at the pump stations. Unless a roost site is near a pump station, the effect on northern long-eared bats from operation of pump stations is expected to be permanent and negligible.

If operation and maintenance activities occur in the vicinity of Superior during the Kirtland's warbler breeding season (May through September), foraging and reproductive activities could be affected by noise and increased human activity. In addition, vegetation clearing during the nesting season could result in loss of eggs or young, should individuals nest in the permanent right-of-way. Piping plovers also could occur near facilities in Superior. It is unlikely that Kirtland's warblers or piping plovers would use human-developed habitats; therefore, operations impacts on these species likely would be permanent and negligible. Migrant whooping cranes would not be affected by pipeline operation.

As described for construction, surveys did not document any individuals of the Dakota skipper or Poweshiek skipperling, and these species are unlikely to occur along the Applicant's proposed project. Therefore, there would be no adverse impacts on either of these species.

The Applicant's proposed project would not cross any current high use area for rusty patched bumble bee. Therefore, no adverse impacts on any individual bees or current high use areas are expected. The Applicant's proposed project crosses through current potential low use areas where rusty patched bumble bees may disperse from a current high use area or where their occurrence is uncertain. If bees are determined to occur in these areas, measures to avoid or minimize impacts could include :

- Limiting vegetation management in high-quality habitat during the active season (March through September).
- Leaving one or more areas unmowed for the entire year in vegetation management areas.
- Using a minimum of 8 to 10 inches cutting height to prevent disturbance of overwintering queens or nesting sites.
- Carefully applying and targeting pesticide use to control pests and invasive species, including:
  - Using the least toxic options and following label directions to ensure proper use.

    Applying as locally and directly as possible; avoiding broadcast application that may be harmful to the rusty patched bumble bee or their nectar plants in areas where the species is likely to be found.
  - Ensuring that field crews recognize target weeds to avoid adverse effects on important native plants (USFWS 2017).

As described under construction impacts, Fassett's locoweed and western prairie fringed orchid are not likely to occur in the right-of-way. Surveys were not conducted for Fassett's locoweed and no individuals of western prairie frindged orchid were documented during field surveys. Therefore, impacts to individuals from operations are not anticipated. In the unlikely event that individuals of either species persist within the permanent right-of-way they could be permanently affected by vegetation maintenance activities; however, given the lack of appropriate habitat and known occurrences, impacts likely would be negligible.

Summary

Operations and maintenance impacts on Canada lynx and gray wolves would be limited to periodic disturbances over the life of the project. These impacts would be temporary and minor. No adverse impacts are expected as a result of vehicle collisions, due to the infrequent nature of the maintenance activities, rarity of the species occurring near the project, and minimization measures such as speed restrictions and measures to prevent trespassing. Impacts on northern long-eared bats would be permanent and negligible. Given the limited distribution and habitat types that could be used by Kirtland's warblers and piping plovers operations and maintenance impacts would be permanent and negligible. Migrant whooping cranes would not be affected by pipeline operation. No adverse impacts are anticipated on the Dakota skipper or Poweshiek skipperling, because no individuals were documented during surveys. Similarly, no adverse impacts are expected to occur to the rusty patched bumble bee, because no high use areas occur within the Applicant's proposed project. Operations would be unlikely to affect federally listed plants because of the scarcity of appropriate habitat and species presence.

State-Listed Species

Endangered and Threatened Species

State-listed endangered and threatened animal species that could occur within the ROI for the Applicant's proposed project and could be affected by construction and operation include one mammal – northern long-eared bat, one fish – pugnose shiner, one reptile – wood turtle, and one invertebrate –

fluted-shell mussel (Table 5.2.5-4). Potential impacts on the northern long-eared bat are discussed above for federally listed endangered and threatened species. Of the 21 state-listed endangered and threatened plants known to occur within the ROI, 13 potentially occur within the construction work area (Table 5.2.5-5).

Construction Impacts

Two aquatic animal species have been documented in the ROI for the Applicant's proposed project: the pugnose shiner and the fluted-shell mussel. Both species have been reported within the construction work area for the Applicant's proposed project. The pugnose shiner coincides with the construction work area in one location, and the fluted-shell mussel coincides with the construction work area in one location. The Applicant surveyed for mussels at sixteen sites along the Applicant's proposed project, and no state-protected mussels were found (Merjent 2015b).

If present at the time of construction, the pugnose shiner and fluted-shell mussel could be affected by in-stream construction or construction activities that take place in the adjacent uplands. Both species are vulnerable to any deterioration in water quality, especially increased siltation. Disturbance to the stream bottom could crush or suffocate the fluted-shell mussel and would temporarily increase turbidity that could reduce feeding efficiency and damage these sensitive aquatic animals. HDD is proposed for both of the stream crossings where these two species have been documented, so any impacts due to in-stream construction would be avoided. HDD requires the use of water-based drilling fluid to cool the cutting tools and remove soil/bedrock cuttings. Inadvertent releases of HDD water-based drilling fluid could affect surface water resources. However, HDD water-based drilling fluid would primarily consist of naturally occurring materials, such as bentonite, which in small quantities would not be detrimental to water quality. Increased turbidity and siltation could still occur due to surface runoff from construction work areas. Stringent erosion and sediment control practices would minimize these potential effects. Contaminated construction equipment and water used for hydrostatic testing could introduce invasive aquatic animals such as zebra mussels and quagga mussels (*Dreissena bugensis*) that could displace and reduce habitat quality for aquatic animals. To minimize the potential for introduction of invasive species, the Applicant would implement an invasive species minimization plan. In addition, EIs would monitor construction activities to ensure compliance with permit conditions and the invasive species plan, reducing the potential for introduction of invasive species during construction.

The wood turtle inhabits aquatic habitats and adjacent uplands. Although there are no known occurrences of this species within the construction footprint, the wood turtle has been documented within the ROI and could be encountered within the construction footprint. If wood turtles were present, construction could result in direct mortality of turtles or destruction of nests; turtles could be crushed by machinery, buried under excavated soil, or trapped in trenches. In areas with suitable habitat and known occurrences of wood turtles, EIs could monitor the trench and ensure that no turtles become entrapped prior to pipeline burial. Stream-disturbing activities and impacts as described above for the pugnose shiner and fluted-shell mussel also would affect aquatic habitats potentially used by wood turtles. Stringent erosion and sediment control practices would minimize these potential effects. Any destruction, degradation, or fragmentation of floodplains also has the potential to negatively affect this species in the long term. Given the limited overlap with wood turtle range and habitat, construction likely would result in temporary to long-term, minor impacts on wood turtles.

Fourteen Minnesota-listed plant species (10 threatened and 4 endangered) and seven Wisconsin-listed plant species (5 threatened and 2 endangered) are known to occur within (i.e., within the construction work area or operation ROW) or near (i.e., within 0.5 mile) the Applicant's proposed project and could be affected during construction and operations (Table 5.2.5-5; Appendix M, Table M-3).

Minnesota-listed plants were documented at 16 survey sites along the Applicant's proposed project. The Applicant would avoid state-listed plants at 12 sites (Table 5.2.5-13) because they occur outside of the construction work area or by implementing avoidance strategies, including but not limited to, workspace area reductions or modifications, exclusion fencing, and minor route centerline adjustments. Some individuals would still be impacted at two of the 12 site (Table 5.2.5-13).

Table 5.2.5-13. Avoidance of Minnesota Endangered and Threatened Plant Populations for the Applicant's Proposed Project

Survey Site	County	Common and Scientific Name	Status	How Avoided
North Dakota Border to Clearbrook				
L3R_03	Kittson	Red saltwort (*Salicornia rubra*)	Threatened	Applicant modified workspace to avoid all 91 individuals of red saltwort.[a]
L3R_04	Kittson/Marshall	Red saltwort (*Salicornia rubra*)	Threatened	All 14,949 individuals of red saltwort are outside of workspace.[a]
L3R_08	Pennington	Sterile sedge (*Carex sterilis*)	Threatened	All individuals of sterile sedge are outside of workspace.
L3R_11	Red Lake	Clinton's bulrush (*Trichophorum clintonii*)	Threatened	All individuals of Clinton's bulrush are outside of workspace.
L3R_12	Polk	Whorled nutrush (*Scleria verticillata*)	Threatened	All 787 individuals of whorled nutrush are outside of workspace.[b]
L3R_14a	Clearwater	Handsome sedge (*Carex formosa*)	Endangered	Applicant modified workspace to avoid 11 individuals of handsome sedge. Applicant would use exclusion fencing to avoid one individual of handsome sedge within workspace.[b]
Clearbrook to Carlton				
L3X_22/23/58	Cass	Butternut (*Juglans cinerea*)	Endangered	Applicant developed and adopted a route deviation to avoid all 24 individual butternut trees.[c]
		Narrow triangle moonwort (*Botrychium lanceolatum* ssp. *angustisegmentum*)	Threatened	There are 19 individuals of narrow triangle moonwort outside of the workspace.[d, e] Other individuals of this species would be affected.
L3X_25	Cass	Purple-flowered bladderwort (*Utricularia purpurea*)	Endangered	All individuals of purple flowered bladderwort are outside of workspace.
L3X_105	Cass	A bristle-berry (*Rubus fuller*)	Threatened	All individuals of a bristle-berry[f] are outside of workspace.

Table 5.2.5-13. Avoidance of Minnesota Endangered and Threatened Plant Populations for the Applicant's Proposed Project

Survey Site	County	Common and Scientific Name	Status	How Avoided
L3X_81a	Aitkin	Narrow triangle moonwort *(Botrychium lanceolatum* ssp. *angustisegmentum)*	Threatened	All individuals of narrow triangle moonwort are outside of workspace.
		Bog bluegrass (*Poa paludigena*)	Threatened	Large numbers of bog bluegrass are outside of workspace. Other individuals of this species would be affected.
L3X_29	Carlton	A liverwort (*Trichocolea tomentella*)	Threatened	All individuals of *T. tomentella* are outside of workspace.
L3X_64	Carlton	Narrow triangle moonwort (*Botrychium lanceolatum* ssp. *angustisegmentum*)	Threatened	All individuals of narrow triangle moonwort are outside of workspace.[g]

Source: Minnesota DNR 2017b.

[a] Number of individuals avoided is based on 2015 population count data. At survey site L3R_03, no individuals were observed during 2016 population counts.

[b] Number of individuals avoided is based on 2016 population count data.

[c] The avoidance of all butternut trees at survey site L3X_22/23/58 is based on 2013 survey data. The Applicant would install exclusion fencing at a 25-foot radius around one individual to avoid impacts on the root zone. This tree, approximately 25 feet tall with a 7-inch diameter at breast height, is within 7 feet of the construction workspace and within 12 feet of additional temporary workspace. The tree size was measured on August 23, 2016. On the same site visit, there was no evidence of butternut canker (a lethal fungal disease) for this tree.

[d] Number of individuals avoided is based on a combination of 2015 and 2016 population count data.

[e] Applicant would fence individuals that are outside of the workspace but within 5 feet of the workspace edge to facilitate avoidance during construction.

[f] This species was tentatively identified on June 20, 2016. Upon revisit on August 23, 2016, to confirm the species identification based on characteristics of mature primocanes, the individuals were no longer present due to logging of the area.

[g] No individuals were observed within workspace or within 5 feet of the edge of workspace during 2016 population counts.

Note:

No Minnesota endangered or threatened plant populations were identified in the Carlton-to-Wisconsin border for the Applicant's proposed project.

Populations of six Minnesota-listed plants at seven sites are within the construction work area for the Applicant's proposed project and would not be avoided (Table 5.2.5-14). The Applicant would consult with Minnesota DNR to complete the Endangered Species permit process for takes at these sites ("takes" include picking, digging, or destroying). If there are no feasible alternatives to takes, the Applicant would propose compensatory mitigation to reduce the impact to an acceptable level. The amount of compensation required would depend on the degree of impact on each plant species (e.g., loss of the entire population at a site versus the loss of a few individuals) and the statewide significance of the population at the affected site. The types of acceptable compensatory mitigation for takes of endangered or threatened plants in Minnesota could include:

- Funding state acquisition and protection 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 Minnesota DNR's understanding of the habitat requirements or protection needs of the species.

Of the seven Wisconsin-listed endangered and threatened plants, multiple populations of five plant species may occur within the construction work area and could be destroyed. Similar state Endangered Species permits for takes and compensatory mitigation may be required by Wisconsin DNR if takes are not avoidable for the state threatened clustered bur-reed, seaside crowfoot, and sweet colt's foot, and for the state endangered neat spike-rush and small yellow water crowfoot.

If the populations of six Minnesota-listed plant species and five Wisconsin-listed plant species cannot be avoided, construction could result in permanent major impacts on those populations. These impacts could be offset by compensatory mitigation.

Summary. Measures to avoid or reduce construction impacts on state-listed animals and plants would be developed in consultation with the appropriate state agencies to ensure that any unavoidable impacts would not jeopardize the continued existence of state-listed species. Given their limited distribution and the proposed construction methods, the pugnose shiner and fluted-shell mussel would not be impacted. Impacts on the wood turtle could be temporary to long-term minor impacts. Eleven state-listed plants are known to occur within the construction work area, and effects on these plants are expected to be major and permanent. An additional 10 state-listed plant species could occur outside of the construction work area, but within the ROI. No impacts to individuals of these 10 species are anticipated. All state-listed animals and plants within the ROI also could be indirectly affected by habitat loss and alteration.

Table 5.2.5-14. Potential Construction Impacts on Minnesota Endangered and Threatened Plant Populations for the Applicant's Proposed Project

Survey Site	County	Common and Scientific Name	Status [a]	Number of Avoided Individuals	Number of Affected Individuals
North Dakota Border to Clearbrook					
L3R_07	Marshall	Sterile sedge (*Carex sterilis*)	Threatened	268[b]	47[c]
L3R_12	Polk	Sterile sedge (*Carex sterilis*)	Threatened	657[d]	292
		Beaked spikerush (*Eleocharis rostellata*)	Threatened	14,665[d]	5,036
		Hair-like beak rush (*Rhynchospora capillacea*)	Threatened	18	106
L3R_14	Clearwater	Handsome sedge (*Carex formosa*)	Endangered	62[c, d]	3[c]
Clearbrook to Carlton					
L3X_99	Cass	Bog bluegrass (*Poa paludigena*)	Threatened	10 (3,500)[c, e]	4[c]
L3X _22/23/58	Cass	Narrow triangle moonwort (*Botrychium lanceolatum* ssp. *angustisegmentum*)	Threatened	19[b]	1 + 40[f, g]
L3X _C1	Cass	Narrow triangle moonwort (*Botrychium lanceolatum* ssp. *angustisegmentum*)	Threatened	-	20[f]
L3X _81a	Aitkin	Bog bluegrass (*Poa paludigena*)	Threatened	45 (7,000)[e]	242[c]
		Bog bluegrass (*Poa paludigena*)	Threatened	257 (8,000)[e]	961[c]
		Bog bluegrass (*Poa paludigena*)	Threatened	1,173 (5,000)[e]	744[c]

Source: Minnesota DNR 2017b.

[a] Status refers to Minnesota listing.

[b] Number of individuals is based on a combination of 2015 and 2016 population counts.

[c] Number of individuals is based on 2016 population count data.

[d] The Applicant would fence individuals that are outside of the workspace but within 5 feet of the workspace edge to facilitate avoidance during construction.

[e] First number is based on number of individuals avoided within site boundary used for 2016 population count. Second number (in parentheses) is based on estimated size of population beyond site boundary during 2016 occurrence surveys;

[f] Number of individuals is based on 2015 population count data.

[g] The Applicant would avoid all individual butternut trees at this site with the understanding that some individuals of narrow triangle moonwort (which have a shorter time to maturity and are less imperiled) would be affected as a result.

Note:

No Minnesota endangered or threatened plant populations were identified in the Carlton-to-Wisconsin border for the Applicant's proposed project.

Operations Impacts

Pipeline operation activities include maintenance mowing of the permanent right-of-way, excavation for visual inspection and repair or replacement of pipeline sections, and invasive species control. Vegetation management that prevents riparian trees and large shrubs from reestablishing within the permanent right-of-way could increase stream temperatures by removing shade, which would reduce habitat suitability for aquatic animals in adjacent waterbodies. The application of herbicides in the vicinity of waterways also has the potential to negatively affect water quality and, consequently, aquatic species. Because the pugnose shiner and fluted-shell mussel are known to occur in the ROI for the Applicant's proposed project, these species could experience a permanent, although negligible, impact during operations. Upland vegetation management could crush nests and wood turtles, causing a permanent minor impact on the species. State-listed plants that persist within the permanent right-of-way after construction could be permanently affected by vegetation management activities, including herbicide application; however, given the potential for avoidance of these plants, the overall impact would be permanent and minor. All state-listed animals and plants in the ROI also could be indirectly affected by habitat loss and alteration.

<u>Special Concern Species</u>

State-listed animals of special concern that could be affected by operation of the Applicant's proposed project include 14 vertebrates: three bats – big brown bat, little brown bat, and northern long-eared bat; prairie vole (*Microtus ochrogaster*); eight birds – Connecticut warbler, greater prairie-chicken (*Tympanuchus cupido*), Le Conte's sparrow, Nelson's sparrow, northern goshawk (*Accipiter gentilis*), red-shouldered hawk, short-eared owl, and trumpeter swan; one amphibian – four-toed salamander (*Hemidactylium scutatum*); one fish – least darter (*Etheostoma microperca*); and five invertebrates – a caddisfly, a jumping spider (*Marpissa formosa*), and three mussels – black sandshell, creek heelsplitter, and pink heelsplitter (Appendix M, Tables M-1 and M-2).

Individuals of fourteen state-listed plant species of special concern could be affected by construction and operation, including blunt sedge, false mountain willow, few-flowered spikerush, least moonwort, mamillate spike-rush, McCalla's willow, northern single-spike sedge, northwestern sticky aster (*Canadanthus modestus*), slender naiad (*Najas gracillima*), small white lady's slipper, Torrey's mannagrass (*Torreyochloa pallida*), twig rush, Vasey's rush, and white adder's mouth (*Malaxis monophyllos* var. *brachypoda*) (Appendix M, Table M-3).

Construction Impacts

Construction could directly affect special concern bat individuals as a result of tree clearing during summer, if occupied maternity or roost trees are cut or disturbed (as described above for the northern long-eared bat). NHIS data and surveys identified that both big brown bats and little brown bats occur within the construction work area. Application of the conservation measures associated with the ESA 4(d) rule that protect the northern long-eared bat also would protect these bats.

Of the special concern birds, the Applicant's proposed project would have the greatest potential to affect greater prairie-chicken individuals during the lek (the period when males assemble in an area termed a "lek" and engage in competitive displays to attract a mate) and nesting period. As many as nine potential nesting areas could occur within the construction work area. Disturbance during the lek could interrupt breeding and make nesting birds and eggs more vulnerable to predation by foxes, skunks, and raptors. Other special concern birds that have been documented during the breeding season within the construction work area include Nelson's sparrow and short-eared owl. Construction during the breeding season could result in the loss of eggs or young for these birds, resulting in short-term major impacts.

Construction of waterbody crossings for the Applicant’s proposed project has the potential to affect individuals of the following aquatic special concern species documented within the ROI: caddisfly, black sandshell, creek heelsplitter, pink heelsplitter, and least darter. Dry or wet open-cut stream crossings can result in injury or death and short-term increased turbidity impacts if these animals are present at the stream crossing during construction. Of these special concern aquatic animals, black sandshell, creek heelsplitter, and least darters would occur at the crossing locations. Construction impacts on these aquatic animals would be short term and negligible to major, depending on the number of individuals present and the type of waterbody crossing method used.

Construction through mature upland forests and fish-free wetlands also could affect the four-toed salamander that is present within the ROI. Vegetation clearing for construction could also have direct impacts on individual jumping spiders.

Eleven of the 14 state-listed plants of special concern have been documented within the construction work area for the Applicant’s proposed project, including blunt sedge, false mountain willow, few-flowered spikerush, least moonwort, mamillate spike-rush, McCalla’s willow, northern single-spike sedge, slender naiad, small white lady’s slipper, Torry’s mannagrass, and Vasey’s rush. Individual plants could be destroyed by construction if populations cannot practicably be avoided. Avoidance could include methods discussed above for state-listed plants. If the individual plants cannot be avoided, construction could result in permanent major impacts on 11 state-listed special concern plants.

Operations Impacts

Pipeline operation would include vegetation management and pipeline inspections that could require excavation and repair or replacement of sections of the pipeline. These activities could affect the four-toed salamander if the species is present within the permanent right-of-way. Pipeline operation would include noise from pump stations, which could but is not likely to, affect special concern birds during nesting. Maintenance mowing during the nesting season could cause nest abandonment and directly destroy nests, eggs, and young of ground-nesting birds, including those of the greater prairie-chicken, Nelson’s sparrow, and short-eared owl. This could result in permanent major impacts on these special concern species. Habitat would be permanently altered by vegetation management, resulting in permanent minor impacts on special concern species that occur in the permanent right-of-way.

If special concern plants continue to persist within the permanent right-of-way, vegetation management and periodic excavation of pipeline sections for repair or replacement could affect them. Most of these plants would be unlikely to persist within the permanent right-of-way; consequently, if impacts do occur, they would be short term and minor.

Species of Greatest Conservation Need

<u>Gap Analysis Program Species Models</u>

The combined region-wide GAP species model data show the total area used by one or more protected or rare species. The distribution of low, medium, and high use areas for protected or rare mammal species indicates that 41 percent of the area within the ROI for the Applicant’s proposed project could support medium to high use by these mammals (4 or more species). This relatively high proportion may reflect the widespread use of this area by Canada lynx. By comparison, 17 percent of the area within the ROI for federally listed species could support medium to high use by protected or rare birds (7 or more species). A total of 27 BCCs were identified as occurring within the ROI from the North Dakota border to Superior, Wisconsin (Appendix M, Table M-5). The Applicant's proposed project is primarily low use for protected or rare amphibians and reptiles (Table 5.2.5-15).

Table 5.2.5-15. GAP Species Models – Habitat Use Areas for Protected and Rare Mammals, Birds, Amphibians, and Reptiles within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for the Applicant's Proposed Project (acres)

GAP Species Groups	Con[a]	Op[a]	Total		Within 0.5 Mile
			Con[b]	Op[b]	
Mammals[c]					
Low	2,487	1,099	3,101	1,247	130,256
Medium	1,474	664	1,705	757	81,340
High	128	62	148	69	8,458
Subtotal	***4,090***	***1,845***	***4,954***	***2,092***	***220,054***
Proportion of medium and high	**39%**	**39%**	**37%**	**39%**	**41%**
Birds[d]					
Low	3,778	1,694	4,601	1,916	205,570
Medium	776	362	1,012	439	35,711
High	0	0	0	0	239
Subtotal	***4,554***	***2,056***	***5,614***	***2,356***	***241,520***
Proportion of medium and high	**17%**	**18%**	**18%**	**19%**	**15%**
Amphibians and Reptiles[e]					
Low	1,117	506	1,328	581	64,727
Medium	<1	<1	<1	<1	18
High	0	0	0	0	-
Subtotal	***1,117***	***506***	***1,328***	***581***	***67,745***
Proportion of medium and high	**<1**	**<1%**	**<1%**	**<1%**	**<1%**

Sources: USGS GAP 2016a, 2016b.

[a] Con = Applicant-provided footprints for construction work area (note 120-foot-wide work area for North Dakota and Wisconsin); Op = 50-foot-wide permanent right-of-way centered on the pipeline

[b] Total: Con = sum of pipeline construction work area (includes the pipeline permanent right-of-way), additional temporary workspaces, and temporary access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, pump stations, and valves

[c] Mammals – Low = 1 to 3 species, Medium = 4 to 6 species, High = 7 to 9 species

[d] Birds – Low = 1 to 6 species, Medium = 7 to 12 species, High = 13 to 19 species

[e] Amphibians and Reptiles – Low = 1 to 2 species, Medium = 3 to 6 species, High = 7 to 11 species

Construction Impacts

General construction impacts and measures to avoid or reduce impacts on rare and protected species addressed in the GAP models would be the same as those described above for federally and state-listed vertebrate fauna. Mammals could be disturbed by construction noise and activity that likely would cause larger mammals to move to other areas, possibly returning after construction activities stop; while smaller, less mobile mammals could be crushed and killed. Overall, effects likely would be short term and minor. Given the low proportion of medium use areas for birds and low overall use for herptiles within the construction areas, impacts on these groups from construction would be short term and minor to negligible.

Operations Impacts

Vegetation management within the permanent right-of-way would prevent the reestablishment of trees and large shrubs. Animals that depend on closed canopies for cover and habitat may avoid the permanent right-of-way. Therefore, the permanent right-of-way may act as a barrier to travel for some animals, such as amphibians, reptiles, and small mammals, and may result in fragmenting SGCN habitat. Habitat fragmentation can increase edge habitats favored by some animals and avoided by others; it can create a barrier to movements for some animals while facilitating movements of others, especially predators. Forest-nesting songbird abundance, diversity, and reproduction rates can be depressed by fragmentation associated with linear developments (Jalkotzy et al. 1997).

Minnesota's Wildlife Action Network

Approximately 28 percent of the Applicant's proposed project would affect WAN habitats (Table 5.2.5-16). Most WAN habitats (78 percent) that would be affected by construction and operation of the Applicant's proposed project are rated low-medium and medium, and no WAN habitats affected by the Applicant's proposed project are rated high. Most of the 97 miles (about 77 percent) of the Applicant's proposed project route that crosses WAN habitats in Minnesota would occur within existing utility or transportation corridors. About 23 miles (23 percent) would cross a new right-of-way, potentially contributing to fragmentation of these WAN habitats. Therefore, overall impacts on WAN habitats would be minor and permanent from habitat loss and alteration in addition to potential fragmentation (fragmentation is described in greater detail in Section 5.2.4).

Table 5.2.5-16. Impacts on the Wildlife Action Network in Minnesota within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for the Applicant's Proposed Project (acres)

Wildlife Action Network Rating	Con[a]	Op[a]	Total		Within 0.5 Mile
			Con[b]	Op[b]	
Low	228.6	100.5	272.9	107.6	10,166.3
Low-medium	598.2	268.9	727.2	299.4	28,181.8
Medium	407.5	187.0	487.8	225.4	21,413.2
Medium-high	57.6	30.1	72.9	36.3	4,270.1
High	0.0	0.0	0.0	0.0	0.0
WAN TOTAL	**1,291.8**	**586.6**	**1,560.9**	**665.1**	**64,031.5**
Minnesota total	***4,555.2***	***2,057.0***	***4,934.1***	***2,057.1***	***215,882.3***
Proportion in WAN	***28.4%***	***28.5%***	***31.6%***	***32.3%***	***29.7%***

Source: Minnesota DNR 2016f.

[a] Con = Applicant-provided footprint for construction work area; Op = Applicant-provided footprint for permanent right-of-way.

[b] Con = sum of pipeline construction work area (includes the pipeline permanent right-of-way), additional temporary workspaces, and temporary access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, pump stations, and valves.

Note:

Table 5.2.5-16. Impacts on the Wildlife Action Network in Minnesota within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for the Applicant's Proposed Project (acres)

Wildlife Action Network Rating	Con[a]	Op[a]	Total		Within 0.5 Mile
			Con[b]	Op[b]	

Values in the table may not sum to totals and subtotals because of rounding.
WAN = Wildlife Action Network

Minnesota Biological Survey Sites of Biodiversity Significance

Construction would affect an estimated 877 acres of MBS Sites, and operations would affect an estimated 403 acres of MBS Sites (Table 5.2.5-17). Outstanding and high rated MBS Sites that would be affected by construction are described in Table 5.2.5-18. The overall abundance of MBS Sites along the Applicant's proposed project is 16 percent for construction compared to the overall abundance of 21 percent within the ROI, suggesting that the route would not disproportionately affect MBS Sites.

Table 5.2.5-17. Estimated Impacts on Minnesota Biological Survey Sites of Biodiversity Significance for the Applicant's Proposed Project in Minnesota (acres)

Site of Biodiversity Significance Rating	Con[a]	Op[a]	Total[b]		Within 0.5 Mile
			Con	Op	
Outstanding	5.8	3.0	7.4	4.6	1,045.4
High	66.0	33.4	77.6	39.7	6,192.3
Moderate	672.1	312.0	791.9	358.8	37,061.6
MBS SITE TOTAL	**743.9**	**418.2**	**876.9**	**403.2**	**44,299.2**
Minnesota total	***4,555.2***	***2,057.1***	***4,934.1***	***2,057.1***	***215,882.3***
Proportion in MBS Sites	***16.3%***	***20.3%***	***17.8%***	***19.6%***	***20.5%***

Source: Minnesota DNR 2016h.
[a] Con = Applicant-provided footprint for construction work area; Op = Applicant-provided footprint for permanent right-of-way.
[b] Con = sum of pipeline construction work area (includes the pipeline permanent right-of-way), additional temporary workspaces pipe yards, and temporary access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, pump stations, and valves.
Note:
Values in the table may not sum to totals and subtotals because of rounding.
MBS Site = Minnesota Biological Survey Site of Biodiversity Significance

Table 5.2.5-18. Minnesota Biological Survey Sites of Outstanding and High Biodiversity Significance within the Construction Work Area for the Applicant's Proposed Project in Minnesota

County	MBS Site Rank Impact	Description	Native Plant Communities Crossed	Conservation Status Rank	North Dakota Border to Clearbrook[a] (acres)	Clearbrook to Carlton[a] (acres)
Pennington	Norden 18 Outstanding Impact – widening of existing corridor	A long, narrow depression with rich fen and disturbed emergent marsh bordered by oak woodland on steep, sandy slopes.	Northern mixed cattail marsh	S2 – Imperiled	3.5	--
Hubbard	La Salle Creek High Impact – greenfield crossing	High-quality rare native plant communities immediately adjacent to La Salle Creek. The steep, forested valley slopes are mostly dominated by red and jack pine. The valley is a unique geological feature and has some of the most interesting terrain in this part of the state.	White Pine – white spruce – paper birch forest	S2 – Imperiled	--	0.6
			Sedge meadow	S4 or S5 – Not rare	--	0.5
			Black ash – (red maple) seepage swamp	S1S2 – Between critically imperiled and imperiled	--	5.1
			Extremely rich tamarack swamp	S4 – Not rare	--	1.9
Carlton	Automba 1 High Impact – widening of existing corridor	Excellent quality wetlands and good quality uplands.	Aspen – birch – basswood forest	S4 – Not rare	--	0.6
			Poor black spruce swamp	S5 – Not rare	--	0.9
			Northern mesic hardwood forest	S4 – Not rare	--	8.0
			Alder – (maple – loosestrife) swamp	S5 – Not rare	--	3.2
			Poor tamarack – black spruce swamp	S4 – Not rare	--	1.5
			Northern rich tamarack swamp (western basin)	S4 or S5 – Not rare	--	1.2
			Northern very wet ash swamp	S4 – Not rare	--	1.0
			Rich tamarack – (alder) swamp	S5 – Not rare	--	11.3

Notes:

[a] Applicant provided footprints for construction work area plus additional temporary workspaces. No outstanding or high MBS Sites are crossed between Carlton and the Wisconsin border.

MBS Site = Minnesota Biological Survey Site of Biodiversity Significance

"--" = no occurrence

Approximately 61 miles of the Applicant's proposed project would be constructed within new rights-of-way, creating a new corridor. Of this new corridor, 17 miles (28 percent) would cross moderate, high, and outstanding ranked MBS Sites, potentially fragmenting habitats within 14 MBS Sites (Table 5.2.5-19). Habitat fragmentation can increase edge habitats favored by some animals and avoided by others, and can create a barrier to movements for some animals (e.g., small mammals, amphibians, reptiles) while facilitating movements of others, especially predators. Interior forest-nesting songbird abundance, diversity, and reproduction rates can be depressed by fragmentation associated with linear developments (Jalkotzy et al. 1997). Forest fragmentation can also lead to increased nest parasitism by the brown-headed cowbirs (*Molothrus ater*).

Table 5.2.5-19. Estimated Fragmentation Impacts on Minnesota Biological Survey Sites of Biodiversity Significance for the Applicant's Proposed Project in Minnesota

Site of Biodiversity Significance Rating	Minnesota Biological Survey Site of Biodiversity Significance	Length Crossed (miles)
High	Unnamed	0.5
	Automba 1	<0.1
	La Salle Creek	0.6
Moderate	Unnamed	1.5
	Atkinson 36	0.4
	Automba 7	3.3
	Beaver 24	3.3
	Daggett Brook	0.5
	Draper Tower Forest	1.3
	Macville 31	3.2
	McGregor 8	0.9
	Spalding 3	0.5
	Venoah Lake	0.2
	White Elk East	0.3
	White Elk Lake	0.4
TOTAL		**16.9**

Source: Minnesota DNR 2016h.

Construction Impacts

Construction of the Applicant's proposed project would affect an estimated 877 acres of MBS Sites. Of these 877 acres, 7 acres (1 percent) would be in areas ranked outstanding, 78 acres (9 percent) would be in areas ranked high, and 792 acres (90 percent) would be in areas ranked moderate. These 877 acres would be directly affected by construction activities that may result in adverse modification of habitats present.

Construction activities would result in destruction of native plant communities (and rare plants) within the construction footprint. In turn, this would decrease the habitat available for rare animals that depend on the MBS Site. Depending on whether the corridor goes through the edge or the interior of the MBS Site and whether there is an existing utility corridor, construction activities could decrease the size of the MBS Site, fragment the MBS Site, or widen an existing corridor. Utility corridors can be effective barriers to animal movements, especially small mammals, amphibians, and reptiles. The wider the corridor, the more animals likely to be affected. Construction activities also may temporarily affect the hydrology of wetlands within the construction work area.

Construction activities also would affect the portions of MBS Sites that are adjacent to the construction work area. Potential impacts due to surface runoff from the construction work area include increased sedimentation and the introduction or spread of invasive species. Sedimentation can affect surrounding uplands or wetlands, as well as waterways in the vicinity of the construction.

The Applicant has committed to preparation of the following plans, procedures, and general vegetation protection measures during construction to minimize impacts:

- Co-locate the construction within and near existing utility corridors to minimize environmental impacts;
- Co-locate the Project with existing rights-of-way where feasible;
- Minimize and confine all construction equipment and vehicles to the approved designated construction work area and additional temporary workspaces;
- Develop and adhere to Project-specific construction methods and procedures for vegetation clearing methods, including treatment of existing vegetation, topsoil segregation, storage, and reapplication;
- Restore preconstruction contours and use slope breakers, sediment barriers, mulch, geotextile fabric, and other erosion control devices to stabilize the disturbed areas during the vegetative regrowth phase and reduce runoff into the adjacent environment;
- Design and plan Project pipeline construction (e.g., parking, access, temporary work areas) to reduce environmental impacts on sensitive plant communities;
- Inspect and clean all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species; and
- Use weed free mulch, topsoil, and seed mix.

Impacts on MBS Sites from construction activities would be short term (i.e., until vegetation cover is reestablished) and major given their occurrence along the Applicant's proposed project.

<u>Operations Impacts</u>

Operations would continue to affect an estimated 403 acres of MBS Sites. Vegetation maintenance to remove trees and large shrubs within the pipeline permanent right-of-way would reduce the habitat availability for rare animals. This would result in a permanent minor habitat loss and a permanent barrier or impediment to travel for some animals.

In addition, the pipeline corridor can provide easier access to more remote MBS Sites and may result in increased human use of the corridor and MBS Sites. This can negatively affect the ecological integrity of these MBS Sites by causing habitat degradation (e.g., operation of off-road vehicles in native plant communities) or by increasing the spread of invasive species.

Long-term vegetation management during operation would result in a major permanent change to MBS Sites.

Minnesota Scientific and Natural Areas

The Applicant's proposed project does not overlap any SNAs, therefore construction and operation of the project would have no impact on SNAs.

5.2.5.3.2 Continued Use of the Existing Line 3 Pipeline

Continued use of the existing Line 3 pipeline would not involve construction impacts as the pipeline is already built and in operation. Impacts on unique natural resources would be limited to continued operation of the pipeline, as discussed below.

Although most impacts would not increase above the level currently experienced, the number of integrity digs required for continued operation would increase, with an estimated 267 integrity digs per year required over the next 15 years. The impacts associated with the increased number of integrity digs would be expected to increase beyond those currently experienced, as described below.

Federally Listed Species

Federally listed threatened and endangered species that could occur within the ROI for the existing Line 3 pipeline and could be affected by operation include three mammals – Canada lynx, gray wolf, and northern long-eared bat; four birds – Kirtland's warbler, piping plover, rufa red knot, and whooping crane; three invertebrates - Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee; and two plants – Fassett's locoweed and western prairie fringed orchid (Table 5.2.5-3).

- If federally listed species persist within the permanent pipeline right-of-way, impacts could continue from ongoing operations and maintenance activities such as mowing for vegetation management, equipment maintenance, invasive species control, and pipeline integrity excavations. These activities could result in direct mortality of non-mobile species if they are present during the activity. Increased noise and human disturbance could cause more mobile animals to leave the area; however, they would be expected to return when the activity ceases.

Periodic project-related noise and human/equipment activity associated with operations and maintenance activities could impact foraging and reproductive activities of individual Canada lynx and gray wolves. However, these impacts would be temporary and lynx and wolves would be expected to resume use of the area following the disturbance. Disturbance could also be caused by public and private use of all-terrain vehicles and snow machines along the permanent right-of-way. Operation of vehicles along the right-of-way could result in collisions with individual lynx or wolves. Minimization measures to reduce the potential for collisions could include operating equipment at speeds suitable for the driving conditions or posted speed limits. Use of the right-of-way for recreational purposes could potentially be reduced by limiting access through use of gates and posting of no trespassing signs, where appropriate. The probability of collisions with work vehicles during operations would be low. Therefore, no adverse impacts are expected as a result of collisions. Impacts to Canada lynx and gray wolf would be limited to periodic disturbance. Therefore, only temporary minor impacts on individuals of these species would be expected over the life of the project.

Operations and maintenance could continue to affect the northern long-eared bat from habitat loss or alteration (i.e., if trees are allowed to grow larger than 3 inch in diameter at breast height between tree maintenance events), disturbance from noise and human activity at aboveground facilities, and pipeline inspection overflights or ground surveillance. Human activities during operations, including increased integrity digs, typically occur during daylight hours; therefore, operations activities would not interrupt foraging nighttime activities. The resultant periodic impacts on the northern long-eared bat would continue to be temporary and negligible but would occur over the life of the Project. Operation of pipeline pump stations would be the same as current conditions and would not result in any additional impacts on northern long-eared bats.

Operations and maintenance activities in the vicinity of Superior, Wisconsin, that occur during the Kirtland’s warbler breeding season (May through September) could affect foraging and reproductive activities. Vegetation clearing for integrity digs during the nesting season could result in loss of eggs or young, should individuals nest in the permanent right-of-way. As described above, piping plovers could occur near facilities in Superior. It is unlikely that Kirtland’s warblers or piping plovers would use the developed habitats around the terminal; therefore, operations impacts would not be expected to increase beyond the current level, and potential impacts would be negligible. Operations activities would continue to have no effect on migrant rufa red knots or whooping cranes.

Operations activities, especially periodic mowing to prevent growth of trees and shrubs, could directly affect adults, eggs, or larvae if Dakota skipper, Poweshiek skipperling, or rusty patched bumble bee come in direct contact with equipment, personnel, or chemicals. These effects could include death, reduced reproduction, or displacement. While it is possible that these species could occur, it is unlikely that the prairie-dependent Dakota skipper or Poweshiek skipperling would be affected by operations activities.

The existing Line 3 pipeline crosses current high use areas for rusty patched bumble bee. Operations, including vegetation management and excavation for pipeline repair or replacement, could directly affect individuals and current high use areas. The following measures would minimize impacts on the rusty patched bumble bee within this high use area. Implementation of these measures would result in a minor permanent impact on the species:

- Limiting vegetation management in high-quality habitat during the active season (March through September).
- Leaving one or more areas unmowed for the entire year in vegetation management areas.
- Using a minimum of 8 to 10 inches cutting height to prevent disturbance of overwintering queens or nesting sites.
- Carefully applying and targeting pesticide use to control pests and invasive species, including:
  - Using the least toxic options and following label directions to ensure proper use.
  - Applying as locally and directly as possible, and avoiding broadcast application that may be harmful to the rusty patched bumble bee or their nectar plants in areas where the species is likely to be found.
  - Ensuring that field crews recognize target weeds to avoid adverse effects on important native plants (USFWS 2017).

If the federally listed Fassett's locoweed and western prairie fringed orchids persist within the permanent right-of-way, they could continue to be permanently affected by vegetation maintenance activities and by the increased level of integrity digs. However, given the disturbed nature of the existing right-of-way, these species are unlikely to be present, and no increase in ongoing impacts is anticipated.

- If the regulatory agencies determine that impacts on federally listed animals and plants would be greater than those currently occurring during operation of the Line 3 pipeline, the Applicant would consult with USFWS to develop measures to avoid or reduce those impacts and to ensure that any additional unavoidable impacts would not jeopardize the continued existence of species protected by the ESA.

State-Listed Species

Endangered and Threatened Species

State-listed endangered and threatened species that could occur within the ROI and could be affected by operation include one mammal – northern long-eared bat, one invertebrate – fluted-shell mussel, and one reptile – wood turtle (Table 5.2.5-6). Potential impacts on the northern long-eared bat are discussed above for federally listed endangered and threatened species. Of the 18 state-listed endangered and threatened plants known to occur within the ROI, 8 potentially occur within the permanent right-of-way and could be affected by operations. These include three in Minnesota – beaked spikerush, hair-like beak rush, and sterile sedge; and five in Wisconsin –clustered bur-reed, neat spike-rush, seaside crowfoot, small yellow-water crowfoot, and sweet colt's foot.

Continued operations impacts for the existing Line 3 would include ongoing vegetation management and pipeline integrity digs. If excavation of the stream crossing where the fluted-shell mussel has been reported to occur was required, short-term turbidity increases and potential destruction of individual mussels could occur. Vegetation management and pipeline excavation could continue to result in injury or mortality of wood turtle eggs or adults if these activities coincided with occupied habitats. The increased number of integrity digs per year required to continue operation of the existing Line 3 would increase the potential for impacts to occur.

If the regulatory agencies determine that impacts on state-listed animals and plants would be greater than those currently occurring during operation of the Line 3 pipeline, measures to avoid or reduce impacts would be developed in consultation with the appropriate state agencies to ensure that any unavoidable impacts would not jeopardize the continued existence of state-protected species. Given the increased need for excavation to repair or replace the pipeline (with an estimated 267 integrity digs required per year over the next 15 years), the potential exists for the excavations to coincide with state-listed species occurrences, resulting in minor permanent impacts on the fluted-shell mussel, wood turtle, and some state-listed plants. If state-listed plants occur where work is proposed, a take permit would be required. If there are no feasible alternatives to takes, compensatory mitigation could be required to offset the impact.

Special Concern Species

State-listed special concern species that could continue to be affected by operation of the existing Line 3 pipeline include nine vertebrates: three bats– big brown bat, little brown bat and northern long-eared bat; six birds – Connecticut warbler, Le Conte's sparrow, Nelson's sparrow, short-eared owl, trumpeter swan, and yellow rail; and four invertebrates: a caddisfly and three mussels – black sandshell, creek heelsplitter, and pink heelsplitter (Appendix M, Tables M-1 and M-2).

- Seventeen state-listed plants of special concern that could be affected by continued operation of the existing Line 3 pipeline include barren strawberry, blunt sedge, English sundew (*Drosera anglica*), false mountain willow, few-flowered spikerush, Lapland buttercup (*Ranunculus lapponicus*), least moonwort, mamillate spike-rush, McCalla's willow, mingan moonwort, northern single-spike sedge, northwestern sticky aster, pale moonwort, small white lady's slipper, St. Lawrence grapefern, twig rush, and Vasey's rush (Appendix M, Table M-3).

Of the three bats of special concern, only the northern long-eared bat has been documented to occur within the Line 3 permanent right-of-way; potential operations impacts on this species is addressed above for federally listed species.

Vegetation management and pipeline excavation could result in injury or mortality of state-listed bird eggs and nests if these activities coincided with occupied habitats during the breeding season. Of the six birds occurring within the ROI, four – Nelson's sparrow, short-eared owl, trumpeter swan, and yellow rail are known to occur within the permanent right-of-way. These species could experience an increase in impacts above the current level because of the increased number of integrity digs required for continued operation of the pipeline. The impact of each integrity dig would be temporary to short term and minor but would occur periodically over the life of the Project. If excavation of the stream crossings where the caddisfly and mussels are present is required for repair or replacement of a pipeline segment, the excavation would result in the loss of some individuals, and the increase in turbidity could affect caddisflies and mussels in the area. The impacts are expected to be temporary to short term and minor for each occurrence.

Special concern plants that persist within the permanent right-of-way could continue be affected directly or indirectly by vegetation management and pipeline repair or replacement if these activities coincided with populations of these plants. Twelve of the 17 plants of special concern occurring within the ROI also are known to occur within the permanent pipeline right-of-way (10 in Minnesota – barren strawberry, blunt sedge, false mountain willow, few-flowered spikerush, least moonwort, mingan moonwort, northern single-spike sedge, pale moonwort, small white lady-s slipper, and St. Lawrence grapefern; and 2 in Wisconsin – mamillate spike-rush and Vasey's rush [Appendix M, Table M-3]). Given the increased need for excavation to repair or replace pipe segments, the excavations have the potential to affect state-listed special concern plants. If there are no feasible alternatives to the integrity digs, these plants could be disturbed. Because these rare plants have, in many instances, persisted or reestablished after construction of multiple pipelines through the Mainline corridor shared by the existing Line 3 pipeline, impacts are likely to be short term and negligible.

Species of Greatest Conservation Need

Gap Analysis Program Species Models

The combined region-wide GAP species model data show the areas used by one or more protected or rare species. The distribution of low, medium, and high use areas for protected or rare mammal species indicates that 49 percent of the permanent right-of-way for the existing Line 3 pipeline could support medium to high use by these mammals (4 or more species). This relatively high proportion may reflect the widespread use of this area by Canada lynx, wolves, and several species of bats. By comparison, 14 percent of the permanent right-of-way for the existing Line 3 pipeline may support medium to high use by protected or rare birds (7 or more species). A total of 26 BCCs were identified as occurring within the ROI for federally listed species from the North Dakota border to Superior, Wisconsin (Appendix M, Table M-5).

The Line 3 permanent right-of-way contains minimal habitats used by protected or rare amphibians and reptiles (Table 5.2.5-20).

- The permanent right-of-way contains an estimated 1,797 acres of habitats used by one or more protected and rare mammal species, 1,987 acres used by one or more protected and rare bird species, and 393 acres used by one or more protected and rare amphibian and reptile species (Table 5.2.5-20). All of the existing Line 3 permanent right-of-way that crosses through these GAP habitats is within the Applicant's existing mainline pipeline corridor. Impacts on these habitats and animals from ongoing operations, should they persist within the permanent pipeline right-of-way, could result from mowing for vegetation management, pipeline maintenance, and invasive species control. The increased number of required integrity digs could increase impacts on these habitats. Operations activities could continue to result in direct mortality of non-mobile animals, if animals are present while the activity is occurring, with the potential for an increase in impacts based on the increased number of integrity digs. The increased noise and human disturbance from the increase in integrity digs could cause more mobile species to leave the area than currently occurs; however, these individuals would be expected to return when the activity ceases.

Table 5.2.5-20. GAP Species Models – Habitat Use Areas for Protected and Rare Mammals, Birds, Amphibians, and Reptiles within the Permanent Right-of-Way and Region of Interest for the Existing Line 3 Pipeline (acres)

GAP Species Groups	Operations[a]	Within 0.5 Mile
Mammals[b]		
Low	923	96,274
Medium	700	72,508
High	174	20,225
Subtotal	***1,797***	***189,007***
Proportion of medium and high	**49%**	**49%**
Birds[c]		
Low	1,715	184,674
Medium	271	24,202
High	0	239
Subtotal	***1,987***	***209,115***
Proportion of medium and high	**14%**	**12%**
Amphibians and Reptiles[d]		
Low	393	**46,391**
Medium	0	**17**
High	0	**0**
Subtotal	***393***	***46,407***
Proportion of medium and high	**0%**	**0%**

Table 5.2.5-20. GAP Species Models – Habitat Use Areas for Protected and Rare Mammals, Birds, Amphibians, and Reptiles within the Permanent Right-of-Way and Region of Interest for the Existing Line 3 Pipeline (acres)

Sources: USGS GAP 2016a, 2016b.

[a] Estimated operations impact area based on 50-foot-wide permanent right-of-way centered on the pipeline

[b] Mammals – Low = 1 to 3 species, Medium = 4 to 6 species, High = 7 to 9 species

[c] Birds – Low = 1 to 6 species, Medium = 7 to 12 species, High = 13 to 19 species

[d] Amphibians and Reptiles – Low = 1 to 2 species, Medium = 3 to 6 species, High = 7 to 11 species

Minnesota's Wildlife Action Network

Approximately 608 acres (35 percent) of the permanent right-of-way for the Line 3 pipeline contains WAN habitats (Table 5.2.5-21). Most WAN habitats (75 percent) that are currently affected are rated low-medium and medium, and no WAN habitats affected by the Line 3 pipeline are rated high. All of the Line 3 pipeline permanent right-of-way that crosses through WAN habitats in Minnesota is located within the Applicant's existing Mainline pipeline corridor. Operations activities such as vegetation management and integrity digs for pipeline repair and replacement could continue to result in direct mortality of non-mobile animals and plants, if these species are present during the activity. The increase in integrity digs could increase the impacts on these habitats. The increased noise and human disturbance from the increase in integrity digs could cause more mobile species to leave the area than currently occurs; however, these individuals would be expected to return when the activity ceases.

Table 5.2.5-21. Impacts on Wildlife Action Network Habitats within the Permanent Right-of-Way and Region of Interest for the Existing Line 3 Pipeline in Minnesota (acres)

Wildlife Action Network Rating	Operations[a]	Within 0.5 Mile
Low	81.0	8,872.3
Low-medium	346.3	34,009.4
Medium	106.8	14,474.3
Medium-high	73.8	8,810.8
High	0	30.2
WAN TOTAL	**607.8**	**66,197.0**
Minnesota total	***1,742.5***	***210,080.0***
Proportion in WAN	***34.9%***	***31.5%***

Source: Minnesota DNR 2016f.

[a] Estimated operations impact area in acres based on 50-foot-wide right-of-way centered on the pipeline route.

WAN = Wildlife Action Network

Minnesota Biological Survey Sites of Biodiversity Significance

Operations currently occur within an estimated 305 acres of moderate to outstanding MBS Sites (Table 5.2.5-22). Most MBS Sites (76 percent) that occur within the permanent right-of-way for the Line 3 pipeline are rated high for biodiversity. All of the Line 3 pipeline permanent right-of-way that crosses MBS Sites in Minnesota is within the Applicant's existing Mainline pipeline corridor. Continuing operations activities such as vegetation management and integrity digs for pipeline repair and replacement could continue to result in direct mortality of plants. The increase in integrity digs could increase the impacts on MBS Sites. Long-term vegetation management and increase in integrity digs during operation would result in a minor permanent change to MBS Sites.

Table 5.2.5-22. Estimated Operations Impacts on Minnesota Biological Survey Sites of Biodiversity Significance for the Existing Line 3 Pipeline in Minnesota (acres)

Site of Biodiversity Significance Rating	Operations[a]	Within 0.5 Mile
Outstanding	24.9	4,196.7
High	233.1	9,203.0
Moderate	46.9	26,918.8
MBS SITE TOTAL	**304.9**	**40,318.5**
Minnesota total	***1,742.5***	***210,080.0***
Proportion in MBS Sites	***17.5%***	***19.2%***

Source: Minnesota DNR 2016h.

[a] Estimated operations impact area in acres based on 50-foot-wide right-of-way centered on the pipeline.

MBS Site = Minnesota Biological Survey Site of Biodiversity Significance

Minnesota Scientific and Natural Areas

The Wawina Peatland SNA (Minnesota DNR 2016d, 2016g) occurs within the ROI. The boundary for this SNA is approximately 0.4 mile northeast of the Line 3 pipeline, and a BNSF rail line lies between the SNA and the Line 3 pipeline. The continued use of the Line 3 pipeline would not affect this SNA.

5.2.5.3.3 System Alternative SA-04

Federally Listed Species

Federally listed threatened and endangered species that could occur within the ROI and could be affected by construction and operation of SA-04 include three mammals – gray wolf, Indiana bat *(Myotis sodalis*), and northern long-eared bat; two birds –rufa red knot and whooping crane; one reptile – eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*); seven invertebrates – Dakota skipper, Hine’s emerald dragonfly (*Somatochlora hineana*), Poweshiek skipperling, Higgins eye mussel (*Lampsilis higginsii*), Iowa Pleistocene snail (*Discus macclintocki*), sheepnose mussel (*Plethobasus cyphyus*), and spectaclecase mussel (*Cumberlandia monodonta*); and eight plants – decurrent false aster (*Boltonia decurrens*), eastern prairie fringed orchid (*Platanthera leucophaea*), lakeside daisy (*Hymenoxys herbacea*), leafy prairie-clover (*Dalea foliosa*), Mead’s milkweed (*Asclepias meadii*), northern wild monkshood (*Aconitum noveboracensel*), prairie bush-clover (*Lespedeza leptostachya*), and western prairie fringed orchid (Table 5.2.5-9). One candidate for listing as threatened or endangered, the rattlesnake-master borer moth (*Papaipema eryngii*), also potentially occurs within the ROI and could be affected by construction and operation.

<u>Construction Impacts</u>

Foraging and reproductive activities of gray wolves could be affected by exposure to Project-related noise and increased human activity. Construction of a pipeline likely would displace a few gray wolves and alter used habitats, especially if packs currently use the existing rights-of-way as travel corridors. If dens are present in the vicinity, construction-related disturbance could reduce pup survival. In addition, wolf-vehicle collisions continue to be a major contributor to wolf mortality. Typical conservation measures to reduce impacts on the gray wolf include:

- Observe vehicular speed limits during construction. Where speed limits are not posted, vehicles and equipment should be operated at speeds suitable for driving conditions. Stop construction activities if the contractor or EI observes a gray wolf or possible den site within the construction corridor, or if USFWS notifies the Applicant of a gray wolf sighting within 1 mile of the construction work area; the stop work order for that area of construction should continue until the wolves leave the area.
- Report any wolf sightings immediately to USFWS, USACE, and state resource agencies (e.g., Minnesota DNR).

Indiana bats have the potential to occur along approximately 103 miles of the Illinois portion of SA-04; the rest of the route is outside of their known range (USFWS 2015). If these bats are present in the construction work area, impacts could occur if clearing or construction occurs when bats are using summer roosts. Bats could be disturbed by noise or human presence, causing them to abandon occupied tree cavities; or they could be injured or killed if occupied trees are cut down. Impacts could be substantial if trees with maternity colonies are destroyed or abandoned. Although short-term minor to major impacts could result from construction, implementation of measures to avoid cutting occupied roost or maternity trees when bats may be present during the summer would result in temporary and minor impacts.

Impacts on individuals or colonies of northern long-eared bats may occur if clearing or construction occurs when bats are using summer roosts. Northern long-eared bats could be disturbed by noise or human presence, causing them to abandon occupied trees. Bats could be injured or killed if occupied trees are cut down. Impacts could be substantial if trees with maternity colonies are destroyed or abandoned. Because the population of northern long-eared bats is declining from white-nose syndrome and destruction of habitat, among other factors, the protection of these bats—and particularly of groups of female and juvenile bats in maternity colonies—is of critical importance.

Conservation measures associated with the ESA 4(d) rule that would reduce potential impacts on northern long-eared bats include:

- Maintain a year-round 0.25-mile radius buffer (which is equivalent to 125.7 acres) around known northern long-eared bat hibernacula.
- Protect known, occupied maternity roost trees. Incidental take is prohibited if the activity cuts or destroys a known, occupied maternity roost tree, or any other trees within a 150-foot radius around a known maternity roost tree, equivalent to 1.6 acres, during the pup season from June 1 to July 31.

The rufa red knot may use wetlands, cultivated fields, or waterbodies in the ROI as migratory stopover habitat. Construction activities have the potential to disturb rufa red knots, especially if disturbance coincides with important migration stopover locations. Noise or presence of humans and equipment during construction could cause rufa red knots to startle and flush from wetlands or fields, or cause them to avoid the area. Short-term impacts to wetlands and cultivated fields from clearing during construction could affect the availability of foraging and sheltering habitats. However, the abundance of wetlands in the vicinity of SA-04 suggests that short-term impacts on a small number of these habitats would not limit the overall availability of stopover habitat for rufa red knots, and impacts on an individual bird's survival or reproductive capacity would be negligible. The following conservation measures would reduce impacts on the rufa red knot:

- Stop construction if the contractor or EI observes a rufa red knot within 1 mile of the construction work area, or if USFWS notifies the Applicant of a rufa red knot sighting within 1 mile; the stop order should continue until the birds have left the area.
- Report any sightings of rufa red knot within the construction work area immediately to USFWS. The Applicant must provide EIs with preconstruction training in identification of rufa red knots and have photos of the species onsite to aid in identification.
- Restore wetlands crossed by the pipeline to preconstruction contours to avoid long-term impacts on the rufa red knot's migratory stopover habitat.

Whooping cranes could occur in the ROI for SA-04 during spring and fall migrations. Noise and activity during construction could displace whooping cranes from stopover habitats during foraging or in wetlands or riverine habitats during roosting. Whooping cranes generally depart from wintering grounds during late March to mid-April and return from breeding grounds beginning in mid-September. The eastern population travels north through Georgia, Tennessee, Kentucky, Indiana, and Illinois to Wisconsin. During migration, whooping cranes use croplands and shallow wetlands for stopover foraging and roosting habitats. The Aransas-Wood Buffalo Park whooping crane population migrates between wintering grounds in Aransas NWR to breeding grounds in Wood Buffalo National Park in northern Alberta. The migration corridor for this population crosses through central Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota. Potential construction impacts could include disturbance to foraging or roosting birds during migration periods (USFWS 2009). Potential foraging and roosting habitats for whooping cranes could occur along SA-04 in North Dakota and Illinois, although it is unlikely that Project activities would coincide with the occurrence of whooping cranes. If their occurrence did overlap construction, effects on whooping cranes would be negligible.

The eastern massasauga rattlesnake could occur in the ROI along the Minnesota and Illinois portions of SA-04, within wetlands and adjacent upland areas. For construction, this represents 3 percent of the overall construction work area in Minnesota and less than 1 percent in Illinois. Construction activities such as vegetation clearing, grading, and trenching could result in direct mortality of individuals of the species if they are present during the activity. During winter, massasaugas hibernate in the aquatic environment and could be affected by fluctuating water levels associated with dewatering, trenching, surface water withdrawals and discharges, and surface water crossings. If water fluctuations occur in winter in the vicinity of massasaugas hibernacula, it could result in direct mortality of individuals due to exposure to sub-freezing temperatures and dehydration (Johnson et al. 2000). If massasaugas are present and fluctuations occur, the overall impact would be temporary and minor.

If present, individuals of the Dakota skipper, Poweshiek skipperling, and rattlesnake-master borer moth could be affected by construction activities that disturb native vegetation. These activities would disrupt egg laying and foraging during spring and summer, and could crush dormant larvae during fall and winter. These prairie-dependent insects depend on high-quality native grasslands and tallgrass prairies to provide food from flower pollen and nectar. Vegetation clearing and replacement with non-native ground covers could injure or kill individuals of these butterflies and moths, and would remove forage plants. While it is possible that these invertebrates could be present along the construction work area, no habitat or presence/absence surveys have been conducted within SA-04. Direct construction impacts on these populations would be temporary. SA-04 is sited to follow existing pipeline, transmission line, or road corridors; consequently, potential impacts, habitat loss, and habitat fragmentation would be minimized. If these species are present, impacts from construction activities would be temporary to short term and minor.

The Hine's emerald dragonfly could occur in the ROI in Illinois; however, SA-04 does not pass through, or come near, any of the counties in which the dragonfly is believed to occur (Cook, DuPage, and Will counties); therefore, it is unlikely these dragonflies or their habitats would be affected by pipeline construction.

If present, protected mussels could be affected by construction activities that increase turbidity and sedimentation, which could bury them. In addition, mussels may be crushed or suffocated by open-cut construction methods for surface water crossings. The spread of invasive zebra and quagga mussels also could smother native mussels if introduced during construction. The Higgins eye, sheepnose, and spectaclecase mussels occur primarily in large rivers in the upper Mississippi River drainage. Although the waterbody crossing methods are not known for SA-04, large rivers where these mussels are most probably present likely would be crossed by HDD, and no impacts on mussel-occupied substrates would occur. HDD requires the use of water-based drilling fluid to cool the cutting tools and remove soil/bedrock cuttings. Inadvertent releases of HDD water-based drilling fluid could affect surface water resources. However, HDD water-based drilling fluid would primarily consist of naturally occurring materials, such as bentonite, which in small quantities would not be detrimental to water quality. Trenched crossings through mussel-occupied rivers would result in increased turbidity and could result in direct disturbance of the mussel beds. These disturbances are expected to be minor, localized, and temporary. Therefore, impacts on federally listed mussel populations from construction would range from no effect to short-term and negligible impacts.

Federally listed plants potentially occurring within the ROI include six prairie-dependent species—decurrent false aster, eastern prairie fringed orchid, leafy prairie-clover, Mead's milkweed, prairie bush-clover, and western prairie fringed orchid. One federally listed native prairie plant—the leafy prairie-clover—has been identified within the ROI but is outside of the construction work area where it could be directly affected by construction. If federally listed plants occurred within the construction work area, direct impacts could include trampling and destruction during grubbing, grading, and trenching. Indirect effects could include conversion of already fragmented prairie habitat into other habitat types and the spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction.

Impacts on prairie soils from construction would be long term and could require a substantial amount of recovery time, which could affect any prairie-dependent plants present. The lakeside daisy may occur on limestone or dolomite outcrops crossed by the construction work area in Illinois. If these habitats are crossed and the lakeside daisy occurs, local reintroduced populations could be damaged.

The Iowa pleistocene snail and northern wild monkshood occur on algific (cold air) talus (loose rock) slopes, which are usually north-facing; they occur where air circulates over underground ice, producing a constant stream of cold moist air through vents to the slope. These rare karst cold microclimate habitats support rare plants and animals. Potential algific talus slope habitats occur in Iowa and Illinois. Natural heritage data for the area within the ROI in Iowa and Illinois did not indicate that any of these rare habitats would be crossed by the construction work area of SA-04. If any algific talus slope habitats are crossed, these federally listed species and the geologic conditions that support them could be damaged, and additional avoidance measures likely would be required.

Summary

Measures to avoid or reduce construction impacts on federally listed animals and plants would be developed in consultation with USFWS to ensure that any unavoidable impacts would not jeopardize the continued existence of species protected by the ESA. The gray wolf could experience temporary minor effects associated with construction activities in North Dakota. Indiana and northern long-eared bats could experience construction impacts on occupied maternity roost trees during the summer along SA-04. With implementation of general conservation measures associated with the ESA 4(d) rule, impacts on these bats during construction would be temporary and minor. Rufa red knot and whooping crane could occur within the construction work area during spring and fall migrations, but it is unlikely that construction would disturb these birds or affect significant foraging or roosting habitat along SA-04. Consequently, negligible impacts are expected. Although construction could affect the eastern massasauga rattlesnake, with implementation of standard conservation measures, impacts would be minor and temporary. Construction through occupied remnant prairie habitats, if they are present within the construction work area, could result in temporary and minor impacts on prairie-dependent insects and plants. If determined to be present, these federally listed insects and plants could be injured or destroyed; this likely would require development of additional avoidance or conservation measures. Most large rivers where federally listed mussels are likely to occur would be crossed using HDD, which would result in no effects on protected mussels. Construction through rocky outcrops occupied by the lakeside daisy could result in permanent major impacts on this federally protected plant if the daisy occurs at these habitats in Illinois. There would be no effects on the Iowa Pleistocene snail or the northern wild monkshood.

<u>Operations Impacts</u>

Project-related noise and increased human activity during operation and maintenance activities could interrupt gray wolf foraging and reproductive activities. Post-construction disturbances, such as public and private use of all-terrain vehicles and snow machines along the right-of-way, could reduce wolf habitat suitability. In addition, wolf-vehicle collisions continue to be a major contributor to wolf mortality. Based on the highly mobile nature of wolves, the transient nature of the disturbance, and wolves' use of a variety of habitats, impacts on wolves from operations would be temporary and minor over the life of the Project.

Operations impacts on the Indiana bat and northern long-eared bat could include continued habitat loss or alteration (i.e., if trees are allowed to grow larger than 3 inch in diameter at breast height between tree maintenance events) and disturbance from noise and activity at aboveground facilities, during pipeline inspection overflights or ground surveillance, and during right-of-way maintenance activities. Human activities during operation would typically occur during daylight hours; therefore, operations activities would not interrupt nighttime foraging activities and impacts would be permanent and negligible. Operation of pipeline pump stations could increase nearby noise levels over existing ambient levels; however, as described in Section 6.2.2, sound level increases would comply with Minnesota Noise Standards and would decrease over distance. Pump station footprints would be devoid of trees, so while bats could forage in the vicinity, they would not roost at the pump station sites. Unless roost sites are near a pump station, the effects on Indiana and northern long-eared bats from operation of pump stations would be permanent and negligible.

Operations activities such could result in direct mortality to the eastern massasauga rattlesnake if they are present within the areas where mowing and integrity digs occur. However, vegetation management activities, if managed correctly, also could benefit the eastern massasauga rattlesnake by opening up and maintaining basking areas along the right-of-way. The following conservation measures identified by

Johnson et al. (2000) could reduce mortality of the eastern massasauga rattlesnake associated with operation of SA-04:

- Raise mowers so that vegetation is cut no lower than 4 to 6 inches above the ground.
- Mow during periods when snakes are less active, preferably before snakes become active in spring or after activity has ceased.
- Mow during periods of the day when snakes are inactive, mainly between 11 am and 3 pm during summer.

Migrant rufa red knot and whooping cranes could be in the area during operation activities. Given the occurrence of stopover habitat along the route, they would not be limited by habitat availability during intermittent pipeline operation and would not be affected.

Habitat and occurrence surveys have not been completed for native prairie-dependent insects – Dakota skipper, Poweshiek skipperling, and rattlesnake-master borer moth; and plants – decurrent false aster, eastern prairie fringed orchid, leafy prairie-clover, Mead's milkweed, prairie bush-clover, and western prairie fringed orchid. Maintenance activities, especially periodic mowing, have the potential to affect adults, eggs, or larvae directly if the species come in contact with equipment, personnel, or chemicals. These effects could include death, reduced reproduction, or displacement. While it is possible that these species could occur, it is not likely; therefore, potential impacts on prairie-dependent insects and plants would be permanent but at most negligible.

No operations impacts on the federally listed mussels are likely. However, if a segment of pipe needs repair or replacement at a surface water crossing that was constructed using the wet or dry open-cut method, an impact on mussels is possible similar to that described above for construction. No operation impacts on the Iowa Pleistocene snail or the northern wild monkshood are expected.

If they persisted in the permanent right-of-way, federally listed native prairie plants could be permanently affected by vegetation maintenance activities. The leafy prairie-clover was identified within the ROI for SA-04 but was outside of the construction work area and permanent right-of-way. The lakeside daisy would not be impacted by operations, because there is no suitable habitat for this plant along SA-04. Rare plant habitat and presence/absence surveys have not been completed for SA-04. If federally listed plants occur within the construction work area, additional avoidance and conservation measures could be required.

Summary

All federally listed animals and plants occurring in the ROI could be indirectly affected by habitat loss and alteration resulting from maintenance of the permanent right-of-way. However, the SA-04 pipeline would follow existing rights-of-way that previously have experienced disturbance from maintenance activities. The gray wolf, due to its transient nature, would experience temporary minor impacts that could occur throughout the life of the Project. Impacts on Indiana and northern long-eared bats would be permanent and negligible. With implementation of appropriate conservation measures, impacts on the eastern massasauga rattlesnake would be short term and minor. Prairie-dependent insects and plants would be unlikely to be affected by operations activities and would experience permanent and at most negligible impacts. The lakeside daisy would not be impacted by operations, because there is no suitable habitat for this plant along SA-04. Listed mussels, the Iowa Pleistocene snail, and the northern wild monkshood would not be affected by operation of SA-04.

State-Listed Species

<u>Endangered and Threatened Species</u>

State-listed endangered and threatened species that could be affected by construction and operation of SA-04 include 17 vertebrates, 13 invertebrates, and 22 plants (Tables 5.2.5-10 and 5.2.5-11; Appendix M, Tables M-1 to M-3).

State-listed vertebrates include one mammal – the northern long-eared bat; five birds – burrowing owl, chestnut-collared longspur (*Calcarius ornatus*), king rail (*Rallus elegans*), loggerhead shrike (*Lanius ludovicianus*), and upland sandpiper (*Batramia longicauda*); three reptiles – Blanding's turtle (*Emydoidea blandingii*), ornate box turtle (*Terrapene ornata*), and plains hog-nosed snake (*Heterodon nasicus)*; and eight fish – American brook lamprey (*Lampetra appendix*), banded killifish (*Fundulus diaphanous*), black buffalo(*Ictiobus niger*), blacknose shiner (*Notropis heterolepis*), greater redhorse (*Moxostoma valenciennesi*), pallid shiner (*Hybopsis amnis*), river redhorse (*Moxostoma carinatum*), and slender madtom (*Noturus exilis*). Potential impacts on the northern long-eared bat are addressed for federally listed endangered and threatened species. The state-listed invertebrates are dominated by aquatic mollusks, but the redveined prairie leafhopper (*Aflexia rubranura*) and regal fritillary butterfly (*Speyeria idalia*) also could be affected during construction (Table 5.2.5-10; Appendix M, Table M-1).

Botanical surveys were not conducted along SA-04. Based on Minnesota DNR NHIS data (Minnesota DNR 2016e), there are no known occurrences of Minnesota-protected plants within the SA-04 construction work area.

Construction Impacts

State-listed birds that could be affected by construction of SA-04 include the burrowing owl, chestnut-collared longspur, king rail, loggerhead shrike, and upland sandpiper.

The eastern extent of the summer breeding range for the burrowing owl includes North Dakota, South Dakota, and the western edge of Minnesota. One NHIS-documented occurrence of burrowing owls in Minnesota is within the ROI and is likely in the construction work area. Burrowing owls occur in open grasslands, especially prairies and savanna, where they nest in abandoned burrows of prairie dogs and ground squirrels. If construction occurs through this area and burrowing owls are present, construction could destroy burrow structures; if construction occurs during the nesting season (from mid-March through September) and burrowing owls are present, it could disrupt breeding and destroy eggs or young within the burrows. Construction activities near active nest burrows could result in abandonment of active nests (Klute et al. 2003). If construction occurs outside of the nesting season, impacts on burrowing owls would be negligible based on their limited known occurrence and habitat availability.

Chestnut-collared longspurs also are ground-nesting, prairie-dependent birds that occur in a few western Minnesota counties. They arrive in Minnesota around April 15 from wintering areas in the southern United States and northern Mexico. Nests are constructed on the ground under a clump of grass. One occurrence of the species is documented in Traverse County, Minnesota, within the ROI; although the site may no longer be occupied. The construction work area for SA-04 occurs within an existing pipeline corridor outside of the prairie habitat where this sighting occurred, and construction is not likely to result in habitat loss or disturbance to the chestnut-collared longspur.

The king rail's breeding range extends from southeast North Dakota through Illinois; they do not occur in northern North Dakota. There is one NHIS-documented occurrence of a king rail in Illinois within the

ROI, but there are no known occurrences within the construction work area. King rails are ground nesters associated with freshwater marshes but can adapt to a variety of habitats that support vegetation and are frequently wet. If the species is present, construction occurring in these habitat types during the nesting season from May through July could disrupt breeding and destroy eggs, while construction post-hatch could kill or disrupt young within nests. If construction occurs outside of the nesting season, impacts on king rails would be negligible based on their limited known occurrence within the construction area.

The entire extent of SA-04 occurs in the loggerhead shrike's summer breeding range. However, there are only three NHIS-documented occurrences of loggerhead shrikes within the ROI, with no known occurrences within the construction work area. Loggerhead shrikes nest in trees or brush associated with open areas containing upland grasslands and agricultural areas; they use both native and non-native grasslands. Loggerhead shrikes could be disturbed by noise or human presence, causing them to abandon occupied nests. If nest trees or shrubs are cut down, eggs or young could be injured or killed. Based on their limited known occurrence in the ROI, impacts on loggerhead shrikes would be at most temporary and negligible during construction, if construction occurs during the breeding season. If construction occurs outside of the breeding season, loggerhead shrikes would not be affected.

The entire extent of SA-04 occurs in the upland sandpiper's summer breeding range. However, there is only one NHIS-documented occurrence of an upland sandpiper within the ROI, and no known occurrences within the construction work area. Upland sandpipers are ground-nesting birds that prefer hayfields and pastures, but they also occur in open grasslands in the absence of preferred habitat. Construction in these habitat types during the nesting season from May through July could disrupt breeding and destroy eggs, while construction post-hatch could kill or disrupt the young within nests. If construction occurs outside of the nesting season, impacts on upland sandpipers would be temporary and negligible based on their limited known occurrence within the construction area.

Reptiles that could be affected by construction of SA-04 include Blanding's turtle, ornate box turtle, and plains hog-nosed snake.

Blanding's turtles do not occur in North Dakota but could occur along the rest of SA-04. There are five NHIS-documented occurrences of Blanding's turtles within the ROI and one occurrence within the construction work area. Blanding's turtles use a variety of wetland types as well as upland areas. They overwinter in bottom mud of marshes, ponds, and streams; use wetlands upon emergence from overwintering sites. Due to their year-round residence, construction activities occurring near wet habitat types, regardless of season, could crush and kill turtles. Uplands are also used for nesting, basking, periods of dormancy, and traveling between wetlands. Blanding's turtles may be affected through direct fatalities or habitat disturbance/destruction due to dewatering, excavation, fill, or other construction activities associated with the Project. Any added mortality can be detrimental to populations of Blanding's turtles, as these turtles have a low reproduction rate that depends upon a high survival rate to maintain population levels. Minnesota DNR recommendations to minimize disturbance include, but are not limited to, the following measures: avoid filling or dewatering wetlands during the winter, implement stringent erosion control methods, use wildlife-friendly erosion control methods, and monitor for turtles during construction. Provided the implementation of applicable measures, construction-related impacts on Blanding's turtles would be short term and minor.

The ornate box turtle could occur along the Illinois and Iowa portions of SA-04; this turtle does not occur in Minnesota or North Dakota. Within Illinois and Iowa, there are three NHIS-documented occurrences within the ROI; within Illinois, one of these occurrences is within the construction work area. Ground-disturbing construction activities in sandy dune habitat could affect nests, resulting in abandonment or mortality of both adults and young. Construction activities also could result in the loss of foraging habitat. Turtles may be injured or killed by collisions with construction vehicles. The following conservation measures identified by Iowa DNR (2016b) could reduce impacts on the ornate box turtle. Assuming that these measures are followed, construction impacts on the ornate box turtle would be negligible.

- Watch sand dunes between May 29 and June 12 from 9 pm to 2 am to identify the presence of nest-building turtles. If turtles are identified within the construction work area, work with Iowa DNR to protect nests.
- Construction and operation vehicles should be aware of road crossing locations for ornate box turtles between April and September.

The plains hog-nosed snake could occur along the entire extent of the SA-04 pipeline. There is one NHIS documented occurrence of a plains hog-nosed snake within the ROI; however, no occurrences have been documented within the construction work area. Habitats used by this species include open, sparsely vegetated areas with sandy or gravelly soils, such as prairies, sandhills, and river floodplains. Females lay eggs from May to August (mainly in June and July), and hatching occurs approximately 2 months later. This snake overwinters in underground burrows. Because of their year-round residence, construction activities occurring near their preferred habitat types, regardless of season, could crush and kill plains hog-nosed snakes. Construction-related impacts would be short term and minor.

State-protected fish that could be affected by construction of SA-04 include the American brook lamprey, banded killifish, black buffalo, blacknose shiner, greater redhorse, pallid shiner, river redhorse, and slender madtom. For each of these species, at least one known NHIS-documented occurrence is within the ROI, and some known occurrences are within the construction area. While these species occupy different habitat types, general impacts from construction activities in the vicinity of surface waters would be similar for all of them; therefore, this assessment does not separate potential effects by species.

Use of open-cut crossings of streams where these state-listed fish occur could result in mortality of these species. Fine sediments introduced during open-cut crossings can suffocate fish eggs and newly hatched larvae living in gravel. The sediments also can abrade the sensitive gill membranes of young and adult fish, resulting in injury or death. Sedimentation can cause reductions in prey availability or the ability of fish to locate prey or escape predation, leading to increased energy expenditure for foraging and increased mortality. Removal of water from waterbodies for hydrostatic testing can result in entrainment of small fish, eggs, and macroinvertebrates during extraction. Spawning fish could be affected through decreased water levels, displaced spawning habitat, and water quality degradation. Fish eggs could desiccate if water levels drop too low, or the eggs could become entrained within test water. They may experience delayed development due to impaired water quality. Larval and juvenile fish could be affected through entrainment during water withdrawal, decreased survival under conditions of poor water quality, and reduced prey availability. Contaminated construction equipment and water used for hydrostatic testing could introduce invasive aquatic animals such as zebra and quagga mussels that could displace and reduce habitat quality for these species. Hydrostatic waters would be discharged in a manner that avoids the use of waterbodies with commercially or recreationally important species as intake sources. Impacts on fish due to water crossings would be temporary to short term and minor because of the localized nature of the activity.

Construction effects on invertebrates for SA-04 would be similar to those described for the Applicant's proposed project. Disturbance to the stream bottom during surface water crossings could crush or suffocate mussels, and would temporarily increase turbidity that could reduce feeding efficiency and damage these sensitive aquatic animals that are in the vicinity of the crossing. Contaminated construction equipment and water used for hydrostatic testing could introduce invasive aquatic animals such as zebra and quagga mussels that could displace and reduce habitat quality for aquatic animals. EIs would monitor construction activities, ensuring compliance with permit conditions and reducing the potential for introduction of invasive species from contaminated equipment.

If state-protected insects are present, they could be affected by construction activities that disturb native vegetation. These activities would disrupt egg laying and foraging during spring and summer, and could crush dormant larvae during fall and winter. These insects depend on high-quality native grasslands and tallgrass prairies to provide food from flower pollen and nectar. Vegetation clearing and replacement with non-native ground covers could injure or kill the redveined prairie leafhopper and regal fritillary butterfly, as well as removing forage plants for these species. Overall, given the limited presence of native prairie in the construction work area, impacts on invertebrates during construction of SA-04 would be temporary and minor.

Of the 22 state-listed endangered or threatened plants that occur within the ROI, four – broomrape, false mallow, plains sedge, and quillwort occur within the construction work area for SA-04. The listed plants in the construction footprint could be destroyed during grubbing, grading, and trenching; and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction.

Permanent major impacts on individuals of the broomrape, false mallow, plains sedge, and quillwort could occur because of their occurrence within the construction work area. Rare plants surveys have not been completed for SA-04, and additional state-listed plants may occur within construction work areas if suitable habitat is present. However, given the habitat conversion that has occurred in the southern and western portion of Minnesota, there is limited suitable habitat for these species in this part of the state. All of the Minnesota protected plants found in the ROI are associated with native prairie or calcareous fens, and there are only two known occurrences of native prairie remnants in the construction work area (a delineated native prairie remnant within a moderate rated MBS Site in Traverse County and a native prairie remnant in a railroad right-of-way in Mower County). As such, it may be possible to avoid most impacts on Minnesota state-listed threatened or endangered plants. If state-protected plants are present, the plants would be affected by construction. Measures to avoid or reduce construction impacts on state-listed animals and plants would be developed in consultation with the appropriate state agencies, if required, to ensure that any unavoidable impacts would not jeopardize the continued existence of state-protected species.

Summary. Aquatic species and insects would experience temporary minor impacts from construction. Provided measures to minimize disturbance are implemented, impacts on the Blanding's turtles and plains hog-nosed snake would be short-term and minor. Implementation of conservation measures would reduce impacts on the box turtle to temporary and negligible. Due to the limited occurrence of state-listed birds or suitable habitats along SA-04, impacts on state-listed birds would be temporary and negligible. Permanent, major impacts would occur to individuals of the broomrape, false mallow, plains sedge, and quillwort. Individuals of the remaining plant species occurring within the ROI would not be impacted because they do not occur in the construction work area.

Operations Impacts

Vegetation management that prevents trees and large shrubs from reestablishing within the permanent right-of-way adjacent to streams could increase stream temperatures by removing shade, which would reduce habitat suitability for aquatic animals. Maintenance activities in and around surface waters also could crush Blanding's turtle adults, nests, and eggs. Upland maintenance activities and vehicle use could crush ground-nesting bird eggs and young (burrowing owl, chestnut-collared longspur, king rail, and upland sandpiper), and ornate box turtle and plains hog-nosed snake nests and eggs, as well as adult turtles and invertebrates. State-listed plants that persist within the permanent right-of-way could be permanently affected by vegetation management activities. Given their limited distribution within this area, overall impacts would be minor. All state-listed species could be indirectly affected by habitat loss and alteration resulting from maintenance of the permanent right-of-way. However, SA-04 would follow existing rights-of-way that have been periodically disturbed by maintenance activities. Given the limited potential for occurrence of state-listed species and the identified conservation measures, impacts from operation on state-listed endangered and threatened species would be expected to be negligible to minor and permanent.

Special Concern Species

State-listed special concern species that could be affected by construction and operation of SA-04 include 12 vertebrates, 9 invertebrates, and 20 plants (as listed in Appendix M, Tables M-1 to M-3). State-listed special concern vertebrates include six birds – Acadian flycatcher (*Empidonax virescens*), bald eagle (*Haliaeetus leucocephalus*), cerulean warbler, greater prairie-chicken, Louisiana waterthrush, and marbled godwit; two reptiles – North American racer (*Coluber constrictor*) and smooth softshell (*Apalone mutica*); and four fish – blue sucker (*Cycleptus elongatus*), least darter, Ozark minnow (*Notropis nubilus*), and redfin shiner (*Lythrurus umbratilis*) (Appendix M, Table M-2). State-listed special concern invertebrates include six arthropods – two jumping spiders (*Marpissa formosa* and *Phidippus pius*), Iowa skipper (*Atrytone arogos iowa*), leadplant flower moth (*Schinia lucens*), redveined prairie leafhopper, and regal fritillary; and three mussels – black sandshell, creek heelsplitter, and round pigtoe (*Pleurobema sintoxia*) (Appendix M, Table M-1).

Twenty state-listed special concern plants could be affected by construction and operation of SA-04, including a lichen (*Buellia nigra*), American ginseng (*Panax quinquefolius*), buffalo grass, cleft phlox (*Phlox bifida*), cutleaf ironplant (*Xanthisma spinulosum var. spinulosum*), flat top white aster (*Aster pubentior*), grassleaf rush (*Juncus marginatus*), green dragon (*Arisaema dracontium*), Kentucky coffee tree (*Gymnocladus dioica*), nodding wild onion (*Allium cernuum*), plains wild indigo, rattlesnake master (*Eryngium yuccifolium*), sage willow (*Salix candida*), small fringed gentian (*Gentianopsis procera*), small white lady's slipper, snow trillium (*Trillium nivale*), soft rush (*Juncus effusus*), swamp thistle (*Cirsium muticum*), valerian (*Valeriana edulis var. ciliata*), and white wild indigo (*Baptisia lactea* var. *lactea*). Of the 20 special concern plants, three occur within the construction work area: buffalo grass, plains wild indigo, and small white lady's slipper (Appendix M, Table M-3).

Construction Impacts. Of the special concern birds, construction of SA-04 would have the greatest potential to affect the bald eagle. This species potentially occurs within the construction work area during the nesting period. Other special concern birds that occur within the ROI during breeding could be affected by disturbance from activities within the construction work areas. Vegetation clearing and grading during breeding could cause loss of eggs or young of these birds, resulting in short-term major impacts if these special concern birds nest within the construction work area.

Reptiles that could be affected by construction of SA-04 include the North American racer and the smooth softshell turtle. There are two NHIS-documented occurrences in the ROI for the North American racer and one occurrence of the smooth softshell. North American racers occupy a variety of habitats in southeastern Minnesota, including forested hillsides, bluff prairies, grasslands, and open woods. These snakes emerge from hibernation during late April; breed in May and early June; and lay eggs under rotting logs, in stumps, or in mammal burrows in late June or early July. Snakes could be injured or killed during vegetation clearing and grading, run over by vehicles, or trapped and buried within the pipeline trench. Inspecting and removing wildlife from the trench prior to backfilling would reduce injuries to snakes.

Smooth softshell turtles inhabit large rivers and use sandy beaches for nesting habitat. Eggs are laid on sandbars and riverbanks from June to early July. Most large rivers would be crossed using the HDD method; consequently, suitable habitats and individual smooth softshell turtles would not likely be affected. Construction of HDD crossings during nesting could disrupt nesting if the entry or exit pits are installed within sandy areas used by the turtles; however, most pits likely would be excavated at a sufficient distance from the water to avoid those areas. Impacts on smooth softshell turtles during construction would be short term and negligible.

Construction of waterbody crossings has the potential to affect aquatic animals, including mussels—black sandshell, creek heelsplitter, round pigtoe and fish—blue sucker, least darter, Ozark minnow, and redfin shiner that have been documented within the ROI for the Applicant’s proposed project and could occur within surface waters crossed by SA-04. Construction of surface water crossing using the wet or dry open-trench methods could result in injury or death, in addition to short-term increases of turbidity and sedimentation. Of these special concern aquatic animals, black sandshell, round pigtoe, blue sucker, least darter, and Ozark minnow likely would occur at the crossing locations. Construction impacts on these aquatic animals would be short term and negligible to major, depending on animal presence and the type of crossing method used.

Vegetation clearing and site grading through native grassland habitats could impact individuals of the prairie-dependent jumping spiders (*Marpissa formosa* and *Phidippus pius*), Iowa skipper, leadplant flower moth, redveined prairie leafhopper, and regal fritillary. These insects depend on high-quality native grasslands and tallgrass prairies to provide food from flower pollen and nectar. High-quality native prairie habitats are not expected to occur within the SA-04 construction work area because it is co-located with existing pipelines, transmission lines, or roads; however, surveys for native prairie habitats and butterflies have not been completed for SA-04. Overall, construction impacts on prairie-dependent invertebrates are expected to be short term, until vegetation cover is reestablished, and minor.

Individuals of three special concern plant species, buffalo grass, plains wild indigo, and small white lady’s slipper, occur within the construction work are and would be directly impacted. Impacts on those individuals would be permanent and major. While individuals of the remaining 17 plant species could occur within the ROI, they are not likely to occur within the construction work area. Therefore, there would be no impacts on those 17 special concern plant species.

Operations Impacts. Operation activities include mowing for vegetation management, periodic excavation for pipeline visual inspection and repair or replacement, and invasive species control.

Vegetation management that prevents trees and large shrubs from reestablishing within the permanent right-of-way adjacent to streams could increase stream temperatures by removing shade, which would reduce habitat suitability for aquatic animals. Upland vegetation and maintenance activities and vehicle use could crush ground-nesting bird eggs and young (greater prairie-chicken, Louisiana waterthrush, and marbled godwit), and North American racer nests and eggs, as well as invertebrates. State-listed special concern plants that persist within the permanent right-of-way could be permanently affected by vegetation management activities; however, overall impacts likely would be minor. All state-listed special concern animals and plants could be indirectly affected by habitat loss and alteration resulting from maintenance of the permanent right-of-way; however, SA-04 would follow existing pipeline, transmission line, and road corridors. Given the potential for occurrence of state-listed special concern species and the identified conservation measures, impacts from operation are expected to be short term and negligible to minor.

Species of Greatest Conservation Need

Gap Analysis Program Species Models

The combined region-wide GAP species model data show the areas used by one or more protected or rare species. The distribution of low, medium, and high use areas for protected or rare mammal species indicates that 1 percent of the construction work area and permanent right-of-way for SA-04 could support medium to high use by these mammals (4 or more species). By comparison, 5 and 6 percent of the construction work area and permanent right-of-way for SA-04, respectively, may support medium to high use by protected or rare birds (7 or more species); and 17 percent of both the construction work area and permanent right-of-way contains habitats used by protected or rare amphibians and reptiles (Table 5.2.5-23). A total of 35 BCCs were identified as occurring within the ROI for SA-04 (Appendix M, Table M-5).

Table 5.2.5-23. GAP Species Models – Habitat Use Areas for Protected and Rare Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04 (acres)

GAP Species Groups	Construction[a]	Operations[b]	Within 0.5 Mile
Mammals[c]			
Low	9,029	3,773	298,935
Medium	46	19	3,629
High	-	-	-
Subtotal	***9,076***	***3,792***	***402,564***
Proportion of medium and high	**1%**	**1%**	**1%**
Birds[d]			
Low	10,913	4,556	477,784
Medium	617	247	27,908
High	19	8	1,151
Subtotal	***11,549***	***4,812***	***506,843***
Proportion of medium and high	**6%**	**5%**	**6%**

Table 5.2.5-23. GAP Species Models – Habitat Use Areas for Protected and Rare Species within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04 (acres)

GAP Species Groups	Construction[a]	Operations[b]	Within 0.5 Mile
Amphibians and Reptiles[e]			
Low	3,310	1,378	149,625
Medium	669	278	29,137
High	5	2	377
Subtotal	***3,984***	***1,658***	***179,139***
Proportion of medium and high	**17%**	**17%**	**16%**

Sources: USGS GAP 2016a, 2016b.

[a] Estimated construction impact area based on 120-foot-wide construction work area.

[b] Estimated operations impact area based on 50-foot-wide right-of-way centered on the pipeline.

[c] Mammals – Low = 1 to 3 species, Medium = 4 to 6 species, High = 7 to 9 species.

[d] Birds – Low = 1 to 6 species, Medium = 7 to 12 species, High = 13 to 19 species.

[e] Amphibians and Reptiles – Low = 1 to 2 species, Medium = 3 to 6 species, High = 7 to 11 species.

Construction Impacts. General construction impacts and measures to avoid or reduce impacts on rare and protected species addressed in the GAP models would be the same as those described above for federally and state-listed vertebrate fauna. Mammals, birds, amphibians, and reptiles could be disturbed by construction noise and activity that likely would cause larger animals to move to other areas, possibly returning after construction activities stop; while smaller, less mobile animals could be crushed and killed. Overall, the effects likely would be short term and minor. Given the low proportion of medium use areas for amphibians, reptiles, and birds and the low overall use for mammals within the construction areas, impacts on these groups from construction would be short term and negligible to minor.

Operations Impacts. The permanent right-of-way would be maintained clear of trees and tall shrubs. Due to periodic vegetation management, protected and rare animals that depend on closed canopies may avoid the permanent right-of-way. The herbaceous cover within the right-of-way may act as a barrier to travel for some small animals, fragmenting habitats. However, SA-04 would follow existing rights-of-way where similar maintenance activities have affected the rights-of-way, limiting the magnitude of the impacts from maintenance of the SA-04 permanent right-of-way. Given the limited areas of high protected and rare species use crossed by SA-04, impacts on habitats used by these animals from operations would be permanent and negligible.

Minnesota's Wildlife Action Network

Approximately 8 percent of the ROI within Minnesota is within the WAN. Most WAN habitats that would be affected by construction and operation of SA-04 are rated low, low-medium, and medium-high (Table 5.2.5-24). All 19 miles of SA-04 crossings of WAN habitats would occur within existing pipeline corridors. Given the limited amount of total WAN area affected, overall impacts on habitats within the WAN from habitat loss and alteration from construction and operations would be permanent and minor (see Section 5.2.4 for additional details).

Table 5.2.5-24. Wildlife Action Network Impacts within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04 in Minnesota (acres)

Wildlife Action Network Rating	Construction[a]	Operations[b]	Within 0.5 Mile
Low	123.4	51.4	5,348.3
Low-medium	50.8	21.2	2,628.0
Medium	39.6	16.5	1,806.8
Medium-high	53.5	22.3	2,075.6
High	9.5	3.9	536.6
WAN TOTAL	**276.7**	**115.3**	**12,422.3**
Minnesota total	***3,650.9***	***1,521.2***	***160,230.0***
Proportion in WAN	***7.6%***	***7.6%***	***8%***

Source: Minnesota DNR 2016f.

[a] Estimated construction impact area in acres based on 120-foot-wide construction work area

[b] Estimated operations impact area in acres based on 50-foot-wide right-of-way centered on the pipeline

WAN = Wildlife Action Network

Minnesota Biological Survey Sites of Biodiversity Significance

Construction would affect an estimated 25 acres of MBS Sites, and operations would affect an estimated 10 acres of these designated lands (Table 5.2.5-25). Potential impacts on these sites from construction and operation would be the same as those described for the Applicant's proposed project and could result in permanent habitat alteration. Given the small proportion of MBS Sites potentially affected and co-location of SA-04 with existing pipeline, transmission line, and road corridors, impacts from construction and operation likely would be permanent and minor.

Table 5.2.5-25. Estimated Impacts on Minnesota Biological Survey Sites of Biodiversity Significance within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04 in Minnesota (acres)

Site of Biodiversity Significance Rating	Construction[a]	Operations[b]	Within 0.5 Mile
Outstanding	1.3	0.5	284.7
High	5.0	2.1	467.3
Moderate	18.4	7.6	869.3
MBS Site TOTAL	**24.7**	**10.3**	**1,621.3**
Minnesota Total	***3,650.9***	***1,521.2***	***160,230.0***
Proportion in MBS Sites	***0.2%***	***0.2%***	***1.0%***

Table 5.2.5-25. Estimated Impacts on Minnesota Biological Survey Sites of Biodiversity Significance within the Construction Work Area, Permanent Right-of-Way, and Region of Interest for System Alternative SA-04 in Minnesota (acres)

Source: Minnesota DNR 2016h.

[a] Estimated construction impact area in acres based on 120-foot-wide construction work area.

[b] Estimated operations impact area in acres based on 50-foot-wide right-of-way centered on the pipeline.

Note:

Values in the table may not sum to totals and subtotals because of rounding.

MBS Site = Minnesota Biological Survey Sites of Biodiversity Significance

Minnesota Scientific and Natural Areas

SA-04 does not overlap any SNAs, therefore construction and operation of SA-04 would have no impact on SNAs.

5.2.5.3.4 Transportation by Rail

Transportation of crude oil by rail would require development of offloading facilities, including new rail access and upgrades of existing rail access to Clearbrook and Superior. Clearing of vegetation and ground disturbance associated with preparing sites for development and construction of these permanent facilities would affect unique natural resources. Rail offloading facilities would require the following:

- Clearing from 100 to 200 acres adjacent to the existing Clearbrook terminal in Minnesota;
- Clearing approximately 100 acres in Superior, Wisconsin, adjacent to the existing Enbridge terminal;
- Reestablishment of 10 miles of track on an existing railbed between Clearbrook and Gully, Minnesota; and
- Construction of a less than 0.5-mile interconnection between existing rail lines in Superior, Wisconsin.

In the United States, operations would include use of the offloading facilities and new and upgraded access routes, and use of existing rail routes from the U.S-Canada border to the Clearbrook and Superior terminals. Approximately 10 unit trains of 110 tanker cars would be required each day to transport the proposed volume.

Federally Listed Species

Federally listed threatened and endangered species that could occur within or near the new facilities and new rail access routes and that could be affected by construction and operation of the rail alternative include three mammals – Canada lynx, gray wolf, and northern long-eared bat; three birds – Kirtland's warbler, piping plover, and whooping crane; three invertebrates - Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee; and one plant – western prairie fringed orchid.

Construction Impacts

If present, individual Canada lynx could be disturbed by construction noise and activity that likely would cause them to move to other areas, possibly returning after construction activities stop. Disturbance effects likely would be temporary and minor unless den sites are disturbed. Den sites, which are used from April to June, are unlikely to occur near the Clearbrook and Superior terminals where new offloading and rail access facilities would be constructed.

Foraging and reproductive activities of gray wolves could be affected by exposure to Project-related noise and increased human activity. Construction of the new rail offloading and access facilities could alter habitats used by wolves. If dens are present in the vicinity, construction-related disturbance could reduce pup survival. In addition, wolf-vehicle collisions continue to be a major contributor to wolf mortality. Typical conservation measures to reduce construction impacts on the gray wolf include:

- Observe vehicular speed limits during construction. Where speed limits are not posted, vehicles and equipment should be operated at speeds suitable for driving conditions. Stop construction activities if the contractor or EI observes a gray wolf or possible den site within the construction area, or if USFWS notifies the Applicant of a gray wolf sighting within 1 mile of the construction work area; the stop work order should continue until the wolves leave the area.
- Report any wolf sightings immediately to USFWS, USACE, and state resource agencies (e.g., Minnesota DNR).

With implementation of conservation measures, gray wolves would not be affected by construction of the new rail facilities and access at Clearbrook and Superior, or the effects would be temporary and minor.

Minnesota and Wisconsin NHISs report no occurrences of the northern long-eared bat for the area around the Clearbrook and Superior terminals or where new rail offloading facilities and rail access are likely to be constructed (Minnesota DNR 2016e; Wisconsin DNR 2016). The Applicant conducted acoustic surveys within forested areas containing suitable habitat for northern long-eared bats (i.e., trees with a diameter at breast height of 3 inches or larger) around the Clearbrook and Superior terminals during 2014 and 2015 to determine the summer presence or probable absence of northern long-eared bats. No northern long-eared bats were confirmed acoustically at the 14 survey sites around the Clearbrook terminal in Clearwater County, Minnesota, or at one survey site near the Superior terminal in Douglas County, Wisconsin (Merjent 2014b, 2015c).

Impacts on individuals or colonies of bats may occur if clearing or construction occurs when bats are using summer roosts. Northern long-eared bats could be disturbed by noise or human presence, causing them to abandon occupied tree cavities. Bats could be injured or killed if occupied trees are cut down. Impacts could be substantial if trees with maternity colonies are destroyed or abandoned. If northern long-eared bats were found to roost near these sites, applicable conservation measures associated with the ESA 4(d) rule could include:

- Maintain a year-round 0.25-mile radius buffer (which is equivalent to 125.7 acres) around known northern long-eared bat hibernacula.
- Protect known, occupied maternity roost trees. Incidental take is prohibited if the activity cuts or destroys a known, occupied maternity roost tree, or any other trees within a 150-

foot radius around a known maternity roost tree, equivalent to 1.6 acres, during the pup season from June 1 to July 31.

Northern long-eared bats are not expected to occur near the new rail offloading and access facilities. With implementation of applicable conservation measures associated with the ESA 4(d) rule, effects on northern long-eared bats would not occur or would be negligible to minor.

Kirtland's warblers nest in jack pine forests in Wisconsin and Michigan, and they migrate along the southeast coast of the United States to overwinter in the Bahamas. No critical habitat has been designated for the species. Kirtland's warblers have been known to occur during the breeding season in Douglas County, Wisconsin. As part of the ongoing recovery effort, five jack pine stands were censused by the USFWS in Douglas County during the 2016 breeding season; however, no signing males were documented (USFWS 2016). If Kirtland's warblers were to nest in the construction work area and vegetation clearing occurred during the nesting season loss of eggs or young could occur. Construction activities and presence of construction personnel could also cause disturbance and displacement of adult birds, should they occur in the vicinity of the activity. No jack pine woodlands appear to occur in the vicinity of the new rail offloading and access facilities near Clearbrook or Superior. Because Kirtland's warblers are not expected to occur near the facilities, they would not be affected during facility construction.

Piping plovers which breed in the Great Lakes region inhabit shorelines of the Great Lakes. They nest on open, sparsely vegetated sandy habitats such as sand spits or sand beaches found on Great Lakes islands and mainland shorelines. Critical habitat for this species has been designated in Douglas County, Wisconsin, and is defined as lands 500 meters (1,640 feet) from the normal high water line from the mouth of Dutchman Creek west-northwest along the Lake Superior shoreline to the breakwall forming the Superior Front Channel opening to Lake Superior (USFWS 2001). The new rail offloading and access facilities would be constructed near the Superior terminal in Douglas County. While it is possible that piping plovers could occur near facilities in Superior, it is unlikely that they would use these developed habitats; therefore, construction would be unlikely to affect piping plovers. There would also be no impact on designated critical habitat for the piping plover because the Superior terminal is not within the designated critical habitat.

Whooping cranes from the eastern population that winter in Florida migrate to breeding areas in Wisconsin and could occur near the Superior terminal during the spring and fall migrations. Noise and activity during construction can displace whooping cranes from stopover habitats during foraging or in wetlands or riverine habitats during roosting. Whooping cranes generally depart from wintering grounds during late March to mid-April and return from breeding grounds beginning in mid-September. During migration, whooping cranes use croplands and shallow wetlands for stopover foraging and roosting habitats. The Aransas-Wood Buffalo Park whooping crane population migrates between wintering grounds in the Aransas NWR to breeding grounds in the Wood Buffalo National Park in northern Alberta. The migration corridor for this population crosses through central Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota and is generally west of the Clearbrook terminal. Potential impacts could include disturbance to foraging or roosting birds from construction during migration periods (USFWS 2009). Whooping cranes are unlikely to occur near the Clearbrook or Superior terminal areas and are not likely to be affected by construction.

If present, individuals of the Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee could be affected by construction activities that disturb native vegetation. Vegetation clearing and grading would disrupt egg laying and foraging during spring and summer, and could crush dormant larvae during fall and winter. These prairie-dependent insects depend on high-quality native grasslands and tallgrass prairies to provide food from flower pollen and nectar. Vegetation clearing and replacement with non-native ground covers could injure or kill individual butterflies and bees, and could remove forage plants. Habitat and presence/absence surveys have not been completed for the area surrounding the Clearbrook and Superior terminals. There may be some native prairie plant species persisting in the hay/pasture vegetation in the vicinity of the Clearbrook terminal that could provide habitat for these species. Two moderate rated northern dry sand-gravel prairie native plant communities are in the vicinity of the rail access route between Clearbrook and Gully. If suitable habitat for prairie-dependent insects are present, these habitats could be lost because of fill for construction of the offloading and rail access facilities. If these habitats are suitable for Dakota skipper, Poweshiek skipperling, or rusty patched bumble bee, loss of these habitats would result in a permanent and minor impact.

The new rail facilities near the Clearbrook terminal would not cross any current high use areas for rusty patched bumble bee, and construction is not likely to directly or indirectly affect any individuals or current high use areas. The new rail facilities would be located within a current potential low use area where rusty patched bumble bees may disperse from a current high use area or where their occurrence is uncertain. The rusty patched bumble bee may benefit from conservation measures implemented within the dispersal area, and USFWS may recommend surveys. Applicable conservation measures that would benefit the rusty patched bumble bee within this dispersal area include restoration and maintenance of high-quality habitat through control of invasive species and restoration, including providing a high diversity and abundance of wildflowers appropriate for the region and local characteristics (USFWS 2017).

Fassett's locoweed has the potential to occur near the Superior terminal, although there are no NHIS reports for the plant in this area. If Fassett's locoweed occurred within the construction area, direct impacts could include trampling and destruction during clearing and grading for site preparation. Indirect effects from construction could include conversion of shoreline habitat (locoweed) into other habitat types and the spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. Surveys were not performed for Fassett's locoweed; however, based on known habitat associations, there is limited potential for the plant to occur within the construction areas around the Superior terminal. If this plant was found to occur, additional avoidance measures may be required, and effects likely would be permanent and negligible.

Summary

Conservation measures to avoid or reduce construction impacts on federally listed animals and plants would be developed in consultation with USFWS to ensure that any unavoidable impacts would not jeopardize the continued existence of species protected by the ESA. Individual Canada lynx and gray wolves could experience temporary minor effects associated with construction activities for the rail alternative. Northern long-eared bats and occupied maternity roots are not known to occur near the Clearbrook and Superior terminals. With implementation of general conservation measures, impacts from construction would be temporary and negligible to minor. Kirtland's warbler, piping plover, and whooping crane are not likely to be affected by construction for the rail alternative. Native prairie plants that could provide habitat for the native prairie-dependent Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee may persist within hay/pasture vegetation in the vicinity of the Clearbrook terminal. If suitable habitat for these butterflies and bumble bees occurs within these grassland, and the habitat was lost during construction, the impact would be permanent and minor. Effects on the federally listed Fassett's locoweed would be negligible to minor and permanent based on the lack of appropriate habitat and species presence.

Operations Impacts

The increase in train traffic could increase barrier effects and wildlife collision mortality (Dorsey 2011) on Canada lynx and gray wolf, which could represent a permanent major impact. There would be no impact on the northern long-eared bat because they are not likely to occur in the vicinity of the new rail terminals. Similarly, there would be no impacts on Kirtland's warbler or piping plover, because there is no suitable habitat for these species in the vicinity of the new rail terminals. Whooping cranes are unlikely to occur near the Clearbrook or Superior terminal areas and therefore would not be impacted by operations. There would be no impact on federally listed insects or plants from operations of the transportation by rail alternative.

State-Listed Species

Endangered and Threatened Species

There are no state-listed endangered and threatened vertebrates or invertebrates that could be affected by construction or operation of the rail alternative; four state-listed plants could be affected (Appendix M, Tables M-1 to M-3).

Construction Impacts. The state-protected plants beaked spikerush, hair-like beak rush, sterile sedge, and sweet colt's-foot could occur near the Clearbrook and Superior terminals where new rail offloading and access facilities would be constructed (Appendix M, Table M-3). Listed plants present in the construction footprint could be destroyed during construction activities, and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. Impacts on state-listed plants in the construction work area would be permanent and major if these plants occur within the facility footprints. Taking of state-listed endangered or threatened plants would require consultation with the appropriate state DNR for a take permit, which may require compensatory mitigation to offset unavoidable losses.

Operations Impacts. The 10 loaded trains per day required for transport of crude oil for the Project (see Section 4.2.6) would not be expected to affect state-listed plant species.

Special Concern Species

There are no state-listed special concern vertebrates or invertebrates that could be affected by construction and operation of the transportation by rail alternative; 3 special concern plants could be affected (Appendix M, Tables M-1 to M-3).

Construction Impacts. State-listed special concern plants with the potential to occur in the areas of the offloading facilities and new rail access include few-flowered spikerush, McCalla's willow, and twig rush (Appendix M, Table M-3). Special concern plants in the construction footprint could be destroyed during construction activities, and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction.

Impacts on special concern plants in the construction work area would be permanent and major if these plants are present within the facility footprints.

Operations Impacts. The 10 loaded trains per day required for transport of crude oil for the Project (see Section 4.2.6) would not be expected to affect state-listed special concern plant species.

Species of Greatest Conservation Need

Gap Analysis Program Species Models and Minnesota Wildlife Action Network

Construction Impacts. General construction impacts and measures to avoid or reduce impacts on protected and rare animals addressed in the GAP models would be the same as those described above for federally and state-listed vertebrate fauna. Overall, GAP models indicate no use by amphibians and reptiles and low and medium use by birds and mammals for offloading facilities and associated access at the Clearbrook terminal. GAP mammal models indicate that the area near the Superior terminal is high use by protected and rare mammals and low and medium use by birds, amphibians, and reptiles. If present, protected and rare animals could be injured or disturbed by construction activity and noise. Disturbance effects likely would be minor and temporary.

Given that most facilities would be in areas with no high use habitats for birds, amphibians, and reptiles, construction impacts on these habitats would be minor based on lack of use by special-status species, although permanent. Construction of facilities at Superior could affect habitats used by seven or more protected and rare mammals, which could cause permanent, major permanent impacts if those species are present, although NHIS data did not identify any state-listed mammals near this location.

The Minnesota WAN applies to facilities at Clearbrook, and no WAN habitats occur near the terminal. Therefore, no WAN habitats would be affected by construction of the Clearbrook terminal offloading facilities.

Operations Impacts. The principal impact on unique natural resources from the substantial increase in rail traffic would be increased wildlife collisions. Rail transportation routes extend through areas ranging from no to high use based on the GAP models for mammals, birds, amphibians, and reptiles. The increase in collision mortality for these animals could result in impacts ranging from negligible to major that would continue for the life of the Project.

Minnesota Biological Survey Sites of Biodiversity Significance

Three MBS Sites preliminarily rated as moderate occur near the Clearbrook terminal where rail facilities are likely to be constructed, and the route of the rail connection between Clearbrook and Gully is near three additional moderate rated MBS Sites. Construction of new rail offloading facilities likely would avoid the MBS Sites near the Clearbrook terminal, with no impacts resulting. Because construction of the new rail connection would be within a previous rail corridor on an existing rail bed, impacts on these MBS Sites also are unlikely.

Minnesota Scientific and Natural Areas

No SNAs occur in the area around the Clearbrook or Superior terminals where new rail facilities are likely to be constructed. Therefore, this alternative would have no impact on SNAs.

5.2.5.3.5 Transportation by Truck

Transportation of crude oil by truck would require development of offloading facilities and new road access. Truck offloading facilities would require an approximately 50-acre site at locations in Clearbrook, Minnesota, and Superior, Wisconsin. New road access would require approximately 5 acres in Clearbrook and 34 acres in Superior. In the United States, operations would include use of the offloading facilities and new and improved road access, and use of the existing highway system from the U.S-Canada border to the Clearbrook and Superior terminals. Transportation of the proposed volume of crude oil by truck would require up to approximately 4,000 loaded tanker trucks per day and 4,000 tanker trucks per day returning empty.

Federally Listed Species

Federally listed threatened and endangered species that could occur within or near the new facilities and new truck access routes and that could be affected by construction and operation of the truck alternative include three mammals – Canada lynx, gray wolf, and northern long-eared bat; three birds – Kirtland's warbler, piping plover, and whooping crane; one invertebrate – rusty patched bumble bee; and one plant – Fassett's locoweed.

<u>Construction Impacts</u>

If present, individual Canada lynx could be disturbed by construction noise and activity that likely would cause them to move to other areas, possibly returning after construction activities stop. Disturbance effects would be temporary and negligible to minor unless den sites are disturbed. Den sites, which are used from April to June, are unlikely to occur near the Clearbrook and Superior terminals where new offloading and truck access facilities would be constructed.

Foraging and reproductive activities for gray wolves could be affected by exposure to construction noise and increased human activity. Construction of the new facilities could alter used habitats used by gray wolves. If dens are present in the vicinity, construction-related disturbance could reduce pup survival. In addition, wolf-vehicle collisions continue to be a major contributor to wolf mortality. Typical conservation measures to reduce construction impacts on the gray wolf include:

- Observe vehicular speed limits during construction. Where speed limits are not posted, vehicles and equipment should be operated at speeds suitable for driving conditions. Stop construction activities if the contractor or EI observes a gray wolf or possible den site within the construction area, or if USFWS notifies the Applicant of a gray wolf sighting within 1 mile of the construction work area; the stop work order should continue until the wolves leave the area.
- Report any wolf sightings immediately to USFWS, USACE, and state resource agencies (e.g., Minnesota DNR).

With implementation of conservation measures, gray wolves would not be affected by construction of the new truck facilities and access roads, or the impact would be temporary and negligible to minor.

Minnesota and Wisconsin NHIS report no occurrences of the northern long-eared bat for the areas near the Clearbrook and Superior terminals where new truck offloading facilities and truck access are likely to be constructed (Minnesota DNR 2016e, Wisconsin DNR 2016). The Applicant conducted acoustic surveys within forested areas containing suitable habitat for northern long-eared bats (trees that have a diameter at breast height of 3 inches or larger) around the Clearbrook and Superior terminals for the Applicant's proposed project during 2014 and 2015 to determine the summer presence or probable absence of northern long-eared bats. No northern long-eared bats were confirmed acoustically at 14 survey sites around the Clearbrook terminal or at one site near the Superior terminal (Merjent 2014b, 2015c).

Impacts on individuals or colonies of bats may occur if clearing or construction occurs when bats are using summer roosts. Northern long-eared bats could be disturbed by noise or human presence, causing them to abandon occupied tree cavities. Bats could be injured or killed if occupied trees are cut down. Impacts could be substantial if trees with maternity colonies are destroyed or abandoned. If northern long-eared bats were found to roost near these sites, applicable conservation measures associated with the ESA 4(d) rule would include:

- Maintain a year-round 0.25-mile radius buffer (which is equivalent to 125.7 acres) around known northern long-eared bat hibernacula.
- Protect known, occupied maternity roost trees. Incidental take is prohibited if the activity cuts or destroys a known, occupied maternity roost tree, or any other trees within a 150-foot radius around a known maternity roost tree, equivalent to 1.6 acres, during the pup season from June 1 to July 31.

Northern long-eared bats are not expected to occur near the new rail offloading and access facilities. With implementation of applicable conservation measures associated with the ESA 4(d) rule, there would be no impact on northern long-eared bats, or the impact would be temporary and negligible to minor.

Kirtland’s warblers nest in jack pine forests in Wisconsin and Michigan and migrate along the southeast coast of the United States to overwinter in the Bahamas. Vegetation clearing for construction of new facilities during the nesting season could result in loss of eggs or young, if the birds are present. They are known to occur during the breeding season in the vicinity of Superior. No jack pine woodlands appear to occur in the vicinity of the new truck offloading and access facilities near Clearbrook or Superior, and Kirtland’s warblers are not expected to occur near the facilities. Therefore, the warblers would not be affected by facility construction.

Great Lakes piping plovers inhabit shorelines of the Great Lakes. Critical habitat for this species has been designated in Douglas County, Wisconsin. New truck offloading and access facilities would be constructed near the Superior terminal in Douglas County. Piping plovers nest on open, sparsely vegetated sandy habitats such as sand spits or sand beaches found on Great Lakes islands and mainland shorelines. While it is possible that piping plovers could occur near facilities in Superior, it is unlikely that they would use these developed habitats; therefore, construction would be unlikely to affect piping plovers. There would also be no impact on designated critical habitat for the piping plover because the Superior terminal is not within the designated critical habitat.

Whooping cranes from the eastern population that winters in Florida migrate to breeding areas in Wisconsin and could be present near the Superior terminal during spring and fall migrations. Noise and activity during construction can displace whooping cranes from stopover habitats during foraging or in wetlands or riverine habitats during roosting. Whooping cranes generally depart from wintering grounds during late March to mid-April and return from breeding grounds beginning in mid-September. During migration, whooping cranes use croplands and shallow wetlands for stopover foraging and roosting habitats. The Aransas-Wood Buffalo Park whooping crane population migrates between wintering grounds in the Aransas NWR to breeding grounds in the Wood Buffalo National Park in northern Alberta.

The migration corridor for this population crosses through central Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota and is located generally west of the Clearbrook terminal where new truck offloading and access would be constructed. Potential impacts could include disturbance to foraging or roosting birds from construction during migration periods (USFWS 2009). Whooping cranes are unlikely to occur near the Clearbrook or Superior terminal areas and are not likely to be affected by construction.

If present, individual rusty patched bumble bees could be affected by construction activities that disturb native vegetation. Vegetation clearing and grading would disrupt egg laying and foraging during spring and summer, and could crush dormant larvae during fall and winter. These prairie-dependent bumble bees depend on high-quality native grasslands and tallgrass prairies to provide food from flower pollen and nectar. Vegetation clearing and replacement with non-native ground covers could injure or kill these ground-nesting bees and remove forage plants. Habitat and presence/absence surveys have not been completed for the area surrounding the Clearbrook and Superior terminals. Native prairie plants that could provide habitat for the bees may persist in the hay/pasture vegetation in the vicinity of the Clearbrook terminal where facilities could be constructed. If suitable habitat for prairie-dependent rusty patched bumble bees is present, it could be lost due to fill or clearing required for construction. Loss of suitable habitat would result in a permanent minor impact.

The new truck facilities near the Clearbrook terminal would not cross any current high use areas for rusty patched bumble bee, and construction is not likely to directly or indirectly affect any individuals or current high use areas. The new facilities would, however, be within a current low potential area where rusty patched bumble bees may disperse from a current high use area or where their occurrence is uncertain. The rusty patched bumble bee may benefit from conserve measures implemented within the dispersal area, and USFWS may recommend surveys. Applicable conservation measures that would benefit the rusty patched bumble bee within this dispersal area include restoration and maintenance of high-quality habitat through control of invasive species and restoration, including a providing a high diversity and abundance of wildflowers appropriate for the region and local characteristics (USFWS 2017).

Fassett’s locoweed has the potential to occur near the Superior terminal, although there are no NHIS reports for the plant in this area. If Fassett’s locoweed occurred within the construction area, direct impacts could include trampling and destruction during construction during clearing and grading for site preparation. Indirect effects from construction could include conversion of shoreline habitat into other habitat types and the spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. Surveys were not performed for Fassett’s locoweed, but based on known habitat associations, there is limited potential for the species to occur within the construction areas around the Superior terminal. If this plant was present, additional avoidance measures may be required. Consequently, there would be no impact, or the impact would be permanent and negligible.

Summary

Conservation measures to avoid or reduce construction impacts on federally listed animals and plants would be developed in consultation with USFWS to ensure that any unavoidable impacts would not jeopardize the continued existence of species protected by the ESA. Individual Canada lynx and gray wolves could experience temporary, negligible to minor effects associated with construction activities. Northern long-eared bats and occupied maternity roots are not known to occur near the Clearbrook and Superior terminals. If there is an occurrence, with implementation of BMPs and general conservation measures associated with the ESA 4(d) rule, construction would have no impacts or impacts would be temporary and negligible to minor. Kirtland's warbler, piping plover, and whooping crane would not to affected by the truck alternative. Native prairie plants that could provide habitat for the native prairie-dependent rusty patched bumble bee may persist within hay/pasture vegetation in the vicinity of the Clearbrook terminal. If suitable habitat for bumble bees occurs within these grasslands, the habitats could be lost, potentially resulting in a permanent minor impact. There would be no impacts on the federally listed Fassett's locoweed or the impacts would be permanent and negligible based on the lack of appropriate habitat and species presence.

Operations Impacts

The principal impact on federally listed animals from such a large increase in truck traffic would be increased wildlife collisions, which could represent a major permanent impact for Canada lynx and gray wolf. There would be no impact on the northern long-eared bat because they are not likely to occur in the vicinity of the new rail terminals. Similarly, there would be no impacts on Kirtland's warbler or piping plover, because there is no suitable habitat for these species in the vicinity of the new rail terminals. Whooping cranes are unlikely to occur near the Clearbrook or Superior terminal areas and therefore would not be impacted by operations. There would be no impact on federally listed insects or plants from operations of the transportation by rail alternative.

State-Listed Species

Endangered and Threatened Species

State-listed endangered and threatened species that could be affected by construction and operation of the truck alternative includes four plants. See also Appendix M (Table M-1, invertebrates; Table M-2, vertebrates; and Table M-3, plants).

Construction Impacts. The state-protected plants beaked spikerush, hair-like beak rush, sterile sedge, and sweet colt's-foot have the potential to occur near the Clearbrook and Superior terminals where new truck offloading and access facilities would be constructed (Appendix M, Table M-3). Listed plants in the construction footprint could be destroyed during construction activities, and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. Impacts on plants in the construction work area would be permanent and major if they are present within the facility footprints. Take of state-listed endangered or threatened plants would require consultation with the appropriate state DNR for a take permit, which may require compensatory mitigation to offset unavoidable losses.

Operations Impacts. All of the state-listed species in the area are plants, and those plants would not be affected by operation of the truck alternative.

Special Concern Species

There are no state-listed special concern animals that could be affected by construction or operation of the truck alternative; three plants could be affected as listed in Appendix M, Tables M-1 to M-3.

Construction Impacts. State-listed special concern plants with the potential to occur in the likely areas for new offloading facilities and new truck access roads include few-flowered spikerush, McCalla's willow, and twig rush (Appendix M, Table M-3). Special concern plants in the construction footprint could be destroyed during construction activities, and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. If these plants are present in the construction footprints, the potential impact would be permanent and major.

Operations Impacts. All of the state-listed special concern species in the area are plants, and those plants would not be affected by operation of the truck alternative.

Species of Greatest Conservation Need

Gap Analysis Program Species Models and Minnesota Wildlife Action Network

Construction Impacts. General construction impacts and measures to avoid or reduce impacts on protected and rare animals addressed in the GAP models would be the same as those described above for federally and state-listed vertebrate fauna. Overall, GAP models indicate no use by amphibians and reptiles and low and medium use by birds and mammals for the areas planned for offloading facilities and associated access at the Clearbrook terminal. GAP mammal models indicate that the area near the Superior terminal includes high use by protected and rare mammals, and low and medium use by birds, amphibians, and reptiles. If present, protected and rare animals could be injured or disturbed by construction activity and noise. Disturbance effects likely would be minor and temporary.

Given that most facilities would be in areas with no high use habitats for birds, amphibians, and reptiles, construction impacts on these habitats would minor although permanent. Construction of facilities at Superior could affect habitats used by seven or more protected and rare mammals, which could result in permanent and major impacts—although NHIS data did not identify any state-listed mammals near this location.

The Minnesota WAN applies to facilities at Clearbrook; however, no WAN habitats occur around the terminal. Therefore, no WAN habitats would be affected by construction of truck offloading facilities near the Clearbrook terminal.

Operations Impacts. The principal operations impact on unique natural resources from the large increase in truck traffic would be increased wildlife collisions. Truck transportation routes would cross areas ranging from no to high use based on the GAP models for mammals, birds, amphibians, and reptiles. The increase in collision mortality for wildlife would result in potential impacts that would be permanent and negligible to major.

Minnesota Biological Survey Sites of Biodiversity Significance

Three MBS Sites preliminarily rated as moderate occur near the Clearbrook terminal where truck facilities are likely to be constructed. Construction of new truck offloading facilities likely would be able to avoid the MBS Sites near the Clearbrook terminal, with the result of no impact.

Minnesota Scientific and Natural Areas

No SNAs occur in the area around the Clearbrook and Superior terminals where new truck facilities are likely to be constructed. Therefore, this alternative would have no impact on SNAs.

5.2.5.3.6 Existing Line 3 Supplemented by Rail

The potential construction- and operations-related impacts on unique biological resources associated with continued use of the existing Line 3 pipeline supplemented by transportation of crude oil by train would be similar to the impacts reported above for each of the components of this alternative. Information on the species and habitats potentially affected by this alternative and the potential impacts are summarized below.

Federally Listed Species

Federally listed threatened and endangered species that could occur within or near the existing Line 3 pipeline and that could be affected by construction and operation of the facilities and routes for the rail alternative include three mammals – Canada lynx, gray wolf, and northern long-eared bat; four birds – Kirtland's warbler, piping plover, rufa red knot, and whooping crane; three invertebrates - Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee; and two plants – Fassett's locoweed and western prairie fringed orchid (Tables 5.2.5-6 and 5.2.5-11).

<u>Construction Impacts</u>

The Line 3 pipeline has been built and is in operation; therefore, no construction impacts are associated with that component of the alternative. Individual Canada lynx and gray wolves could experience temporary, minor effects associated with construction of new rail offloading and access facilities at the existing Clearbrook and Superior terminals. Northern long-eared bats and occupied maternity roosts are not known to occur near the terminals. With implementation of general conservation measures for northern long-eared bats associated with the ESA 4(d) rule, impacts from construction would be temporary and minor. Kirtland's warbler, piping plover, rufa red knot, and whooping crane are not likely to be affected by construction of rail facilities. Native prairie plants that could provide habitat for the native prairie-dependent Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee may persist within hay/pasture vegetation in the vicinity of the Clearbrook terminal. If suitable habitat for these butterflies and bumble bees occurs within these grasslands, it could be lost, potentially resulting in a permanent and minor impact. There would be no effect on the federally listed Fassett's locoweed based on the lack of appropriate habitat and species presence.

<u>Operations Impacts</u>

- If federally listed species persist within the permanent Line 3 pipeline right-of-way, impacts on those species from ongoing operations and maintenance, such as mowing for vegetation management, equipment maintenance, invasive species control, right-of-way monitoring and inspections, and pipeline integrity excavations, would continue. Vegetation maintenance and the increase in required integrity digs to maintain the aging pipeline (an estimated 267 integrity digs per year over the next 15 years) could result in direct mortality of individuals of non-mobile species, including the Dakota skipper, Poweshiek skipperling, rusty patched bumble bee, Fassett's locoweed, and western prairie fringed orchid if individuals of these species are present during the activity. Increased noise and human disturbance at offloading facilities could cause individuals of more mobile animals, including Canada lynx, gray wolf, northern long-eared bat, Kirtland's warbler, pipeline plover, rufa red knot, and whooping crane to leave the area; however, they would be expected to return when the activity ceases.

Implementation of this combined alternative would reduce Project-related rail traffic from 10 unit trains per day to 6 unit trains per day. Nevertheless, this would be an increase in rail traffic over current conditions and could result in permanent and major impacts on the federally listed gray wolf and Canada lynx because of the increased potential for collisions of trains with wildlife. Impacts on all other federally listed animals and plants would not occur or would be permanent and minor.

State-Listed Species

Endangered and Threatened Species

State-listed endangered and threatened species that could occur within the ROI for the existing Line 3 pipeline and that could be affected by construction and operation in the vicinity of the Clearbrook and Superior terminals where new rail offloading facilities and access would be constructed include one mammal – northern long-eared bat, one invertebrate – fluted-shell mussel, and one reptile – wood turtle. Potential impacts on the northern long-eared bat are discussed for federally listed endangered and threatened species. Of the 18 state-listed endangered and threatened plants known to occur within the ROI for the existing Line 3 pipeline, eight species potentially occur within the permanent right-of-way and could be affected by continued maintenance activities. These consist of three in Minnesota – beaked spikerush, hair-like beak rush, and sterile sedge; and five in Wisconsin –clustered bur-reed, neat spike-rush, seaside crowfoot, small yellow-water crowfoot, and sweet colt’s foot. The state-protected plants beaked spikerush, hair-like beak rush, sterile sedge, and sweet colt’s-foot have the potential to occur near the Clearbrook and Superior terminals, where new rail offloading and access facilities would be constructed for the rail alternative (Appendix M, Table M-3).

Construction Impacts

Listed plants in the construction footprint for rail offloading and access facilities could be destroyed during construction activities, and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. If listed plants are present in the construction work area, construction impacts would be permanent and major. Takings of state-listed endangered or threatened plants would require consultation with the appropriate state DNR for a take permit, which may require compensatory mitigation to offset unavoidable losses.

Operations Impacts

Pipeline operations that could affect state-listed species include ongoing vegetation management, right-of-way monitoring and inspection, and pipeline excavation for repair or replacement of pipe segments. If excavation of pipe segments is required at surface water crossings where the fluted-shell mussel is present, destruction of the mussels could occur, and increased turbidity and sedimentation also could affect the mussels. Vegetation management and pipeline excavation could result in injury or mortality of wood turtle eggs or adults if these activities coincided with turtle presence in the habitats.

Listed plants that persist within the permanent right-of-way could be affected directly or indirectly by maintenance activities. With the increased need for excavation to repair or replace the existing Line 3 pipeline, there is a potential for the excavations to affect state-listed plants. If state-listed plants occur where work is proposed, a take permit would be required. If there are no feasible alternatives to takings, compensatory mitigation could be used to offset the impact.

Where railways cross suitable habitat, increased train traffic has the potential to affect the wood turtle by increasing the risk of fatalities due to collision. The remaining state-listed species in the vicinity of the rail facilities are plants that would not be affected by increased rail traffic.

Special Concern Species

- State-listed special concern species that could be affected by construction and operation of existing Line 3 supplemented by rail include nine vertebrates: three bats – big brown bat, little brown bat and northern long-eared bat; six birds – Connecticut warbler, Le Conte's sparrow, Nelson's sparrow, short-eared owl, trumpeter swan, and yellow rail; and four invertebrates: a caddisfly, and three mussels – black sandshell, creek heelsplitter and pink heelsplitter (Appendix M, Tables M-1 and M-2).
- Seventeen state-listed plants of special concern that could be affected by operation of the combined rail alternative include barren strawberry, blunt sedge, English sundew, false mountain willow, few-flowered spikerush, Lapland buttercup, least moonwort, mamillate spike-rush, McCalla's willow, mingan moonwort, northern single-spike sedge, northwestern sticky aster, pale moonwort, small white lady's slipper, St. Lawrence grapefern, twig rush, and Vasey's rush (Appendix M, Table M-3). The state-protected plants beaked spikerush, hair-like beak rush, sterile sedge, and sweet colt's-foot have the potential to occur near the Clearbrook and Superior terminals (Appendix M, Table M-3).

Construction Impacts. The state-protected plants beaked spikerush, hair-like beak rush, sterile sedge, and sweet colt's-foot have the potential to occur near the Clearbrook and Superior terminals where new rail offloading and access facilities would be constructed for the rail alternative (Appendix M, Table M-3). Listed plants in the construction footprint could be destroyed during construction activities, and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. If listed plants are present in the construction work area, construction impacts would be permanent and major. Takings of state-listed endangered or threatened plants would require consultation with the appropriate state DNR for a take permit, which may require compensatory mitigation to offset unavoidable losses.

Operations Impacts. Of the three bats of special concern, only the northern long-eared bat has been reported to occur within the permanent right-of-way for the existing Line 3. Vegetation management and pipeline excavation within the permanent right-of-way is unlikely to affect bats, unless trees are allowed to grow larger than 3 inch in diameter at breast height between tree maintenance events. Vegetation management and pipeline excavation could continue to result in injury or mortality of bird eggs and nests, if they are present when maintenance activities occur during the breeding season. Of the six birds occurring within the ROI for the existing Line 3 pipeline, four – Nelson's sparrow, short-eared owl, trumpeter swan, and yellow rail are also known to occur within the permanent right-of-way. If excavation of pipe segments is required at surface water crossings where the fluted-shell mussel or caddisflies are present, destruction of the mussels or caddisflies could occur, and increased turbidity and sedimentation also could affect these species.

Special concern plants that persist within the permanent right-of-way for the existing Line 3 could be affected directly or indirectly by vegetation management and pipeline repair or replacement. Twelve of the 17 plants of special concern occurring within the ROI for the existing Line 3 pipeline also are known to occur within the permanent pipeline right-of-way (10 in Minnesota – barren strawberry, blunt sedge, false mountain willow, few-flowered spikerush, least moonwort, mingan moonwort, northern single-spike sedge, pale moonwort, small white lady-s slipper, and St. Lawrence grapefern; and 2 in Wisconsin – mamillate spike-rush and Vasey's rush [Appendix M, Table M-3]). Given the increased need for excavation to repair or replace aging pipe segments, the excavations could coincide with occurrences of state-listed special concern plants. If special concern plants are present during maintenance activities and there are no feasible alternatives, they could be disturbed. Because these rare plants have, in many instances, persisted or reestablished after construction of other pipelines through this shared corridor, impacts are likely to be short term and negligible.

The increased train traffic could increase collisions with and mortality of special concern birds, including the Connecticut warbler, Le Conte's sparrow, Nelson's sparrow, short-eared owl, trumpeter swan, and yellow rail. These birds would be most susceptible if they nest in habitats near the train tracks. The remaining state-listed species in the vicinity of the rail facilities are plants that would not be affected by increased rail traffic.

Species of Greatest Conservation Need

Gap Analysis Program Species Models

The distribution of low, medium, and high use areas for protected or rare mammal species indicates that 49 percent of permanent right-of-way for the existing Line 3 pipeline could support medium to high use by these mammals (4 or more species). This relatively high proportion may reflect the widespread use of this area by Canada lynx, wolves, and several species of bats. By comparison, 14 percent of the permanent right-of-way for the existing Line 3 pipeline may support medium to high use by protected or rare birds (7 or more species). A total of 26 BCCs were identified as occurring within 1 mile of the existing Line 3 pipeline from the Canada-North Dakota border to Superior, Wisconsin (Appendix M, Table M-5). Little of the Line 3 permanent right-of-way contains habitats used by protected or rare amphibians and reptiles.

Overall, GAP models indicate no use by amphibians and reptiles, and low and medium use by birds and mammals for offloading facilities and associated access at the Clearbrook terminal. GAP mammal models indicate that the area near the Superior terminal is high use by protected and rare mammals, and low and medium use by birds, amphibians, and reptiles.

Construction Impacts. General construction impacts and measures to avoid or reduce impacts on protected and rare animals addressed in the GAP models would be the same as those described above for federally and state-listed vertebrate fauna. If present, protected and rare animals could be injured or disturbed by construction activity and noise. Disturbance effects likely would be minor and temporary. Given that most facilities would be in areas with no high use habitats for birds, amphibians, or reptiles, construction impacts on these habitats would be permanent and minor, based on lack of use. Construction of facilities at Superior could affect habitats used by seven or more protected and rare mammals. If any of these species are present, construction could cause permanent major impacts—although NHIS data did not identify any state-listed mammals near this location.

Operations Impacts. The permanent right-of-way for the existing Line 3 pipeline contains an estimated 1,797 acres of habitats used by one or more protected and rare mammal species; 1,987 acres used by one or more protected and rare bird species; and 393 acres used by one or more protected and rare amphibian and reptile species. All of the existing Line 3 pipeline permanent right-of-way that crosses these GAP habitats is located within the existing Enbridge Mainline pipeline corridor. If these habitats and animals persist within the permanent pipeline right-of-way, they could be affected by ongoing maintenance activities, particularly by the increased number of integrity digs. Maintenance activities could result in direct mortality of non-mobile animals if animals are present during the activity. Increased noise and human disturbance could cause more mobile species to leave the area; however, they would be expected to return when the activity ceases.

The principal impact on unique natural resources from the increase in rail traffic would be an increased probability of wildlife collisions. Rail transportation routes would cross areas ranging from no to high use, based on the GAP models for mammals, birds, amphibians, and reptiles; the impact of the increase in collision mortality for these animals would be permanent and negligible to major.

Minnesota's Wildlife Action Network

Approximately 608 acres (35 percent) of the permanent right-of-way for the existing Line 3 pipeline contains WAN habitats. Most WAN habitats (75 percent) that are affected by operation of the Line 3 pipeline are rated low-medium and medium, and no WAN habitats that would be affected by continued operation of the existing Line 3 pipeline are rated high. All of the Line 3 permanent right-of-way that crosses through WAN habitats in Minnesota is located within the existing Enbridge Mainline pipeline corridor. Maintenance activities such as vegetation management and integrity digs for pipeline repair and replacement could result in direct mortality of non-mobile animals and plants, if these species are present while the activity is occurring—particularly the increase in the number of integrity digs above current levels. These activities also would affect the habitats of these species. Increased noise and human disturbance could cause more mobile species to leave the area; however, they would be expected to return when the activity ceases.

The Minnesota WAN applies to facilities at Clearbrook, Minnesota; however, no WAN habitats would be affected as none occur around the terminal.

Minnesota Biological Survey Sites of Biodiversity Significance

Continued operation of the Line 3 pipeline would occur within an estimated 305 acres of moderate to outstanding MBS Sites. Most MBS Sites (76 percent) that occur within the permanent right-of-way for the existing Line 3 are rated high for biodiversity. All of the Line 3 permanent right-of-way that crosses through MBS Sites in Minnesota is located within the existing Enbridge Mainline pipeline corridor. Maintenance activities such as vegetation management and integrity digs for pipeline repair and replacement could result in direct mortality of plants; in particular, the increase in the number of integrity digs above current levels in could affect these MBS Sites. Long-term vegetation management and increased integrity digs during operation would result in a minor permanent change to MBS Sites.

Three MBS Sites preliminarily rated as moderate occur near the Clearbrook terminal where rail facilities are likely to be constructed, and the rail connection between Clearbrook and Gully would cross near three additional moderate rated MBS Sites. Construction of new rail offloading facilities likely would be able to avoid the MBS Sites near the Clearbrook terminal, resulting in no impact. The new rail connection would be constructed on an existing rail bed along a previously used rail corridor and is unlikely to affect the three adjacent MBS Sites.

Minnesota Scientific and Natural Areas

The Wawina Peatland SNA (Minnesota DNR 2016d, 2016g) is within the ROI for the existing Line 3 pipeline. The boundary for this SNA is located approximately 0.4-mile northeast of the Line 3 pipeline; a BNSF rail line lies between the SNA and Line 3. Continued use of the Line 3 pipeline would not affect this SNA.

5.2.5.3.7 Existing Line 3 Supplemented by Truck

The potential construction- and operations-related impacts on unique biological resources associated with continued use of the existing Line 3 pipeline supplemented by transportation of crude oil by truck would be similar to the impacts reported above for each of the components of this combined alternative. Information on the species and habitats potentially affected by this alternative and the impacts that may occur are summarized below.

Federally Listed Species

Federally listed threatened and endangered species that could occur within or near the existing Line 3 pipeline and that could be affected by construction and operation of facilities and routes for the truck alternative include three mammals – Canada lynx, gray wolf, and northern long-eared bat; four birds – Kirtland's warbler, piping plover, rufa red knot, and whooping crane; three invertebrates – Dakota skipper, Poweshiek skipperling, and rusty patched bumble bee; and two plants – Fassett's locoweed and western prairie fringed orchid (Table 5.2.5-14 and 5.2.5-14).

Construction Impacts

The Line 3 pipeline has been built and is in operation; therefore no construction impacts are associated with that component of the combined alternative. Individual Canada lynx and gray wolves could experience temporary minor effects associated with construction of new truck offloading and access facilities at the existing Clearbrook and Superior terminals. Northern long-eared bats and occupied maternity roosts are not known to occur near the Clearbrook and Superior terminals. With implementation of general conservation measures for northern long-eared bats associated with the ESA 4(d) rule, impacts related to construction would be temporary and minor. Kirtland's warbler, piping plover, and whooping crane are not likely to be affected by construction of truck offloading facilities or access roads. Native prairie plants that could provide habitat for the native prairie-dependent rusty patched bumble bee may persist within hay/pasture vegetation in the vicinity of the Clearbrook terminal. If suitable habitat for these butterflies and bumble bees occurs within these grasslands, it could be lost, potentially resulting in a permanent minor impact. Effects on the federally listed Fassett's locoweed would be negligible based on the lack of appropriate habitat and species presence.

Operations Impacts

- If federally listed species persist within the permanent right-of-way for the existing Line 3, impacts on those species could continue from ongoing operations such as mowing for vegetation management, equipment maintenance, invasive species control, right-of-way monitoring and inspections, and pipeline integrity excavations. Vegetation maintenance and the increase in integrity digs (an estimated 267 integrity digs per year over the next 15 years) could result in direct mortality of individuals of non-mobile species, including the Dakota skipper, Poweshiek skipperling, rusty patched bumble bee, Fassett's locoweed, and western prairie fringed orchid, if these species are present while the activity is occurring. Increased noise and human disturbance at offloading facilities could cause more mobile animals, including Canada lynx, gray wolf, northern long-eared bat, Kirtland's warbler, piping plover, rufa red knot, and whooping crane, to leave the area; however, they would be expected to return when the activity ceases.

Implementation of this combined alternative would reduce Project-related truck traffic from 4,000 loaded tanker trucks per day to 1,947 trucks per day. Nevertheless, this represents a substantial increase in truck traffic over current conditions that could result in permanent and major impacts on the federally listed gray wolf and Canada lynx because of the increased potential for collisions of trucks with wildlife. Impacts on all other federally listed animals and plants would not occur or would be permanent and minor.

State-Listed Species

<u>Endangered and Threatened Species</u>

State-listed endangered and threatened species that could occur within the ROI for the existing Line 3 pipeline and that could be affected by construction and operation in the vicinity of the Clearbrook and Superior terminals where new truck offloading facilities and access roads would be constructed include one mammal – northern long-eared bat, one invertebrate – fluted-shell mussel, and one reptile – wood turtle. Potential impacts on the northern long-eared bat are discussed for federally listed endangered and threatened species. Of the 18 state-listed endangered and threatened plants known to occur within the ROI for the Line 3 pipeline, 8 potentially occur within the permanent right-of-way and could be affected by operations. These include three in Minnesota – beaked spikerush, hair-like beak rush, and sterile sedge; and five in Wisconsin –clustered bur-reed, neat spike-rush, seaside crowfoot, small yellow-water crowfoot, and sweet colt's foot. The state-protected plants beaked spikerush, hair-like beak rush, sterile sedge, and sweet colt's-foot have the potential to occur near the Clearbrook and Superior terminals where new truck offloading and access facilities would be constructed (Appendix M, Table M-3).

Construction Impacts

Listed plants present in the construction footprint for truck offloading facilities and access roads could be destroyed during construction activities, and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. If listed plants are present in the construction work area, construction impacts would be permanent and major. Takings of state-listed endangered or threatened plants would require consultation with the appropriate state DNR for a take permit, which may require compensatory mitigation to offset unavoidable losses.

Operations Impacts

Pipeline operations for the existing Line 3 that could affect state-listed species include ongoing vegetation management, right-of-way monitoring and inspection, and pipeline excavation for repair or replacement of pipe segments. If excavation of pipe segments is required at surface water crossings where the fluted-shell mussel is present, destruction of the mussels could occur, and increased turbidity and sedimentation also could affect the mussels. Vegetation management and pipeline excavation could result in injury or mortality of wood turtle eggs or adults, if these activities coincided with occupied habitats.

Listed plants that persist within the permanent right-of-way could be affected directly or indirectly by maintenance activities. With the increased need for excavation to repair or replace the Line 3 pipeline, there is a potential for the excavations to affect state-listed plants. If this is the case, a take permit would be required. If there are no feasible alternatives to takings, compensatory mitigation could be required to offset the impact.

The principal impact on state-listed animals from the increase in truck traffic associated with this combined alternative would be increased wildlife collisions. This could represent a major permanent impact for state-listed species. Wood turtles are likely to be hit by trucks if they are on the roadway. If routes cross occupied habitats with no provision for turtles to avoid crossing roads, the projected increase in traffic could increase road kills. The remaining state-listed species in the vicinity of new truck facilities are plants that would not be affected by truck traffic.

Special Concern Species

- State-listed special concern species that could be affected by construction and operation of the alternative include nine vertebrates: three bats – big brown bat, little brown bat and northern long-eared bat; six birds – Connecticut warbler, Le Conte's sparrow, Nelson's sparrow, short-eared owl, trumpeter swan, and yellow rail; and four invertebrates: a caddisfly, and three mussels – black sandshell, creek heelsplitter and pink heelsplitter (listed in Appendix M, Tables M-1 and M-2).
- Seventeen state-listed plants of special concern that could be affected by operation of the combined alternative include barren strawberry, blunt sedge, English sundew, false mountain willow, few-flowered spikerush, Lapland buttercup, least moonwort, mamillate spike-rush, McCalla's willow, mingan moonwort, northern single-spike sedge, northwestern sticky aster, pale moonwort, small white lady's slipper, St. Lawrence grapefern, twig rush, and Vasey's rush (Appendix M, Table M-3). The state-protected plants beaked spikerush, hair-like beak rush, sterile sedge, and sweet colt's-foot have the potential to occur near the Clearbrook and Superior terminals where new truck offloading and access facilities would be constructed (Appendix M, Table M-3).

Construction Impacts. The state-protected plants beaked spikerush, hair-like beak rush, sterile sedge, and sweet colt's-foot have the potential to occur near the Clearbrook and Superior terminals where new truck offloading and access road facilities would be constructed (Appendix M, Table M-3). Listed plants present in the construction footprint could be destroyed during construction activities, and their habitats could be degraded by the introduction or spread of noxious weeds and invasive plants. To minimize the spread of noxious weeds and invasive plants, the Applicant would implement measures in a Noxious Weeds and Invasive Species Control Plan. This plan would include control measures for management of noxious weeds and invasive plants during construction. If listed plants are present in the construction work area, construction impacts would be permanent and major. Takings of state-listed endangered or threatened plants would require consultation with the appropriate state DNR for a take permit, which may require compensatory mitigation to offset unavoidable losses.

Operations Impacts. Of the three bats of special concern, only the northern long-eared bat has been reported to occur within the permanent right-of-way for existing Line 3. Vegetation management and pipeline excavation within the Line 3 permanent right-of-way is unlikely to affect bats, unless trees are allowed to grow larger than 3 inch in diameter at breast height between tree maintenance events. Vegetation management and pipeline excavation could continue to result in injury or mortality of bird eggs and nests, if maintenance activities are conducted during the breeding season and they are present. Of the six birds occurring within the ROI for the existing Line 3 pipeline, four – Nelson's sparrow, short-eared owl, trumpeter swan, and yellow rail are known to occur within the permanent right-of-way. If excavation of pipe segments is required at surface water crossings where the fluted-shell mussel or caddisflies are present, destruction of the mussels or caddisflies could occur, and increased turbidity and sedimentation also could affect these species.

Special concern plants that persist within the permanent right-of-way could be affected directly or indirectly by vegetation management and pipeline repair or replacement. Twelve of the 17 plants of special concern occurring within the ROI for the existing Line 3 pipeline also are known to occur within the permanent pipeline right-of-way (10 in Minnesota – barren strawberry, blunt sedge, false mountain willow, few-flowered spikerush, least moonwort, mingan moonwort, northern single-spike sedge, pale moonwort, small white lady-s slipper, and St. Lawrence grapefern; and 2 in Wisconsin – mamillate spike-rush, and Vasey's rush [Appendix M, Table M-3]). Given the increased need for excavation to repair or replace aging pipe segments, the excavations could coincide with occurrences of state-listed special concern plants. If this is the case and there are no feasible alternatives, these plants could be disturbed. Because these rare plants have, in many instances, persisted or reestablished after construction of other pipelines through this corridor, impacts are likely to be short term and negligible.

The increased truck traffic could increase collisions with and mortality of special concern birds, including the Connecticut warbler, Le Conte's sparrow, Nelson's sparrow, short-eared owl, trumpeter swan, and yellow rail. These birds would be most susceptible if they nest in habitats near the highways. The increase in collision mortality could represent a permanent major impact on these state-listed species. The remaining state-listed species in the vicinity of the truck facilities are plants that would not be affected by truck traffic.

<u>Species of Greatest Conservation Need</u>

Gap Analysis Program Species Models

The distribution of low, medium, and high use areas for protected or rare mammal species indicates that 49 percent of the permanent right-of-way for the existing Line 3 pipeline could support medium to high use by these mammals (4 or more species). This relatively high proportion may reflect the widespread use of the area by Canada lynx, wolves, and several species of bats. By comparison, 14 percent of the permanent right-of-way for the Line 3 pipeline may support medium to high use by protected or rare birds (7 or more species). A total of 26 BCCs were identified as occurring within 1 mile of the Line 3 pipeline from the Canada-North Dakota border to Superior, Wisconsin (Appendix M, Table M-5). Little of the Line 3 permanent right-of-way contains habitats used by protected or rare amphibians and reptiles.

Overall, GAP models indicate no use by amphibians and reptiles and low and medium use by birds and mammals for offloading facilities and associated access roads at the Clearbrook terminal. GAP mammal models indicate that the area near the Superior terminal is high use by protected and rare mammals, and low and medium use by birds, amphibians, and reptiles.

Construction Impacts. General construction impacts and measures to avoid or reduce impacts on protected and rare animals addressed in the GAP models would be the same as those described for federally and state-listed vertebrate fauna. If present, protected and rare animals could be injured or disturbed by construction activity and noise. Disturbance effects likely would be minor and temporary. Given that most facilities would be in areas with no high use habitats for birds, amphibians, and reptiles, construction impacts on these habitats would be permanent and minor, based on lack of use. Construction of truck facilities at Superior could affect habitats used by seven or more protected and rare mammals. If any of these species are present, construction could cause permanent, major permanent impacts—although NHIS data did not identify any state-listed mammals near this location.

Operations Impacts. The permanent right-of-way for the existing Line 3 pipeline contains an estimated 1,797 acres of habitats used by one or more protected and rare mammal species; 1,987 acres used by one or more protected and rare bird species; and 393 acres used by one or more protected and rare amphibian and reptile species. All of the Line 3 pipeline permanent right-of-way that crosses these GAP habitats is located within the existing Enbridge Mainline pipeline corridor. If these habitats and animals persist within the permanent pipeline right-of-way, they could be affected by ongoing maintenance activities, particularly by the increased number of integrity digs. Maintenance activities could result in direct mortality of non-mobile animals, if animals are present while the activity is occurring. Increased noise and human disturbance could cause more mobile species to leave the area; however, they would be expected to return when the activity ceases.

The principal impact on unique natural resources from such a large increase in truck traffic would be increased wildlife collisions. Truck transportation routes would cross areas ranging from no to high use for mammals, birds, amphibians, and reptiles, based on the GAP models. The increase in collision mortality for these animals would be a permanent and negligible to major impact.

Minnesota's Wildlife Action Network

Approximately 608 acres (35 percent) of the permanent right-of-way for the existing Line 3 pipeline contains WAN habitats. Most WAN habitats (75 percent) that are affected by operation of the existing Line 3 are rated low-medium and medium, and no WAN habitats affected by Line 3 are rated high. All of the Line 3 permanent right-of-way that crosses WAN habitats in Minnesota is located within the existing Enbridge Mainline pipeline corridor. Maintenance activities, such as vegetation management and integrity digs for pipeline repair and replacement, could result in direct mortality of non-mobile animals and plants, if these species are present while the activity is occurring—particularly the increased number of integrity digs above current levels. These activities also would affect the habitats of these species. Increased noise and human disturbance could cause more mobile species to leave the area; however, they would be expected to return when the activity ceases.

The Minnesota WAN applies to facilities at Clearbrook, Minnesota; however, no WAN habitats would be affected as none occur around the terminal.

Minnesota Biological Survey Sites of Biodiversity Significance

Continued operation of the existing Line 3 pipeline would occur within an estimated 305 acres of moderate to outstanding MBS Sites. Most MBS Sites (76 percent) that occur within the permanent right-of-way for the Line 3 pipeline are rated high for biodiversity. All of the Line 3 permanent right-of-way that crosses MBS Sites in Minnesota is located within the existing Enbridge Mainline pipeline corridor. Maintenance activities such as vegetation management and integrity digs for pipeline repair and replacement could result in direct mortality of plants; in particular, the increased number of integrity digs above current levels could affect these MBS Sites. Long-term vegetation management and increased integrity digs during operation would result in a minor permanent change to MBS Sites.

Three MBS Sites preliminarily rated as moderate occur near the Clearbrook terminal where truck facilities are likely to be constructed. Construction of new truck offloading facilities likely would be able to avoid the MBS Sites near the Clearbrook terminal, with the result of no impact.

Minnesota Scientific and Natural Areas

The Wawina Peatland SNA (Minnesota DNR 2016d, 2016g) is within the ROI for the existing Line 3 pipeline. The boundary for this SNA is approximately 0.4-mile northeast of Line 3; a BNSF rail line lies between the SNA and Line 3. Continued use of the existing Line 3 pipeline would have no effect on this SNA.

5.2.5.4 Summary and Mitigation

5.2.5.4.1 Summary

Potential effects on protected and conservation concern species were evaluated directly based on occurrence identified from IPaC searches, NHIS data, and field survey data. Potential effects on species of conservation concern were also evaluated indirectly through abundance, distribution, and habitat-based models for rare species, including the Gap Analysis Program, and the WAN and MBS Sites in Minnesota. The potential for effects on federally and state-protected and conservation concern animals and plants depends on whether they occur near the alternatives; whether they would be present when activities that may injury, harm, or disturb them would occur; and whether typical conservation measures would effectively prevent impacts. Table 5.2.5-25 presents a summary of construction- and operations-related impacts on unique resources for the Applicant's proposed project and CN Alternatives.

The data and analyses regarding unique natural resources presented in this EIS can be used by the regulatory agencies to assess potential impacts on unique natural resources. In addition, the USACE is preparing a Biological Assessment for the Project that would be used by USFWS as part of its determination on whether the Project would jeopardize the continued existence of any federally listed species or would result in destruction or adverse modification of their critical habitat. Potential effects on protected species would require avoidance and conservation measures with a potential for requirements for formal ESA consultation and federal and state incidental take permits where unavoidable impacts are likely to occur.

Construction impacts could include injury or loss of aquatic and terrestrial invertebrates, amphibians and reptiles, small mammals, bird eggs and young, and plants; loss or alteration of forage and cover habitats; and disturbance from noise and activity. Operations effects could include permanent habitat loss or alteration and continued disturbance from noise and activity at aboveground facilities and from pipeline inspection overflights, ground surveillance, and pipeline integrity excavation. Creation of new pipeline rights-of-way may contribute to fragmentation of habitats creating barriers to movements for amphibians, reptiles, and small mammals; facilitated movements for some predators; new edge habitats; and potential reduction in the abundance and diversity of forest nesting birds. Potential direct injury or mortality of protected animals may be avoided or minimized through typically required conservation measures, although reduction in habitat quality resulting from facility and pipeline construction may indirectly impact protected animals due to a permanent reduction in the habitats suitability to support some protected species.

Construction Impacts

Construction activities have the potential to disturb special-status animals, plants, and habitats due to increased noise and human activity, the use of construction equipment, and vegetation removal. Injury, mortality, or disturbance of individuals of special-status species and alteration of habitat types could also occur as a result of these activities.

Construction noise and increased human activity likely would cause individuals of more mobile species (e.g., larger mammals, bats, birds) to move to other areas, possibly returning after construction activities stop. If these disturbances were to occur during sensitive reproductive periods it could cause them to abandon their young or nesting/denning/roosting area, resulting in a decrease in survival and possible reproductive failure of individual mating pairs. Individuals of less mobile species that occur within the construction work area would not be able to avoid construction activities and could be crushed and killed.

Surface water crossings could affect individuals of aquatic species that are present. Disturbance to the stream bottom due to the use of dry or wet open-cut crossing methods could crush or suffocate individuals of aquatic species and/or their nests and would temporarily increase turbidity that could reduce feeding efficiency and damage these sensitive aquatic animals in the vicinity. Contaminated construction equipment and water used for hydrostatic testing could introduce invasive aquatic animals such as zebra and quagga mussels that could displace and reduce habitat quality for aquatic animals. Waterbodies crossed using the HDD crossing method would avoid direct mortality, injury, and habitat impact on special-status aquatic species.

Vegetation removal could injure or kill individuals of special-status species if they are present when clearing or construction activities occur. Mobile special-status animals would be likely to move to other areas, while individuals of less mobile species could be crushed and killed. Direct loss of protected plants may occur during construction and changes to soils and surrounding vegetation communities may leave habitats unsuitable after construction. Avoidance may be possible once precise locations are determined through surveys, such as those completed for the Applicant's proposed project. Some protected and special concern plants may be preserved and continue to persist within pipeline rights-of-way. In general, construction of aboveground facility sites and the establishment of pipeline rights-of-way would alter existing habitat types (including WAN and MBS Sites) and increase fragmentation.

Construction of the Applicant's proposed project, SA-04, or the rail and truck alternatives would have the potential to affect threatened and endangered species. Based on distribution and NHIS records, SA-04 has a greater potential to affect more federally and state-protected animals, while the Applicant's proposed project has a greater potential to affect more state-protected plants. The suite of federally and state-protected animals differs between the Applicant's proposed project and SA-04 because of their divergent routes and the different ecosystems they cross. There are more federally and state-protected animals in the ROI of SA-04 than the ROI of the Applicant's proposed project, partially due to the greater length of the SA-04 and the increased diversity of habitats along SA-04. Whether that translates into greater potential for impacts depends upon the suitability of the habitats crossed and the measures implemented to minimize disturbance, especially given the larger amount and higher quality of habitat along Minnesota portion of the Applicant's proposed project. For the populations of state-listed plants that cannot be avoided during construction, the impacts could be permanent and major. These impacts could be offset by compensatory mitigation.

Indirect habitat evaluations for vertebrate species based on GAP species models for the new pipeline alternatives indicate that SA-04 would affect more than twice the area of habitats identified as suitable for mammals, birds, amphibians, and reptiles of conservation concern compared to the Applicant's proposed project. This supports the overall conclusion from the IPaC and NHIS occurrence data that the potential for impacts on protected animals would increase for the new pipeline construction options. Among these vertebrate groups, however, the proportion of the suitable habitats used by the most species of conservation concern varies. A higher proportion of the area is used by mammals and birds for the Applicant's proposed project, and a higher proportion of the area is used by amphibians and reptiles for SA-04 (Table 5.2.5-18 and Table 5.2.5-26). Overall, SA-04 has the potential to affect more protected species. With implementation of BMPs and appropriate species-specific conservation measures for new pipeline construction, direct and indirect impacts on federally and state-listed vertebrates primarily would be temporary disturbance, short-term habitat loss, and permanent habitat alteration—resulting in overall minor impacts.

Considering the potential impacts on unique natural resources within the portions of the new pipeline routes only within Minnesota, however, leads to the opposite conclusion. A review of construction impact areas indicates that the Applicant's proposed project would affect 5 times more WAN (habitat for SGCN) and 30 times more MBS Sites than SA-04. This is consistent with the overall increase in numbers of occurrences and species for state-protected plants for the Applicant's proposed project compared to SA-04. In addition, the Applicant's proposed project potentially would contribute to fragmentation within new pipeline rights-of-way across 23 miles of WAN habitats and across 17 miles of moderate to outstanding rated MBS Sites.

Direct impacts on federally and state-protected vertebrates from construction of rail and truck offloading and access facilities are expected to be negligible to minor for construction. Construction of these facilities for the rail and truck alternatives would potentially affect several state-protected and special concern plants.

Operations Impacts

Pipeline right-of-way maintenance activities during operation would include mowing, equipment maintenance, invasive species control, right-of-way monitoring, and integrity digs to repair or replace pipe segments. Vegetation maintenance that removes riparian trees and large shrubs could increase stream temperatures by removing shade, which would reduce habitat suitability for aquatic animals. Activities in and around water, as well as upland vegetation maintenance could result in direct mortality of individuals of less mobile species through crushing, if individuals are present while the activity is occurring. State-listed plants that persist within the permanent right-of-way after construction could be permanently affected by vegetation maintenance activities.

Individuals of all special-status species within the ROI could be indirectly affected by habitat loss and alteration due to maintenance activities. Maintained pipeline rights-of-way could act as a barrier to travel for some animals such as amphibians, reptiles, and small mammals, fragmenting habitat for SGCNs. Habitat fragmentation can increase edge habitats favored by some animals and avoided by others; and can create a barrier to movements for some animals while facilitating movements of others, especially predators.

With implementation of BMPs and appropriate species-specific conservation measures for operations of new pipeline, most impacts due to pipeline operations would be temporary disturbance and permanent habitat alteration, resulting in overall minor impacts for both the Applicant's proposed project and SA-04.

The effects of continued use of the existing Line 3 pipeline on protected and rare animals and plants would be the same as ongoing Line 3 operations, although the increased number of integrity excavations required for the aging pipeline would increase the potential for disturbance to protected or rare animals and plants, if they continue to persist within the permanent right-of-way. However, habitats along the route have been previously altered by construction of multiple pipelines and the long-term maintenance of the Line 3 permanent right-of-way and are unlikely to support a diversity or abundance of threatened or endangered species.

The primary potential impact for the rail and truck alternatives would be increased rail and truck wildlife collisions, which could affect protected and rare mammals, birds, reptiles, and insects. Incremental increases in rail and truck traffic may result in increased collision mortality, especially for protected prairie-dependent insects that may persist in remnant prairie patches along rail lines, for protected reptiles where highways cross suitable habitat, and for protected wide-ranging mammals such as wolves and Canada lynx where rail and truck routes cross their ranges.

5.2.5.4.2 Mitigation

In addition to the Applicant-proposed measures described above, which would be incorporated into the Project, the Applicant would comply with conditions specified in permits required for the Project. Typical conservation measures to reduce impacts on unique resources are identified above in the discussions for the specific species. These measures likely would be required by the applicable agencies, and additional mitigation for potential impacts could be required.

Actions identified by Minnesota DNR to further minimize disturbance to MBS Sites include, but are not limited to, the following:

- Do not park equipment or stockpile supplies within MBS Sites,
- Do not place spoil within MBS Sites,
- Limit construction activities to frozen ground conditions, and
- Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible.

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Federally Protected Species							
Construction Impacts							
Potential for injury, mortality, or disturbance	Minor/temporary impacts • 3 mammals Minor/short-term impacts • 1 insect Negligible/ temporary to short-term impacts • 3 birds • 2 insects No impact • 2 plants 11 species total	Minor/temporary impacts • 3 mammals	Minor/temporary impacts • 3 mammals • 1 reptile • 3 insects Negligible/ temporary impacts • 2 birds Negligible/ permanent impacts • 6 plants No impact • 1 insect • 4 mollusks • 2 plants 21 species total, plus 1 candidate	Negligible to minor/temporary impacts • 3 mammal Minor/ permanent impacts • 3 insects Negligible to minor/permanent • 1 plant No impact • 3 birds 10 species total	Negligible to minor/temporary impacts • 3 mammal Minor/permanent impacts • 1 insects No impact • 3 birds • 1 plant 8 species total	Minor/temporary impacts • 3 mammals Minor/permanent impacts • 3 insects No impact • 4 birds • 1 plant 10 species total	Minor/temporary • 3 mammals Minor/permanent • 1 insects No impact • 3 birds • 1 plant 8 species total

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Operations Impacts							
Potential for injury, mortality, or disturbance of federal ESA species	Minor/temporary impacts • 2 mammals Negligible/ permanent impacts • 1 mammal • 2 birds • 1 plant No impact • 1 bird • 3 insects • 1 plant 11 species total	Minor/permanent impacts • 1 mammal Minor/short-term • 1 mammal Negligible/ permanent impacts • 1 mammal, • 2 birds • 3 insects • 2 plants No impact • 2 birds 12 species total	Minor/Temporary impacts • 1 mammal, • 1 reptile Negligible/ permanent impacts • 2 mammals, • 4 insects • 6 plants No impact • 2 birds, • 4 mollusks • 2 plants 21 species total, plus 1 candidate	Major/permanent impacts • 2 mammals No impact • 1 mammal • 3 birds • 3 insects • 1 plant 10 species total	Major/permanent impacts • 2 mammals No impact • 1 mammal • 3 birds • 1 insect • 1 plant 8 species total	Major/permanent impacts • 2 mammals Minor/permanent impacts • 3 insects • 1 mammal • 4 birds • 2 plant 12 species total	Major/permanent impacts • 2 mammals Minor/permanent impacts • 1 insects Minor/temporary impacts • 1 mammal No impact • 3 birds • 1 plant 8 species total
State-listed Endangered or Threatened Species							
Construction Impacts							
Mammals	1 species (northern long-eared bat) See federal species	1 species (northern long-eared bat) See federal species	1 species See federal species	--	--	See Existing Line 3	See Existing Line 3
Birds	--	--	5 species Temporary/ negligible	--	--	--	--

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Herptiles	1 species (wood turtle) Temporary to long-term/minor	1 species (wood turtle)	3 species Temporary to long-term/negligible to minor	--	--	See Existing Line 3	See Existing Line 3
Fish	1 species (pugnose shiner) No impact	--	8 species Temporary/minor	--	--	--	--
Mussels	1 species (fluted-shell mussel) no impact	1 species	11 species Temporary/minor	--	--	See Existing Line 3	See Existing Line 3
Insects	--	--	2 species Temporary/minor	--	--	--	--
Plants	11 species (6 Minnesota, 5 Wisconsin) Permanent/major 10 species No impact	8 species	4 species Permanent/major 18 species No impact	4 species Permanent/major	4 species Permanent/major	8 species (3 Minnesota, 5 Wisconsin) Permanent/major 10 species No impact	8 species (3 Minnesota, 5 Wisconsin) Permanent/major 10 species No impact
Operations Impacts							
Mammals	1 species (northern long-eared bat) See federal species	1 species (northern long-eared bat) See federal species	1 species See federal species	--	--	See Existing Line 3	See Existing Line 3

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Birds	--	--	5 species Permanent/ negligible	--	--	--	--
Herptiles	1 species (wood turtle) Permanent/minor	1 species (wood turtle) Permanent/minor	3 species Permanent/ negligible	--	--	See Existing Line 3	See Existing Line 3
Fish	1 species (pugnose shiner) Permanent/ negligible	--	8 species Permanent/ negligible	--	--	--	--
Mussels	1 species (fluted-shell mussel) Permanent/ negligible	1 species Permanent/ negligible	11 species Permanent/ negligible	--	--	See Existing Line 3	See Existing Line 3
Insects	--	--	2 species Permanent/ negligible	--	--	--	--
Plants	11 species (6 Minnesota, 5 Wisconsin) Permanent/minor 10 species No impact	8 species Permanent/minor 10 species No Impact	22 species Permanent/minor	4 species No impact	4 species No impact	8 species (3 Minnesota, 5 Wisconsin) Permanent/minor 10 species No impact	8 species (3 Minnesota, 5 Wisconsin) Permanent/minor 10 species No impact

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Species of Concern							
Construction Impacts							
Mammals	4 species Short-term/minor	1 species	--	--	--		
Birds	1 species Short-term/major	6 species	6 species Short-term/major	--	--	See Existing Line 3	See Existing Line 3
Herptiles	1 species Short-term/ negligible to major	--	2 species Short-term to permanent/ negligible to major	--	--	--	--
Fish	1 species Short-term/ negligible to major	--	4 species Short-term/ negligible to minor	--	--	--	--
Mussels	3 species Short-term/ negligible to major	3 species	3 species Short-term/ negligible to minor	--	--	--	--
Insects	2 species	1 species	6 species Short-term/minor	--	--	See Existing Line 3	See Existing Line 3
Plants	11 species Permanent/major 3 species No impact	17 species	3 species Permanent/major 17 species No impact	3 species Permanent/major	3 species Permanent/major	See Existing Line 3	See Existing Line 3

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Operations Impact							
Mammals	4 species Short-term/minor	1 species See federal species 2 species No impact	--	--	--	See Existing Line 3	See Existing Line 3
Birds	1 species Short-term/major	6 species Temporary to short-term/minor	6 species Short-term/ negligible to minor	--	--	See Existing Line 3	See Existing Line 3
Herptiles	1 species Short-term/ negligible to major	--	2 species Short-term/ negligible to minor	--	--	--	--
Fish	1 species Short-term/ negligible to major	--	4 species Short-term/ negligible to minor	--	--	--	--
Mussels	3 mussels Short-term/ negligible to major	3 species Temporary to short-term/minor	3 species Short-term/ negligible to minor	--	--	See Existing Line 3	See Existing Line 3
Insects	--	1 species Temporary to short-term/minor	6 species Short-term/ negligible to minor	--	--	See Existing Line 3	See Existing Line 3
Plants	11 species Short-term/minor 3 species No impact	17 species Short-term/ negligible	20 species Short-term/ negligible to minor	3 species No impact	3 species No impact	See Existing Line 3	See Existing Line 3

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Species in Greatest Conservation Need – GAP Models							
Mammal Habitat	Con: 4,954 acres *Op: 2,092 acres*	Con: -- *Op: 1,797 acres*	Con: 9,076 acres *Op: 3,792 acres*	<u>Clearbrook</u> Con: low/medium *Op: low/medium* <u>Superior</u> Con: high/medium *Op: high/medium*	<u>Clearbrook</u> Con: low/medium *Op: low/medium* <u>Superior</u> Con: high/medium *Op: high/medium*	<u>Clearbrook</u> Con: low/medium *Op: Line 3 + Rail* <u>Superior</u> Con: high/medium *Op: Line 3 + Rail*	<u>Clearbrook</u> Con: low/medium *Op: Line 3 + Truck* <u>Superior</u> Con: high/medium *Op: Line 3 + Truck*
Bird Habitat	Con: 5,614 acres *Op: 2,356 acres*	Con: -- *Op: 1,987 acres*	Con: 11,549 acres *Op: 4,812 acres*	<u>Clearbrook</u> Con: low/medium *Op: low/medium* <u>Superior</u> Con: low/medium *Op: low/medium*	<u>Clearbrook</u> Con: low/medium *Op: low/medium* <u>Superior</u> Con: low/medium *Op: low/medium*	<u>Clearbrook</u> Con: low/medium *Op: Line 3 + Rail* <u>Superior</u> Con: low/medium *Op: Line 3 + Rail*	<u>Clearbrook</u> Con: low/medium *Op: Line 3 + Truck* <u>Superior</u> Con: low/medium *Op: Line 3 + Truck*
Herptile Habitat	Con: 1,328 acres *Op: 581 acres*	Con: -- *Op: 393 acres*	Con: 3,984 acres *Op: 1,658 acres*	<u>Clearbrook</u> Con: none *Op: none* <u>Superior</u> Con: low/medium *Op: low/medium*	<u>Clearbrook</u> Con: none *Op: none* <u>Superior</u> Con: low/medium *Op: low/medium*	<u>Clearbrook</u> Con: none *Op: Line 3 + Rail* <u>Superior</u> Con: low/medium *Op: Line 3 + Rail*	<u>Clearbrook</u> Con: none *Op: Line 3 + Truck* <u>Superior</u> Con: low/medium *Op: Line 3 + Truck*
	Short-term/ negligible to minor *Short-term/ negligible to minor*	-- *Short-term/ negligible to minor*	Con: Short-term/ negligible to minor *Op: Permanent/ negligible*	Permanent/minor *Permanent/minor*	Permanent/minor *Permanent/minor*	Permanent/minor *Op: Line 3 + Rail*	Permanent/minor *Op: Line 3 + Truck*

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Species in Greatest Conservation Need – MN Wildlife Action Network							
SGCN Habitat	23 miles new corridor Con: 1,561 acres *Op: 665 acres*	0 mi. new corridor Con: -- *Op: 608 acres*	0 mi. new corridor Con: 277 acres *Op: 115 acres*	--	--	See Existing Line 3	See Existing Line 3
	Permanent/major *Permanent/minor*	-- *Permanent/minor*	Permanent/minor *Permanent/minor*	--	--	See Existing Line 3	See Existing Line 3
Minnesota Biological Survey Sites of Biodiversity Significance							
	17 miles in new corridor	0 mi. new corridor	0 mile in new corridor	--	--	See Existing Line 3	See Existing Line 3
Outstanding	Con: 7 acres *Op: 5 acres*	-- *Op: 25 acres*	Con: 1 acre *Op: <1 acres*	-- --	-- --	See Existing Line 3	See Existing Line 3
High	Con: 78 acres *Op: 40 acres*	-- *Op: 233 acres*	Con: 5 acres *Op: 2 acres*	-- --	-- --	See Existing Line 3	See Existing Line 3
Total	Con: 877 acres *Op: 403 acres*	-- *Op: 305 acres*	Con: 25 acres *Op: 10 acres*	-- --	-- --	See Existing Line 3	See Existing Line 3
	Permanent/major *Permanent/major*	-- *Permanent/minor*	Permanent/minor *Permanent/minor*	-- --	-- --	See Existing Line 3	See Existing Line 3
Minnesota SNA and Analogous PAD-US							
	No impact	No impact	No impact	No impact	No impact	No impact	No impact

Table 5.2.5-26. Summary of Potential Impacts on Unique Natural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact / Category	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]

ESA = Endangered Species Act, GAP = GAP Analysis Program, MBS Sites = Minnesota Biological Survey Sites of Biodiversity Significance, SGCN = Species of Greatest Conservation Need, SNA = Scientific and Natural Area, WAN = Wildlife Action Network

[a] **No single dataset in this summary table provides a complete indication of all relevant impacts to unique natural resources. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, the individual NHIS elemental occurrences provide information about past sitings, but the absence of past sitings does not necessarily mean a species does not or could not inhabit a certain area. Because of this, NHIS data is used together with habitat information from the GAP and WAN datasets to get a better idea of the potential for impacts. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.**

[b] **Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-351 through 5-413. The table above, for example provides acreages of habitat types crossed and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to critical habitat is contained in the text of this section.**

[c] **The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-352 to 5-372. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[d] **Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on pages 5-372 to 5-378. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[e] **SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-378 to 5-393. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[f] **The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-393 to 5-398. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[g] **The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-399 to 5-402. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

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5.2.6 Public Lands

Public lands are lands managed or held by federal, state, and county governments for a variety of public benefits—including preservation of natural areas, wildlife habitat, timber, mineral resources, water resources and other natural resources, recreation areas, and other public interests. Because construction and operation of the Applicant's proposed project and the CN Alternatives may affect the future use of federal, state, and county land, the public lands analysis assessed:

- Potential impacts on public lands, including compatibility of the Project with designated uses of specific public lands.

In addition to the analysis of compatibility with the designated use of public lands in this section, impacts on the public resources contained within public lands are generally described (e.g., vegetation, wildlife, and recreation) although not correlated to specific public lands, and the measures that would be implemented to minimize potential impacts on those resources can be found in several other sections within Chapter 5, including Sections 5.2.1, 5.2.3, 5.2.4, and 5.3.2.

This section first describes the existing type and quantity of public lands for the Applicant's proposed project and each of the CN Alternatives (continued use of existing Line 3, SA-04, transportation by rail, transportation by truck, and existing Line 3 supplemented by rail or truck). Potential impacts on public lands from construction and operation of the Applicant's proposed project and the CN Alternatives are discussed next. A summary and comparison of the impacts for the Applicant's proposed project and CN Alternatives are included at the end of the section.

5.2.6.1 Regulatory Context and Methodology

5.2.6.1.1 Regulatory Context

Regulations governing public lands vary significantly depending on the specific purpose for which the lands were obtained and the government entity responsible for its management. The following section describes the general structure of public land ownership (federal, state, and county) and identifies the authorizing agency and major relevant regulatory provisions. Federal land would be crossed by the Applicant's proposed project and CN Alternatives in North Dakota, Minnesota, and Illinois; no federal or state lands would be crossed in Iowa. While the Applicant's proposed project and CN Alternatives would collectively cross five states, state-owned/managed lands would only be crossed in Minnesota.

5.2.6.1.2 Methodology

The ROI for the analysis of impacts on public lands was the construction and operations footprint for the Applicant's proposed project and each of the CN Alternatives. All federal, state, and county land directly crossed by construction and operations areas within the ROI was assessed for the Applicant's proposed project and CN Alternatives. The analysis was undertaken by first identifying and inventorying in GIS all public lands in the counties crossed by the Applicant's proposed project and the CN Alternatives.

The following construction and operation footprints were overlaid to quantify resources affected by construction and operation:

- The route and estimated footprints for the pipeline and associated facilities for the Applicant's proposed project,

- The 120-foot-wide construction footprint and 50-foot-wide permanent right-of-way for SA-04,
- The permanent right-of-way for the existing Line 3 pipeline, and
- The estimated footprints of required facilities and existing potential routes for the rail and truck alternatives.

Public land within the ROI for the Applicant's proposed project and CN Alternatives were identified using GIS datasets and layers in the following data source:

- PAD-US.
- Where data were available, ownership and identification of the authorizing agency for each land type is provided, along with a discussion of compatibility with the relevant regulatory provisions.

No single element of these public lands data provides a complete indication of all relevant impacts to public lands, but together the data about ownership and use provide a reasonably comprehensive indication of potential impacts. For example, while the datasets identify where federal, state, and county lands occur within the ROI, this information must be coupled with information about public uses of the land (eg. wildlife management, forest, etc.) to gain a better understanding of the possible impacts.

Furthermore, quantitative information in the tables should be coupled with the qualitative descriptions of impacts that are contained in the text. Tables in this section provide acreages, for example, of WMAs crossed; however, a more complete discussion of the qualitative nature of impacts that could occur to WMAs is contained in the text of this section.

5.2.6.2 Existing Conditions

This section identifies public lands that could be affected by the Applicant's proposed project and CN Alternatives. Appendix A includes maps of the federal and state lands within the ROI.

Federal Land

Federal lands are lands in the United States for which ownership is claimed by the federal government. The primary purpose of federal land is to benefit the people of the United States with conservation of the natural resources as a priority; most federally owned lands are open to the public for recreational use. Primary federal landholders of the land that would be crossed by the Applicant's proposed project and CN Alternatives include the Department of the Interior (DOI), which includes agencies such as BLM, USFWS, NPS, and the Department of Agriculture—which includes the USFS. The types of land in federal ownership in this analysis include forests that are managed by USFS, refuge land managed by USFWS, National Heritage Parks managed by NPS, and other land managed by BLM. Compatibility of the Project with designated uses varies by authorizing agencies; therefore, a general discussion of the responsible agency based on land ownership and any associated regulatory provisions is provided. BLM is authorized to grant a right-of-way or permit for projects "where the surface of the Federal lands involved is administered by the Secretary of two or more Federal agencies" (30 USC § 185(c)). Under the Mineral Leasing Act, "Federal Lands means all lands owned by the United States except lands in the National Park System, lands held in trust for an Indian or Indian Tribe, and lands on the Outer Continental Shelf."

State Land

State lands are lands that are held under state management. State lands that would be crossed by the Applicant's proposed project and CN Alternatives include state WMAs, state AMAs, and state forests. These lands are administered by each state's respective DNR. Compatibility of the Project with designated uses varies by authorizing agencies; therefore, a general discussion of the responsible agency based on land ownership and any associated regulatory provisions is provided.

In certain instances, more than one government agency may have an interest in a specific piece of land; thus, additional regulatory authorizations would be needed. For example, if the State of Minnesota purchased and designated land as a WMA, but used federal grant money as part of that purchase, the federal government has different and additional regulatory processes for considering proposed encroachments, such as pipelines.

County Land

County lands are lands that are held in trust for the public, for which ownership is claimed by county governments. As with federal and state land, their primary purpose is to benefit the public. These lands typically include county parks, forests, and other special management areas. Compatibility of the Project with designated uses varies by authorizing agencies; therefore, a general discussion of the responsible agency based on land ownership and any associated regulatory provisions is provided.

Counties in Minnesota may acquire land through tax forfeiture. Some of this land is then sold or exchanged; if the lands are classified as conservation lands, they may be retained and managed for designated conservation purposes or as forestry land. Some lands bordering lakes and streams cannot be sold by the counties.

5.2.6.2.1 Applicant's Proposed Project

Federal Land

In In Minnesota, the Applicant's proposed project would cross:

- North Country National Scenic Trail – The North Country National Scenic Trail stretches across seven states from New York to North Dakota (North Country Trail Association 2016). The National Scenic Trail program is administered through NPS. It includes trails that are 100 miles or longer and provides non-motorized recreational opportunities. At the location of the proposed crossing, the trail is administered by Hubbard County. However, compatibility of the Project with designated uses would be determined by the authorizing agency, which is NPS, and ultimately DOI.

State Land

All of the state land that would be crossed by the Applicant's proposed project is in Minnesota. The route would cross 17 acres in two WMAs (Grayling Marsh WMA (14 acres) and Lawler WMA (3 acres)), approximately 0.4 acre of the La Salle Creek AMA, and 422 acres in eight state forests:

- Foothills State Forest (42 acres),
- Hill River State Forest (103 acres),

- Huntersville State Forest (97 acres),
- Land O'Lakes State Forest (130 acres),
- Mississippi Headwaters State Forest (25 acres),
- Paul Bunyan State Forest (less than 0.1 acre),
- Savanna State Forest (9 acres), and
- Waukenabo State Forest (16 acres).

These forests, WMAs, and AMA are managed by Minnesota DNR as multiple use areas. They are primarily used for fish and wildlife resource protection, forestry, and recreation. Compatibility of the Project with designated uses would be determined during easement negotiations with the authorizing agency. Table 5.2.6-1 provides the total acres of state land that would be crossed by the Applicant's proposed project. The total amount of state land in the ROI for the Applicant's proposed project is 526 acres (including ATWS, access roads, and valves) (Table 5.2.6-1).

Table 5.2.6-1. State Lands Crossed by the Applicant's Proposed Project (acres)

State	Construction Work Area	Permanent Right-of-Way	ATWS	Temp Access Road	Perm Access Road	Valves[a]	Con Total[b]	Op Total[b]
North Dakota	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minnesota	439.6	199.4	32.1	27.6	27.0	0.2	525.5	226.6
Wisconsin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	**439.6**	**199.4**	**32.1**	**27.6**	**27.0**	**0.2**	**525.5**	**226.6**

Source: PAD-US – USGS 2016.

[a] Includes valve sites and valve driveways. Because valve sites are within the permanent right-of-way, total Project impacts may be slightly overestimated from double counting.

[b] Con = sum of pipeline construction work area, additional temporary workspaces (ATWS), pump stations, valves, and temporary and permanent access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, valves, and pump stations.

Note:

Acres for the construction work area and the permanent right-of-way are based on Enbridge-provided footprints for the Applicant's proposed project.

Perm = permanent; Temp = temporary

Although not directly affected by pipeline construction or standard operations, the centerline of the Applicant's proposed project would be located approximately 1,083 feet east of Itasca State Park boundary. Additionally, the temporary construction workspace for the Applicant's proposed project would be located approximately 960 feet from the Itasca State Park boundary. This state park is one of Minnesota's flagship state parks, with over 500,000 annual visits. The park was established in 1891 to preserve remnant stands of virgin pine and to protect the basin that is the source of the Mississippi River. The Itasca State Park is one of Minnesota's National Natural Landmarks.

County Land

Table 5.2.6-2 provides the county land that would be crossed by the Applicant's proposed project in Minnesota. It is likely that county land would be crossed in North Dakota and Wisconsin; however, data for these states were not available at the time of this assessment. In total, approximately 548 acres of county land would be within the ROI for the construction work area of the Applicant's proposed project, with an additional 102 acres disturbed for ATWS, access roads, and MLVs. While the exact designated use of this land is unknown, it is likely to be land in county parks or forests; therefore, compatibility with designated uses would be determined by the relevant county governments.

Table 5.2.6-2. County Lands Crossed by the Applicant's Proposed Project (acres)

State, County	Construction Work Area	Permanent Right-of-Way	ATWS	Temp Access Road	Perm Access Road	Valves[a]	Con Total[b]	Op Total[b]
North Dakota	NA	NA	NA	NA	NA	NA	NA	NA
Minnesota								
Carlton	128.1	53.4	4.7	1.3	1.6	0.0	135.7	55.0
Cass	273.7	114.0	21.5	17.7	27.1	0.0	340.0	141.1
Clearwater	26.8	11.1	3.1	0.0	0.0	0.1	30.0	11.2
Hubbard	119.1	49.6	7.0	10.1	7.8	0.0	144.0	57.4
Subtotal	***547.7***	***228.1***	***36.3***	***29.1***	***36.5***	***0.1***	***649.7***	***264.7***
Wisconsin	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL	**547.7**	**228.1**	**36.3**	**29.1**	**36.5**	**0.1**	**649.7**	**264.7**

Source: County-owned parcels were identified using the "owner" name within each county's GIS parcel data. Because parcel data and owner naming conventions vary from county to county, DOC-EERA identified county-owned parcels as best as possible. Note that Red Lake County had no GIS parcel data, and Aitkin County had no ownership information on their parcel data; therefore, these counties were not included in the analysis.

[a] Includes valve sites and valve driveways. Because valve sites are within the permanent right-of-way, total Project impacts may be slightly overestimated from double counting.

[b] Con = sum of pipeline construction work area, additional temporary workspaces (ATWS), pump stations, valves, and temporary and permanent access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, valves, and pump stations.

Note:

Acres for the construction work area and the permanent right-of-way are based on Enbridge-provided footprints for the Applicant's proposed project.

Perm = permanent; Temp = temporary

NA = data not available at the time of the analysis

5.2.6.2.2 Continued Use of Existing Line 3

Federal Land

A portion of the existing Line 3 lies within the boundaries of the Chippewa National Forest, and the easement covers about 37 acres. The Chippewa National Forest is managed by USFS and includes 666,952 acres of managed forest; 1,300 lakes and ponds; 925 miles of rivers; 440,000 acres of wetlands; and 25 watersheds (USFS 2017). The forest is managed to protect forest and water resources and provides a variety of recreational opportunities. Because the existing Line 3 is already in operation, it is already being regulated by USFS and has been permitted to comply with designated uses.

State Land

A portion of the existing Line 3 lies within three state forests (Bowstring [170 acres], Fond du Lac [15 acres], and Mississippi Headwaters [32 acres]) and two AMAs (Clearwater River AMA [0.1 acre] and Little Otter Creek AMA [2 acres]). Because the existing Line 3 is already in operation, it is already being regulated by Minnesota DNR and has been permitted to comply with designated uses.

County Land

A portion of the existing Line 3 lies within county land: Beltrami (0.7 acre), Carlton (4 acres), Cass (1 acre), Clearwater (2 acres), Hubbard (26 acres), Itasca (0.2 acre), and St. Louis (0.3 acre). Because the existing Line 3 is already in operation, it is already being regulated by the local county-level authorities and has been permitted to comply with designated uses.

5.2.6.2.3 System Alternative SA-04

Federal Land

Table 5.2.6-3 lists the total amount of federal land that would be crossed by SA-04. Public land that would be crossed in North Dakota incudes:

- Dakota Tallgrass Prairie WMA – This federal management area was established in 2000 to preserve tallgrass prairie habitat, primarily through the purchase of perpetual grassland easements (USFWS 2016); however, it is also open to the public for recreational use. USFWS administers the Dakota Tallgrass Prairie WMA; therefore, the Applicant would be required to comply with the designated uses and regulatory provisions established by USFWS as the authorizing agency. Non-federal oil and gas operations on NWRs and the associated regulatory provisions are contained within 50 CFR 29C and 29D.
- Pembina County Waterfowl Production Area – This waterfowl production area is managed by USFWS as part of the NWR system. The land is primarily used for bird and wildlife resource management; and is open for public access and general wildlife-dependent recreation such as hunting, wildlife watching and photography. Therefore, the Applicant would be required to comply with the designated uses and regulatory provisions established by USFWS as the authorizing agency.

Table 5.2.6-3. Federal Lands Crossed by System Alternative SA-04 (acres)

State	Construction Work Area	Permanent Right-of-Way
North Dakota	800.2[a]	331.2[b]
Minnesota	0.3	0.1
Iowa	0.0	0.0
Illinois	176.5	73.6[e]
TOTAL	**977.0[a,b]**	**404.9[a,b]**

Source: PAD-US – USGS 2016.

[a] Includes acreages of the Dakota Tallgrass Prairie Wildlife Management Area that are not owned by the U.S. Fish and Wildlife Service.

[b] Includes acreages of the Illinois and Michigan Canal National Heritage Area that are not owned by the National Park Service.

In Illinois, SA-04 would cross:

- The Upper Mississippi River National Wildlife and Fish Refuge – This refuge also is part of the NWR system and is managed by USFWS. As with other land managed by the USFWS, it is primarily used for fish and wildlife resource management and is open for public access and general recreation. Therefore, the Applicant would be required to comply with the designated uses and regulatory provisions established by USFWS as the authorizing agency.
- The Illinois and Michigan Canal in Illinois – This is a registered National Heritage Area administered by NPS. The actual origin site of the Illinois and Michigan Canal has been converted into a nature park that integrates history, ecology, and art to communicate the canal's importance in the development of Chicago. The former brownfield site has been converted to a landscape that provides passive recreational uses. Compatibility of the Project with designated uses would be determined by the authorizing agency (NPS), and ultimately DOI. As previously noted, the House Committee on Natural Resources passed a bill in 2015 granting the secretary of DOI the power to negotiate rights-of-way for gas pipelines through national park lands.

State Land

Table 5.2.6-4 lists the total amount of state land within the ROI for SA-04. Small areas of state land would be crossed by SA-04 in Minnesota and Illinois. In Minnesota, SA-04 would cross:

- Lyle-Austin WMA – This WMA is managed by Minnesota DNR to provide recreational opportunities for hunters, trappers, and wildlife watchers. Compatibility of the Project with designated uses would be determined during easement negotiations with the authorizing agency, which is Minnesota DNR.

Table 5.2.6-4. State Lands Crossed by System Alternative SA-04 (acres)

State	Construction Work Area[a]	Permanent Right-of-Way[a]
North Dakota	0.0	0.0
Minnesota	0.3	0.1
Iowa	0.0	0.0
Illinois	0.9	0.4
TOTAL	**1.2**	**0.5**

Source: PAD-US – USGS 2016.

[a] Acres for the construction work area and the permanent right-of-way are based on a 120-foot-wide construction footprint and a 50-foot-wide permanent right-of-way.

In Illinois, SA-04 would cross:

- Hennepin Canal State Trail – This regional trail runs 105 miles along the towpath of the old Hennepin Canal. The trail offers many opportunities for recreation, including hiking, biking, and fishing. It is administered by Illinois DNR; therefore, compatibility of the Project with designated uses would be determined during easement negotiations with Illinois DNR as the authorizing agency.

County Land

No county owned lands would be crossed by SA-04.

5.2.6.2.4 Transportation by Rail

The rail alternative includes construction of a new offloading facility in Clearbrook, Minnesota; an offloading facility in Superior, Wisconsin; and replacement and upgrades of existing rail infrastructure. The land that would be permanently converted for facility construction is not currently designated as public land. It is mostly mixed-use, industrial, and agricultural land.

5.2.6.2.5 Transportation by Truck

The truck alternative includes constructing a new offloading facility in Clearbrook, Minnesota; an offloading facility in Superior, Wisconsin; and new local access roads to these facilities. The land that would be permanently converted for facility construction and expansion is not currently designated as public land. It is mostly mixed-use, industrial, and agricultural land. The routes on existing highways most likely traveled by the trucks would not pass through public land areas, except for the second leg of the route that begins on U.S. Highway 2 in Bagley and continues all the way to Superior. The route crosses through the Mississippi Headwaters State Forest in Minnesota.

5.2.6.3 Impact Assessment

The impact assessment focuses on the compatibility of construction and operation of the Applicant's proposed project and CN Alternatives with designated uses of specific federal, state, and county public lands. In addition to the analysis of compatibility with the designated use of public lands in this section, impacts on the public resources contained within public lands (e.g., vegetation, wildlife, and recreation) and the measures that would be implemented to minimize potential impacts on those resources can be found in several other sections in Chapter 5, including Sections 5.2.1, 5.2.3, 5.2.4, and 5.3.2.

5.2.6.3.1 Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

The Applicant's proposed project would cross approximately 5 acres of federal land, 440 acres of state land, and 548 acres of county land during construction. These lands include state forests and state-managed WMAs and AMAs. The only federal lands that would be crossed by the Applicant's proposed project would be the North Country National Scenic Trail in Hubbard County, Minnesota.

Depending on the specific resource or feature being affected, impacts on public lands from construction would vary. The use of public lands would be temporarily restricted during the period of active construction. Construction in any location would last for several days to several weeks, depending on a variety of factors, such as land use type, topography, weather, and other environmental conditions. Limited use, access restrictions, and noise and visual disturbance could occur during this timeframe. However, the affected area would represent a relatively small area in proportion to the total amount of public land within the specific forest or resource area that remains undisturbed or unaffected. Given that construction impacts would be limited to small areas within the overall forest and resource area, and that the original use of these larger areas would be maintained during construction, it is likely that construction of the pipeline would result in a temporary, minor to negligible impact related to compatibility with the designated uses of these public lands. Removal of forested habitat would be a long term impact and depending on the route and the forest, the magnitude could be major.

Operations Impacts

Operation of the pipeline would involve periodic inspection, pipeline maintenance activities, and mowing to maintain appropriate vegetation along public lands. During operation, the permanent right-of-way for the Applicant's proposed project would include two acres of federal land, 199 acres of state land, and 228 acres of county land. The permanent right-of-way would be periodically cleared of vegetation, and no trees would be permitted to grow. With the exception of the 37 acres of county land and 27 acres of state lands that would be permanently converted to permanent access roads and MLV sites (Tables 5.2.6-1 and 5.2.6-2), the pipeline itself would be buried, so there would be no ongoing restriction to surface use, except at valve locations. Therefore, the public land could continue to be managed for its designated uses, and impacts associated with operation are likely to be long-term, but negligible to minor. The exception to this would be on forested land where the management objective is timber production, and no trees would be permitted to grow within the permanent right-of-way of the pipeline corridor. However, given the amount of affected land in state forests compared to the overall forested land that remains available for timber production, it is likely that operation of the pipeline would result in a permanent, but minor impact related to compatibility with the designated use of forested land for timber production.

5.2.6.3.2 Continued Use of Existing Line 3

Construction Impacts

There would be no impacts related to compatibility of the pipeline with the designated uses of public lands from continuing use of the existing Line 3 pipeline, because it is already built.

Operations Impacts

Impacts associated with operation of the existing Line 3 would be mainly limited to restricted use during times when inspections and repair digs or other maintenance activities are being conducted on the line. Impacts during continued operations related to compatibility of the pipeline with designated uses of public lands are expected to be negligible, temporary, localized, and limited to the permanent right-of-way. Because the permanent right-of-way already has been cleared of trees, no further loss of forested vegetation would be expected.

5.2.6.3.3 System Alternative SA-04

Construction Impacts

During construction, SA-04 would cross 977 acres of federal land and one acre of state land (0.3 acre in Minnesota, 0.9 acre in Illinois). Federal land crossed includes the Dakota Tallgrass Prairie WMA and the Illinois and Michigan Canal National Heritage Area. State land crossed consists of the Lyle-Austin WMA in Minnesota and the Hennepin Canal State Trail in Illinois. No county owned lands would be crossed by SA-04.

Operations Impacts

Operation of the pipeline would involve periodic inspection, pipeline maintenance activities, and mowing to maintain appropriate vegetation along public lands. During operation, the permanent right-of-way for SA-04 includes 405 acres of federal land and 0.5 acre of state land (0.1 acre in Minnesota, 0.4 acre in Illinois). With the exception of public lands that would be permanently converted to permanent access roads and MLV sites, the pipeline itself would be buried, so there would be no ongoing restriction to surface use, except at valve locations. Therefore, the public land could continue to be managed for its designated uses, and impacts associated with operation are likely to be long-term and negligible to minor.

5.2.6.3.4 Transportation by Rail

Construction Impacts

There would be no impacts related to the compatibility of construction of loading/offloading facilities with the designated use of public lands for new or improved rail access, because proposed locations for these facilities are not on public lands.

Operations Impacts

There would be no impacts related to the compatibility of transportation of crude oil via rail with the designated uses of public lands. The rail route would follow existing rail lines that are already in operation. Any additional rail traffic from increased volume would be passing through areas that are already accustomed to noise and visual disturbances from ongoing rail operations.

5.2.6.3.5 Transportation by Truck

Construction Impacts

There would be no impacts related to the compatibility of construction of loading/offloading facilities or new roads with the designated uses of public lands, because proposed locations for these facilities are not on public lands.

Operations Impacts

There would be no impacts related to the compatibility of transportation of crude oil via truck with the designated uses of public lands. The truck route would follow existing truck routes that are already in operation. Any additional traffic from increased volume would be passing through areas that are already accustomed to noise and visual disturbances from preexisting traffic.

5.2.6.3.6 Existing Line 3 Supplemented by Rail

Construction Impacts

No impacts would be associated with compatibility of the pipeline with designated uses of public lands from continuing use of the existing Line 3 pipeline, because it is already built.

No impacts related to compatibility with the designated use of public lands would be associated with construction of loading/offloading facilities for new or improved rail access, because proposed locations for these facilities are not on public lands.

Operations Impacts

No impacts related to the compatibility of continued operation of Line 3 with designated uses of public lands are expected unless integrity maintenance digs are required within the permanent right-of-way on public lands. Impacts of integrity digs are expected to be temporary, localized, and limited to the permanent right-of-way, thereby resulting in a negligible impact on public lands (depending on the location of the dig). Shipment of crude oil via rail is not expected to affect compatibility with designated uses of public lands.

5.2.6.3.7 Existing Line 3 Supplemented by Truck

Construction Impacts

There would be no impacts related to compatibility of the pipeline with designated uses of public lands from continued use of the existing Line 3 pipeline, because it is already built.

No impacts related to compatibility with the designated use of public lands would be associated with construction of loading/offloading facilities and new roads, because proposed locations for these facilities are not on public lands.

Operations Impacts

No impacts are expected concerning compatibility of continued operation of the existing Line 3 with designated uses of public lands unless integrity maintenance digs are required within the permanent right-of-way in public lands. Impacts of integrity digs are expected to be temporary, localized, and limited to the permanent right-of-way, thereby resulting in a negligible impact on public lands. Continued shipment of crude oil via truck would not be expected to affect compatibility with the designated uses of public lands.

5.2.6.4 Summary and Mitigation

5.2.6.4.1 Summary

Table 5.2.6-5 presents the results of the analysis of potential compatibility impacts on public lands from construction and operation of the Applicant's proposed project and the CN Alternatives. The results show that the duration and magnitude of construction impacts related to compatibility with designated uses of public land range from no impact to negligible or minor temporary to long-term impacts.

The low level of impacts occurs for two reasons. The limitation of designated use represents a small portion of the overall land designated for public use in most affected areas, and any impacts on these lands would be restored following construction. Therefore, any impacts related to compatibility of the pipeline with the designated uses of the land would be limited to the duration of construction (4 to 6 weeks) and full restoration of the site. Following restoration, the land would be able to be maintained for its original designated use, with the exception of changes in habitat associated with the permanent right-of-way. Construction of the Applicant's proposed project would have the largest impact in terms of total land area on state-owned land (i.e., forests) in Minnesota, whereas SA-04 would have the largest total impact on federally owned land (mostly associated with a WMA in North Dakota).

During operations, impacts related to compatibility of the pipeline with designated uses would be long-term to permanent and negligible to major. Except for public lands that would be permanently converted to permanent access roads and MLV sites, the pipeline itself would be buried, so there would be minimal ongoing restriction to surface use, except at valve locations. Therefore, the public land could continue to be managed for its designated uses, and impacts associated with operation are likely to be long-term and negligible to minor. The exception to this would be on forested land where the management objective is timber production, and no trees would be permitted to grow within the permanent right-of-way of the pipeline corridor. Given the area of land affected relative to the public land that remains available for timber production, it is likely that continued operation of the pipelines would result in a permanent, but minor impact related to compatibility with the designated use of forested land for timber production. Operation of the rail and truck alternatives would not be expected to affect public lands because they would use preexisting truck and rail routes with ongoing volumes of rail and truck traffic. Operation of the existing Line 3 would result in temporary negligible impacts related to the compatibility of the pipeline with public lands during integrity maintenance digs, if they occur on public lands.

5.2.6.4.2 Mitigation

As previously noted, crossing through public lands would prompt authorizing agencies to ensure that the Applicant's proposed project or a CN Alternative complies with the designated uses of the land; therefore, the various agencies would require mitigation, and the Applicant would need to coordinate with the authorizing agency.

With implementation of the Applicant-proposed measures and compliance with conditions specified in required permits, no mitigation has been identified to further minimize impacts on federal, state, and county lands—with the exception of forested land within the permanent right-of-way, which would not be allowed to re-establish. A potential mitigation would be to purchase and dedicate private forest land to timber production as an offset, or to compensate the federal, state, or county government for any merchantable timber lost.

Table 5.2.6-5. Summary of Potential Impacts Related to Compatibility of the Applicant's Proposed Project and Certificate of Need Alternatives with Designated Uses of Public Land[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Federal land	Temporary/negligible to minor impacts • 5 acres	No impact	Temporary/negligible to minor impacts • 977 acres	No impact	No impact	No impact	No impact
State land	Temporary to Long term/negligible to minor impacts • 440 acres	No impact	Temporary/negligible to minor impacts • 1 acre	No impact	No impact	No impact	No impact
County land	Temporary/negligible to minor impacts • 548 acres	No impact	No Impact	Not available	Not available	Not available	Not available
Operations impacts							
Federal land	Long-term to permanent/negligible to minor impacts • 2 acres	Temporary/ negligible impacts	Long-term to permanent/negligible to minor impacts • 405 acres	No impact	No impact	Temporary/ negligible impacts	Temporary/ negligible impacts
State land	Long-term to permanent/negligible to minor impacts • 199 acres	Temporary/ negligible impacts	Long-term to permanent/negligible to minor impacts • 0.5 acre	No impact	No impact	Temporary/ negligible impacts	Temporary/ negligible impacts
County land	Long-term to permanent/negligible to minor impacts • 228 acres	Temporary/ negligible impacts	No Impact	Not available	Not available	Temporary/ negligible impacts	Temporary/ negligible impacts

[a] **No singledataset in this summary table provides a complete indication of all relevant impacts to public lands Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indicaton of the potential impacts. For example, while the datasets identify where federal, state, and county lands occur within the ROI, this information must be coupled with information about public uses of the land (e.g., wildlife management, forest, etc.) in the text to gain a better understanding of the range of possible impacts. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive**

Table 5.2.6-5. Summary of Potential Impacts Related to Compatibility of the Applicant's Proposed Project and Certificate of Need Alternatives with Designated Uses of Public Land[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]

understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-437 through 5-440. The table above, for example, provides acreages of state land within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to state land is contained in the text of this section.

[c] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-440 to 5-438. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on page 5-438. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-438 to 5-439. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on page 5-439. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on page 5-439. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

5.2.6.5 References

North Country Trail Association. 2016. Trail association website. https://northcountrytrail.org/trail/. Accessed on December 11, 2016.

U.S. Fish and Wildlife Service (USFWS). 2016. Dakota Tallgrass Prairie. https://www.fws.gov/refuge/Dakota_Tallgrass_Prairie/about.html. Accessed on December 9, 2016.

U.S. Forest Service (USFS). 2017. Chippewa National Forest. Forest Facts. https://www.fs.usda.gov/detail/chippewa/about-forest/?cid=fsm9_016551. Accessed on January 28, 2017.

U.S. Geological Survey (USGS). 2016. Gap Analysis Program. May 2016. Protected Areas Database of the United States (PAD-US), Version 1.4 Combined Feature Class.

5.2.7 Air Quality

Construction and operation of the Applicant's proposed project and CN Alternatives may affect air quality through the emission of air pollutants that, directly or indirectly, enter the atmosphere and contribute to increased levels of air pollution. Air quality is defined by the ambient concentration of certain pollutants (i.e., criteria pollutants) in the atmosphere determined by EPA to be of concern to the health and welfare of the general public and the environment.

Construction causes air pollution primarily through emissions from construction equipment (i.e., non-road engines), mobile sources (i.e., vehicles), and construction-related activities (i.e., burning, blasting, and road travel). This analysis evaluates air quality impacts from construction of the Applicant's proposed project and CN Alternatives by assessing:

- Air pollutant emissions, including GHG emissions, generated by construction; and
- Stored carbon releases from tree clearing within the construction work areas.

Under normal operations, oil pipelines emit small amounts of fugitive emissions. More significant emissions may result from storage tanks at terminals and pump stations that utilize internal combustion engines. However, the pump stations for the Applicant's proposed project would use electric drive motors that do not directly emit air pollutants, but do create air emissions indirectly from the electricity generation required to operate them. This analysis evaluates air impacts from operations of the Applicant's proposed project and CN Alternatives by assessing:

- Air pollutant emissions, including GHG emissions, from pipeline, rail, and truck operations;
- The social cost of carbon (SCC), which provides an estimate of potential climate change damages based on GHG emissions; and
- Loss of carbon of carbon sequestration potential within the pipeline rights-of-way (i.e., carbon sequestration).
- Possible GHG emissions associated with upstream (production) or downstream (combustion) GHG emissions

This section first describes the existing condition for air quality within an area along the Applicant's proposed project and CN Alternatives where air quality could be affected by construction and operation. Next, this section evaluates the potential impacts of construction and operation on the existing air quality and compares these impacts for the Applicant's proposed project and CN Alternatives.

Chapter 10 addresses the impacts on air quality resulting from a crude oil release.

5.2.7.1 Regulatory Context and Methodology

5.2.7.1.1 Regulatory Context

Air Quality Standards

Air quality standards have been established at both the federal and state level to protect and enhance air quality for each of the primary pollutants of concern, called "criteria pollutants." They include carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone, suspended particulate matter less than or equal to 10 microns in diameter (PM-10), fine particulate matter less than or equal to 2.5 microns in diameter (PM-2.5), and lead. These pollutants are subject to both primary and secondary National Ambient Air Quality Standards (NAAQS). Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

State air quality standards cannot be less stringent than the NAAQS. The states potentially affected by the Applicant's proposed project and CN Alternatives include North Dakota, Minnesota, Wisconsin, Iowa, and Illinois. All of these states have adopted ambient air quality standards that are the same or more stringent than the NAAQS. Table 5.2.7-1 lists the NAAQS for the seven criteria pollutants. Minn. R. 7009.0080 set out the Minnesota Ambient Air Quality Standards (MAAQS). In addition to the criteria pollutants, Minnesota also sets standards for hydrogen sulfide and retains a standard for total suspended particulates (TSP). MAAQS are shown in Table 5.2.7-2.

Table 5.2.7-1. National Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Time	National Ambient Air Quality Standards	
		Primary	Secondary
PM-10	24-hour	150 µg/m³	150 µg/m³
PM-2.5	Annual	12 µg/m³	15 µg/m³
	24-hour	35 µg/m³	35 µg/m³
SO_2[a]	3-hour	--	0.5 ppm
	1-hour	75 ppb	--
NO_2	Annual	53 ppb	53 ppb
	1-hour	100 ppb	--
Ozone	8-hour	0.070 ppm	0.070 ppm
CO	8-hour	9 ppm	--
	1-hour	35 ppm	--
Lead	Rolling 3-month average	0.15 µg/m³	0.15 µg/m³

Table 5.2.7-1. National Ambient Air Quality Standards for Criteria Pollutants

Source: EPA 2016a.

Notes:

The primary annual (0.03 ppm) and 24-hour (0.14 ppm) SO_2 NAAQS have been revoked by the U.S. Environmental Protection Agency (EPA) since 2010. However, the State of Minnesota still adopts these standards. According to EPA, these previous annual and 24-hour SO_2 standards will additionally remain in effect in: (1) any area for which it has not yet been 1 year since the effective date of designation under the current (2010) standards; and (2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved, and which is designated as nonattainment under the previous SO_2 standards or is not meeting the requirements of a State Implementation Plan under the previous SO_2 standards (40 Code of Federal Regulations 50.4[3]).

Minnesota has promulgated ambient air quality standards (Minnesota Ambient Air Quality Standards) for hydrogen sulfide (H_2S), Ozone, CO, SO_2, PM-10, PM-2.5, NO_2, Pb, TSP (Minnesota Rules 7009.0080)

CO = carbon monoxide, NO_2 = nitrogen dioxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, ppb = parts per billion, ppm = parts per million, SO_2 = sulfur dioxide, μg/m^3 = micrograms per cubic meter

"--" = no standard

Table 5.2.7-2. Minnesota Ambient Air Quality Standards

Pollutant	Averaging Time	Level of Standard		Form of the Standard
		Primary	Secondary	
H_2S	30-minutes	0.05 ppmv (70.0 μg/m^3)	--	30-minute average not to be exceeded more than two times in a year
H_2S	30-minutes	0.03 ppmv (42.0 μg/m^3)	--	30-minute average not to be exceeded more than two times in 5 consecutive days
Ozone	8-hour	70 ppbv (137 μg/m^3)	70 ppbv (137 μg/m^3)	3-year average of the annual fourth high daily maximum 8-hour concentration does not exceed standard
CO	8-hour	9 ppmv (10 mg/m^3)	--	Annual second-high 8-hour concentration does not exceed standard
CO	1-hour	35 ppmv (40 mg/m^3)	--	Annual second-high 1-hour concentration does not exceed standard
SO_2	Annual	30 ppbv (79 μg/m^3)	--	Annual average concentration does not exceed standard
SO_2	24-hour	140 ppb (367 μg/m^3)	--	Annual second-high 24-hour concentration does not exceed standard
SO_2	3-hour		500 ppbv (1,310 μg/m^3)	Annual second-high 3-hour concentration

Table 5.2.7-2. Minnesota Ambient Air Quality Standards

Pollutant	Averaging Time	Level of Standard		Form of the Standard
		Primary	Secondary	
				does not exceed the standard
SO_2	1-hour	75 ppb (197 µg/m^3)	--	3-year average of the annual 99th-percentile of daily maximum 1-hour concentrations does not exceed standard
TSP	Annual	75 µg/m^3	60 µg/m^3	Annual geometric mean concentration does not exceed standard
TSP	24-hour	260 µg/m^3	150 µg/m^3	Annual second-high 24-hour concentration does not exceed standard
NO_2	Annual	53 ppbv (100 µg/m^3)	53 ppbv (100 µg/m^3)	Annual average concentration does not exceed standard
NO_2	1-hour	100 ppbv (188 µg/m^3)	--	3-year average of the annual 98th-percentile of daily maximum 1-hour concentrations does not exceed standard
Lead	Rolling 3-month average	0.15 µg/m^3	0.15 µg/m^3	Maximum 3-month rolling average from 3 consecutive years does not exceed the standard
PM-10	24-hour	150 µg/m^3	150 µg/m^3	3-year average of the annual estimated exceedance days is less than or equal to 1
PM-2.5	24-hour	35 µg/m^3	35 µg/m^3	3-year average of the annual 98th-percentile of 24-hour concentrations does not exceed the standard
PM-2.5	Annual	12 µg/m^3	15 µg/m^3	3-year average of the annual seasonally-weighted average does not exceed the standard

Table 5.2.7-2. Minnesota Ambient Air Quality Standards

Pollutant	Averaging Time	Level of Standard		Form of the Standard
		Primary	Secondary	

Notes:

CO = carbon monoxide, H_2S = hydrogen sulfide, NO_2 = nitrogen dioxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, ppbv = parts per billion by volume, ppmv = parts per million by volume, SO_2 = sulfur dioxide, $\mu g/m^3$ = micrograms per cubic meter, TSP = total suspended particulates

Attainment of Air Quality Standards

EPA determines air quality attainment status based on whether the air quality in an area meets (attains) the NAAQS. Areas that do not meet the NAAQS for a specific criteria pollutant are designated as nonattainment areas for that pollutant. Areas with insufficient data are designated as attainment/unclassified areas and are treated as attainment areas. Areas that were previously designated as nonattainment but have achieved compliance with an NAAQS are designated as maintenance for 20 years after the effective date of attainment, assuming that they remain in compliance with the standard. A portion of the truck route from the Gretna pump station to the Superior terminal goes through Duluth, Minnesota. This area is designated as maintenance with respect to CO emissions (8-hour and 1-hour NAAQS) (EPA 2016b). Also, CN Alternative SA-04 would pass through Will County, IL which is designated as an ozone (8-hour NAAQS) non-attainment area. The Applicant's proposed project or the CN Alternatives would not pass through any other air quality nonattainment or maintenance areas.

Air Quality Control Regions

Air quality control regions are categorized as Class I, Class II, or Class III. Class I areas (commonly called "pristine areas") were established primarily as national parks and wilderness areas above a certain size and receive special protections under the Clean Air Act to help maintain pristine air quality.[18] The closest distances to Class I areas within states that would be intersected by the Applicant's proposed project and CN Alternatives are listed in Table 5.2.7-3. The table includes the Fond du Lac Reservation because the Fond du Lac Band of Lake Superior Chippewa is currently seeking re-designation from a Class II to a Class I area. Neither the Applicant's proposed project nor SA-04 would pass through a Class I area; however, the rail and truck alternative routes would pass through the Fond du Lac Reservation.

Table 5.2.7-3. Closest Distance to Class I Areas for the Applicant's Proposed Project and Certificate of Need Alternatives (miles)

Class I Area	Distance to Applicant's Proposed Project	Distance to System Alternative SA-04	Distance to Rail Alternative Route	Distance to Truck Alternative Route
Voyageurs National Park, Minnesota	110.8	184.8	82.7	82.5
Boundary Waters Canoe Area, Minnesota	87.6	216.3	68.4	68.5

[18] Class II areas include all attainment and not classifiable areas not designated as Class I areas and are allowed higher levels of added pollution than Class I areas. Indian tribes that have received Treatment in the Same Manner as State designations can re-designate Class II tribal lands to Class I. Class III areas, allowing even higher levels of added pollutants, are intended for heavily industrialized zones and can be designated only on request. There are currently no Class III areas in the United States.

Table 5.2.7-3. Closest Distance to Class I Areas for the Applicant's Proposed Project and Certificate of Need Alternatives (miles)

Class I Area	Distance to Applicant's Proposed Project	Distance to System Alternative SA-04	Distance to Rail Alternative Route	Distance to Truck Alternative Route
Fond du Lac Reservation, Minnesota *(pending re-designation as Class I)*	2.0	162.8	0.0	0.0
Theodore Roosevelt National Park, North Dakota	305.4	296.6	295.3	279.4
Lostwood National Wilderness Area, North Dakota	225.4	225.4	240.1	223.8
Rainbow Lake Wilderness Area, Wisconsin	38.4	195.0	38.6	40.9
Forest County Potawatomi Community Reservation, Wisconsin	184.1	245.6	183.6	186.1

Sources: Jackson 2014; Minnesota PCA 2016; North Dakota DoH 2010; Wisconsin DNR 2015.

Air Quality Permitting Requirements

Air permits may be required for a project, depending on the quantity of specific project emissions. In general, federal permits are required for larger emitters and are implemented nationwide under a consistently applied permitting program. These federal permits may be issued by states when authority has been delegated to the state. State permits are those air permits required by state rules and statutes. These permits are the result of state-specific strategies approved by the federal government to regulate minor sources of air emissions and to attain compliance with broader air quality federal laws and regulations.

Oil pipelines under normal operations emit fugitive emissions in small amounts that do not require an air permit. Pipeline associated facilities, such as storage tanks at terminals and pump stations that utilize internal combustion engines to power pipeline pumps, do commonly require air permits. For the Applicant's proposed project, all pump stations use electric drive motors and no combustion air emissions are generated. However, they do create air emissions indirectly due to the additional electricity generation required to operate them. Also, the piping components (valves, connectors, pump seals, etc.), sump tanks, and pig traps at pump stations emit volatile organic compounds (VOCs). Note that although pipeline construction causes air pollution through emissions from non-road engines and mobile sources; these emissions do not count towards permitting triggers and therefore do not require air permits. Air permits also are not required for operation of rail equipment or trucks (i.e., mobile sources). Such equipment is subject to emissions performance standards that apply uniformly to specific types of equipment. The federal government has used such standards to reduce diesel particulate, nitrogen oxide (NOx), and volatile organic compound (VOC) emissions from trucks and railroad locomotives. The additional storage tank withdrawal losses due to increased throughput at two terminals will require air permits. At Clearbrook terminal, the Applicant would obtain a synthetic-minor individual state permit in order to limit VOC emissions and retain status as a minor source (Enbridge 2016a). The Superior terminal currently operates as a Title I Prevention of Significant Deterioration and Title V major source. The Applicant is currently working on an application for an air permit to accommodate the potential increased throughput of the terminal (Wisconsin DNR 2016).

5.2.7.1.2 Methodology

Construction and operation of the Applicant's proposed project and CN Alternatives would result in emissions that may affect local air quality. The ROI for the air quality analysis consisted of the airsheds (i.e., geographical regions that share the same air supply and are subject to the same air pollutants) through which pipeline and existing rail and truck routes pass. Because of the large regional nature of airsheds, the Applicant's proposed project and the CN Alternatives generally would occur within the same airsheds.

Potential impacts on air quality within the ROI from construction and operations of the Applicant's proposed project and the CN Alternatives were assessed as follows:

- Direct construction emissions data were obtained from the Applicant for one pipeline construction spread. The data were used to assess total construction emissions for the Applicant's proposed project (7 spreads) and SA-04 route (15 spreads).
- Direct operations emissions data were obtained from the Applicant for the Applicant's proposed project (based on 8 electric pump stations and 27 MLV sites) and SA-04 (based on 16 pump stations and 52 MLV sites).
- Direct operations emissions for the rail and truck alternatives were assessed using projected rail ton-miles per year truck miles per year, respectively.
- Indirect GHG emissions for the Applicant's proposed project and SA-04 from generation of electricity by the existing local utilities for electric pump station operations were calculated using pump station electricity consumption data supplied from the Applicant and GHG emission factors from EPA's Emissions and Generation Resource Integrated Database (eGRID).
- The amounts of carbon that potentially would be released back into the atmosphere during tree removal within the construction work areas were estimated using the average carbon density of trees within the Northern Lake States as developed by the USFS.
- The loss of carbon sequestration for areas along the permanent right-of-way that would remain cleared were estimated using the average annual carbon accumulation associated with trees within the Northern Lake States as developed by the Chicago Climate Exchange.
- The SCC values were assessed using a 3-percent discount rate developed by the Interagency Working Group to provide an estimate of potential climate change damages for the Applicant's proposed project and CN Alternatives based on total direct and indirect GHG emissions.

No single one of theses data sources provides a complete indication of all relevant impacts to air quality, but together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, the estimates of direct emissions of GHG emissions from construction do not account for the GHG emission implications of clearing in the ROW, but together with carbon stock loss calculations they provide a reasonable estimate of the overall GHG impacts of construction.

Furthermore, the quantitative information provided by these data sources should be coupled with the qualitative descriptions of impacts that are contained in the text. Tables in this section provide estimates, for example, of GHG emissions and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that

result from the emission of greenhouse gases is contained in the text of this section and in Section 12.6.

5.2.7.2 Existing Conditions

5.2.7.2.1 Applicant's Proposed Project and Certificate of Need Alternatives

Climate/Meteorology

Air quality is substantially influenced by climate and meteorological conditions; therefore, prevalent weather patterns are a major factor in both short-term and long-term air quality conditions. The Applicant's proposed project and the trucking and rail alternative routes would be located in portions of North Dakota, Minnesota, and Wisconsin; SA-04 would be in portions of North Dakota, Minnesota, Iowa, and Illinois. These areas are located within the humid continental climate, which is noted for its variable weather patterns and large temperature ranges. Representative climate data are presented in Table 5.2.7-4.

Table 5.2.7-4. Representative Climate Data

Measurement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cavalier, Pembina County, North Dakota												
Average low temperature (°F)	-7	0	13	29	41	51	56	53	43	31	15	0
Average high temperature (°F)	12	20	32	51	68	75	79	78	67	53	33	18
Average precipitation (inches)	0.4	0.4	0.7	1.1	2.2	3.2	3.3	2.6	1.8	1.5	0.7	0.4
Mean snowfall (inches)	6.7	5.5	5.9	2.0	0.4	0.0	0.0	0.0	0.1	1.6	5.9	6.6
Bagley, Clearwater County, Minnesota												
Average low temperature (°F)	-8	-1	13	28	42	51	55	53	42	31	16	0
Average high temperature (°F)	13	21	34	52	67	74	78	77	67	54	33	19
Average precipitation (inches)	0.6	0.5	0.9	1.4	2.7	4.4	4.1	3.5	2.9	2.4	1.0	0.6
Mean snowfall (inches)	9.6	5.3	7.7	3.5	0.2	0.0	0.0	0.0	0.0	1.0	5.0	9.4
Superior, Douglas County, Wisconsin												
Average low temperature (°F)	1	8	18	31	39	48	57	58	48	38	24	9
Average high temperature (°F)	20	26	35	47	57	68	75	73	65	53	37	25
Average precipitation (inches)	1.0	0.5	1.4	1.6	2.3	3.7	3.7	3.7	3.7	1.9	1.4	0.8
Mean snowfall (inches)	9.6	5.5	9.0	2.2	0.2	0.0	0.0	0.0	0.0	0.2	4.6	11.2
Alta Visa, Chickasaw County, Iowa												
Average low temperature (°F)	7	14	25	37	48	58	62	60	51	40	26	13
Average high temperature (°F)	24	31	43	58	71	80	83	81	73	61	42	28
Average precipitation (inches)	1.1	1.0	2.2	3.8	4.4	4.9	4.6	4.9	3.3	2.6	2.5	1.4

Table 5.2.7-4. Representative Climate Data

Measurement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean snowfall (inches)	8.5	6.7	8.1	2.4	0.0	0.0	0.0	0.0	0.0	0.2	3.9	9.0
Joliet, Will County, Illinois												
Average low temperature (°F)	17	21	29	39	49	60	64	63	55	43	33	21
Average high temperature (°F)	31	36	47	61	71	81	84	82	76	64	49	35
Average precipitation (inches)	1.8	1.8	2.3	3.5	4.1	3.9	4.3	4.2	3.0	2.8	3.1	2.2
Mean snowfall (inches)	8.9	7.4	2.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.7	10.0

Sources: Intellicast 2016; WeatherDB 2017.

°F = degrees Fahrenheit

Existing Air Quality

To characterize the background air quality for the ROI when no site-specific monitoring data were available, data were obtained from air quality monitoring stations located within the states and counties nearest to the Applicant's proposed project and CN Alternatives. A summary of the available background air quality data showing criteria pollutant concentrations for 2015 is presented in Table 5.2.7-5. The table shows that ambient air quality for all criteria pollutants is below the NAAQS for all areas that would be crossed by the Applicant's proposed project and CN Alternatives. Furthermore, ambient air quality for all criteria pollutants does not exceed MAAQS within Minnesota. The only pollutant concentration that approaches the standards is the 8-hour ozone concentration for all of the states.

Table 5.2.7-5. Representative Background Air Quality Data

Pollutant (Averaging Time)	Monitoring Station Location				
	Cass County, North Dakota	Anoka County, Minnesota	Milwaukee County, Wisconsin	Scott County, Iowa	Champaign County, Illinois
PM-10 (24-hour, 2^{nd} max)	75 μg/m^3 (50% of NAAQS)	54 μg/m^3 (36% of NAAQS)	44 μg/m^3 (29% of NAAQS)	135 μg/m^3 (90% of NAAQS)	--
PM-2.5 (Annual, mean)	7.2 μg/m^3 (60% of NAAQS)	6.6 μg/m^3 (55% of NAAQS)	9.6 μg/m^3 (80% of NAAQS)	9.9 μg/m^3 (83% of NAAQS)	8.7 μg/m^3 (73% of NAAQS)
PM-2.5 (24-hour, 98%)	20 μg/m^3 (57% of NAAQS)	16 μg/m^3 (46% of NAAQS)	28 μg/m^3 (80% of NAAQS)	27 μg/m^3 (77% of NAAQS)	19 μg/m^3 (54% of NAAQS)
SO_2 (1-hour, 99%)	2 ppb (3% of NAAQS)	4 ppb (5% of NAAQS)	13 ppb (17% of NAAQS)	7 ppb (9% of NAAQS)	12 ppb (16% of NAAQS)
NO_2 (Annual, mean)	4 ppb (8% of NAAQS)	7 ppb (13% of NAAQS)	15 ppb (28% of NAAQS)	6 ppb (11% of NAAQS)	--
NO_2 (1-hour, 98%)	31 ppb (31% of NAAQS)	44 ppb (44% of NAAQS)	46 ppb (46% of NAAQS)	41 ppb (41% of NAAQS)	--

Table 5.2.7-5. Representative Background Air Quality Data

Pollutant (Averaging Time)	Monitoring Station Location				
	Cass County, North Dakota	Anoka County, Minnesota	Milwaukee County, Wisconsin	Scott County, Iowa	Champaign County, Illinois
Ozone (8-hour, 4th max)	0.057 ppm (81% of NAAQS)	0.064 ppm (91% of NAAQS)	0.068 ppm (97% of NAAQS)	0.063 ppm (90% of NAAQS)	0.065 ppm (93% of NAAQS)
CO (8-hour, 2nd max)	0.7 ppm (8% of NAAQS)	0.9 ppm (10% of NAAQS)	0.7 ppm (8% of NAAQS)	0.8 ppm (9% of NAAQS)	0.3 ppm (3% of NAAQS)
CO (1-hour, 2nd max)	0.8 ppm (2% of NAAQS)	1.2 ppm (3% of NAAQS)	1.1 ppm (3% of NAAQS)	1.2 ppm (3% of NAAQS)	0.3 ppm (1% of NAAQS)
Lead (Max 3-month avg)	--	0.01 µg/m^3 (7% of NAAQS)	--	--	--

Source: EPA 2016c.

Notes:

Table results depict the data from the monitoring site within the county with the highest pollutant level, including exceptional events data.

Air pollution levels measured at a particular monitoring site are not necessarily representative of the air quality for an entire county or urban area.

Air quality standards for some pollutants (e.g., PM-2.5, lead) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standards. In those cases, the site-level statistics may differ from the monitor-level statistics.

CO = carbon monoxide, NAAQS = national ambient air quality standard, NO_2 = nitrogen dioxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, ppb = parts per billion, ppm = parts per million, SO_2 = sulfur dioxide, µg/m^3 = micrograms per cubic meter

"--" = no available data.

EPA developed the Air Quality Index to provide a simple, uniform way to report daily air quality conditions taking into account all of the criteria air pollutants measured within a geographic area. The Applicant's proposed project would not be located near any of the areas noted for unhealthy air quality. SA-04 would come within 7 miles of Fargo, North Dakota, for which 3 days were cited as unhealthy for sensitive groups in 2015. The rail alternative route to the Superior terminal would intersect Bemidji and Brainerd, Minnesota, and comes within 3 miles of Duluth, Minnesota; and the truck route to the Superior terminal would intersect Bemidji and Duluth, Minnesota. Each of these cities were cited as having air quality conditions that were unhealthy for sensitive groups for 2 days in 2015 (EPA 2016d).

Greenhouse Gases

GHGs occur in the atmosphere both naturally and as a result of human activities, such as burning fossil fuels. GHGs are gases that trap heat in the atmosphere and include carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases. CO_2 is the reference gas for climate change, so measures of non-CO_2 GHGs are converted into a CO_2 equivalent (CO_2e).[19]

[19] CO_2e gives you the equivalent number of tons of CO_2 emissions associated with an emission of another GHG. CO_2-equivalence is usually calculated using the Global Warming Potentials (GWPs) developed for each GHG by the Intergovernmental Panel on

EPA's authority to regulate GHGs through the Clean Air Act was clarified in the U.S. Supreme Court decision in 2007. The Supreme Court ruled that GHGs meet the definition of air pollutants under the existing Clean Air Act and must be regulated if these gases could be reasonably anticipated to endanger public health or welfare. Responding to the Court's ruling, EPA finalized an endangerment finding in December 2009 and began regulating GHGs. Based on overwhelming scientific evidence, EPA found that GHGs were responsible for contributing to climate change which results in a threat to public health and welfare. Specifically, the impacts of climate change that will cause harm to human health and welfare of current and future generations include but are not limited to increased drought; more heavy downpours and flooding; more frequent and intense heat waves and wildfires; greater sea level rise; more intense storms; and harm to water resources, agriculture, wildlife, and ecosystems (Center for Climate and Energy Solutions 2016).

In 2007, the Minnesota Legislature passed the Next Generation Energy Act, which set goals for reducing GHG emissions in the state and goals for renewable energy use and energy conservation. The Next Generation Energy Act set a goal that would reduce GHG emissions in 2015 to a level 15% below the 2005 level, and also for 2025 and 2050 emissions levels to be 30% and 80%, respectively, below the 2005 emission levels (Minnesota Statutes 216H.02 Greenhouse Gas Emissions Control)

In 2009, President Obama pledged to reduce U.S. GHG emissions to approximately 17 percent below 2005 levels by 2020. In June 2013, the President outlined the Climate Action Plan—the steps his administration would take to cut carbon pollution, help prepare the United States for the impacts of climate change, and continue to lead international efforts to address global climate change (Executive Office of the President 2013). In a progress report released in June 2015, the President stated that the United States is half-way to reaching its 2020 goal (Executive Office of the President 2015). U.S. GHG emissions in 2014 were 9 percent below the 2005 level of 7,350 million metric tons of CO_2e (EPA 2016e). Building on this progress, the President announced that the United States would commit to further reducing its carbon emissions to approximately 26 to 28 percent below 2005 levels by 2025 (Executive Office of the President 2015).

In 2014, approximately 76 percent of the U.S.'s GHG emissions were from fossil fuel combustion (EPA 2016e). Furthermore, fossil fuel-fired power plants are the largest source of emissions, making up 31 percent of U.S. total GHG emissions (EPA 2016f). To reduce carbon pollution from existing power plants, EPA issued the final Clean Power Plan on August 3, 2015 (EPA 2016g). The GHG reduction requirements in the Clean Power Plan could apply to power generation facilities that supply power to the Project's pump stations. This results in indirect GHG emissions for the Project. The ultimate goal of the Clean Power Plan is to reduce carbon pollution from the power sector by 32 percent below 2005 levels by 2030. Under the plan, states are required to develop and implement plans to ensure that the power plants in their state—individually, together, or in combination with other measures—achieve the performance rate goals for CO_2 for 2030 and for interim years 2022-2029 that are listed in the Final Rule. Under the Clean Power Plan Final Rule, states can opt to adopt state-level mass-based goals (in tons of statewide emissions for electric generating units) or rate-based goals (pounds per megawatt hour). Table 5.2.7-6 shows the final emission rate goal under the final Clean Power Plan for each of the states intersected by the Applicant's proposed project and CN Alternatives. Note that EPA uses 2012 as the

Climate Change. GWPs are a measure of the infrared energy that a gas traps in the troposphere, typically over 100 years, compared to CO_2 (U.S. Environmental Protection Agency 2013). As an example, methane, which is a common GHG, is widely represented as having a 100-year GWP of 25 (i.e., for the same weight, the comparative effect of methane on climate change is 25 times greater than CO_2 over a 100-year period).

baseline year for a fixed percentage of reductions. On March 28, 2017, President Trump signed an executive order that directs EPA to "as appropriate" initiate rulemaking to suspend, revise, or rescind the Clean Power Plan and related actions. Although the plan is currently subject to challenge in the D.C. Circuit and has been stayed by the Supreme Court, the executive order directs the Department of Justice to inform the D.C. Circuit of EPA's plans and ask the court to put those challenges on hold while EPA takes action to rescind or revise the rule.

On June 6, 2017, Minnesota Gov. Mark Dayton signed onto the U.S. Climate Alliance, a coalition launched after President Trump announced (June 1, 2017) plans to withdraw the United States from the Paris Agreement. The Paris Agreement reached in 2016 by 195 countries, aims to reduce the greenhouse gases emissions that are driving climate change. The U.S. Climate Alliance is a coalition of states that are committed to upholding the objectives of the Paris Agreement on climate change within their borders. The U.S. Climate Alliance also commits states to meeting or exceeding the targets of the federal Clean Power Plan discussed above.

Table 5.2.7-6. Final Clean Power Plan Emission Performance Goals

State	2012 Adjusted Baseline Emission Rate [a] (lb CO_2/MWh)	2030 State Goal (lb CO_2/MWh)	CO_2 Percent Reduction for Existing Fossil Fuel-Fired Electric Generating Units
North Dakota	2,368	1,305	45%
Minnesota	2,082	1,213	42%
Iowa	2,195	1,283	42%
Illinois	2,149	1,245	42%
Wisconsin	1,996	1,776	41%

Source: EPA 2015a.

[a] Emission rate is in units of adjusted output-weighted-average pounds of CO_2 per net MWh from all existing fossil fuel-fired electric generating units, excluding those located on tribal lands within the state.

CO_2 = carbon dioxide, lb = pounds, MWh = megawatt hours

5.2.7.3 Impact Assessment

This section of the analysis assesses the temporary air quality effects associated with construction of the pipeline and associated facilities and the permanent air quality effects resulting from facility operations for the Applicant's proposed project and each of the CN Alternatives.

5.2.7.3.1 Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

Air quality impacts associated with construction would include emissions from fossil fuel-fired construction equipment engines, fugitive dust from ground disturbance and transportation, and emissions associated with burning wood debris in construction work areas. Table 5.2.7-7 shows the estimated construction emissions for the Applicant's proposed project, which would be constructed in 7 spreads (7 separate sections).

Fossil fuel-fired construction equipment is a source of combustion emissions, including NOx, CO, VOCs, SO_2, PM-10, PM-2.5, and small amounts of hazardous air pollutants. Construction equipment also emits GHGs. Gasoline and diesel engines must comply with the EPA mobile source regulations in 40 CFR Part 85 for on-road engines and 40 CFR Part 89 for non-road engines. These regulations are designed to minimize emissions and require a maximum sulfur content in diesel fuel of 15 parts per million. Open burning of cleared materials from construction activities has the potential to affect air quality, particularly the large volume of trees that would be removed from the right-of-way. Consequently, the burning of mature trees would not be allowed. Only small and dry brush piles will be allowed to burn.

Table 5.2.7-7. Estimated Construction Emissions for the Applicant's Proposed Project

Emission Source Description	Direct Emissions (tons)							
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs	HAPs
On- and off-road diesel equipment combustion emissions	8.6	123.5	121.0	0.2	5.3	5.0	23,690.0	0.5
On- and off-road gasoline equipment combustion emissions	1.10	2.34	15.3	1.2	0.2	0.2	2,105.0	0.0
Fugitive emissions from paved roads	0.0	0.0	0.0	0.0	59.1	14.5	0.0	0.0
Fugitive emissions from unpaved roads	0.0	0.0	0.0	0.0	8.4	0.8	0.0	0.0
Emissions from open burning of wood debris	0.0	0.0	272.7	0.0	26.6	26.6	141.0	0.0
Blasting emissions[a]	0.0	0.2	0.3	0.003	0.0005	0.00003	0.0	0.0
Subtotal per spread	***9.7***	***126.0***	***409.3***	***1.4***	***99.6***	***47.1***	***25,936.0***	***0.5***
TOTAL EMISSIONS[b]	**67.7**	**880.8**	**2,863.3**	**9.8**	**697.3**	**329.6**	**181,552.0**	**3.7**

Source: Enbridge 2017.

[a] Blasting would be required for only one 1,500-foot section in Spread 7.

[b] Total emissions represent emissions from 7 construction spreads.

CO = carbon monoxide, GHGs = greenhouse gases, HAPs = hazardous air pollutants, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compounds

Fugitive dust is a source of respirable airborne PM, including PM-10 and PM-2.5 that could result from blasting, open burning, and mobile source traffic on paved and unpaved roads. The amount of dust generated is a function of construction activity, silt and moisture content of the soil, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. State regulations typically require measures to prevent fugitive dust from becoming airborne and leaving the property boundary. The Applicant would minimize dust generated from construction activities by wetting soils on the right-of-way and limiting working hours in residential areas as needed (Enbridge 2016a), and/or additional measures as appropriate based on site-specific conditions.

Because the pipeline would be constructed in 7 spreads, total emissions would not be concentrated in any one location but would occur incrementally along the pipeline route. Further, each spread of pipeline activity moves along the route daily during construction; therefore, emissions would be minimal and short term at any specific location, and typical meteorological conditions likely would cause rapid dispersal. As a result, air emissions from construction would result in localized minor, intermittent and temporary impacts. Because air permitting is not triggered by temporary construction phase emissions, dispersion modeling to ensure compliance with ambient air quality standards would not be required.

Stored Carbon Releases

A "carbon sink" is a natural or artificial reservoir that accumulates and stores some carbon-containing chemical compounds for an indefinite period. Trees, like other green plants, are carbon sinks that use photosynthesis to convert CO_2 into sugar, cellulose, and other carbon-containing carbohydrates that they use for food and growth. They are able to lock up large amounts of carbon in their wood, on the forest floor and in forest soils and they continue to add carbon as they grow. When a tree is harvested and converted into forest products, a part of the CO_2 it has stored over a lifetime is retained within its cellular structure. When trees die and decompose or are burned, some of the stored carbon remains as forest litter and soils, but much of the rest is released back into the atmosphere as CO_2 (New York DEC 2016).

Construction along the Applicant's proposed project could require removal of trees from up to 1,612 acres of forested land in the construction work area. Of this, 702 acres would remain permanently without trees, while the forest would be allowed to regrow on the other 981 acres. Within the Northern Lake States, USFS estimated the carbon density of forested lands for six forest types: aspen-birch, elm-ash-cottonwood, maple-beech-birch, oak-hickory, spruce-fir, and white-red-jack pine (Smith et al. 2006). The average for the six forest types is 30.2 metric-tons of carbon per acre. Consequently, the amount of carbon that potentially would be released back into the atmosphere during construction tree removal of 1,612 acres is estimated at approximately 205,500 tons of CO_2e. Regrowth of the forest on the 981 acres outside of the pipeline right–of-way eventually would more than halve this loss in the long run after forest regrowth, bringing net CO_2 emissions from forest clearance down to a level of about 85,658 tons. Note that the annual loss of carbon sequestration is quantified below as an operations impact.

Operations Impacts

Table 5.2.7-8 shows the estimated operations emissions for the Applicant's proposed project based on 8 electric pump stations and 27 MLV sites. Air quality impacts associated with operations would predominantly involve emissions from piping components (e.g., pumps, valves, and flanges) at the pump stations and MLVs, and emissions associated with potential increased throughput of a terminal's external floating roof storage tanks. The external floating roof tank design is such that evaporative losses from the stored crude oil are limited to losses from the rim seal system and deck fittings (standing storage loss) and any exposed crude oil on the tank walls (working loss). Indirect GHG emissions resulting from power generation to supply electrical energy to the pump stations are considered in the following section.

Some of the external floating roof storage tanks at the existing Clearbrook terminal are subject to New Source Performance Standards (NSPS) in 40 CFR 60 Subpart Kb, "Standards of Performance for Volatile Organic Liquid Storage Vessels." Subpart Kb regulates VOC emissions and establishes controls based on the vapor pressure of the stored liquid. The Clearbrook terminal currently operates under a minor source Option A Registration Permit, which is a state of Minnesota permit, solely because an NSPS applies and no federal or state permitting thresholds are exceeded (i.e., applicability to NSPS Subpart Kb requires a State air permit under Minn. R. 7007.0250). The increased throughput associated with the Applicant's proposed project would cause potential emissions of VOCs at the Clearbrook terminal that exceed the 100-tons-per-year major source threshold, triggering a Title V operating permit. The Applicant would obtain a synthetic-minor individual state permit in order to limit VOC emissions and retain status as a minor source (Enbridge 2016a). Dispersion modeling to ensure compliance of the Clearbrook terminal with ambient air quality standards has not been completed and would likely not be triggered by this permit change. Furthermore, operational emissions would consist primarily of VOCs, which are a precursor to the criteria pollutant, ozone. VOC emissions cannot practically be modeled to show a source's ozone formation given the regional transport nature of the pollutant.

Table 5.2.7-8. Estimated Operations Emissions for the Applicant's Proposed Project

Emission Source Description	Direct Emissions (tons per year)							
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs	HAPs
Pump station fugitive emissions from pumps, piping components, sump tanks, and pig traps	2.9	0.0	0.0	0.0	0.0	0.0	0.04	0.09
Mainline valve fugitive emissions from piping components	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.004
Clearbrook terminal fugitive emissions from pumps, piping components, sump tanks, and pig traps	0.5	0.0	0.0	0.0	0.0	0.0	0.006	0.02
Additional Clearbrook terminal storage tank withdrawal losses from pipeline throughput[a]	17.5	0.0	0.0	0.0	0.0	0.0	372.2	1.2
Fugitive emissions from unpaved roads	0.0	0.0	0.0	0.0	0.1	0.01	0.0	0.0
Vehicle combustion emissions	0.002	0.004	0.03	0.002	0.0004	0.0004	3.6	0.0
Additional Superior terminal storage tank withdrawal losses from pipeline throughput[b]	--	--	--	--	--	--	--	--
TOTAL EMISSIONS	**21.0**	**0.004**	**0.03**	**0.002**	**0.1**	**0.01**	**375.9**	**1.3**

Source: Enbridge 2017.

[a] Only those emissions associated with the proposed increase in throughput of the Clearbrook terminal are included as part of the Project's operations emissions (i.e., existing operations emissions are equivalent to the existing environment).

[b] The Applicant is currently working on an application for an air permit to accommodate the proposed increase in throughput of the Superior terminal.

Note:

Operations emissions are based on 8 pump stations and 27 mainline valve sites.

CO = carbon monoxide, GHGs = greenhouse gases, HAPs = hazardous air pollutants, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compounds

"--" = Emissions not estimated.

The existing Superior terminal has both internal and external floating roof storage tanks that are subject to NSPS in 40 CFR 60 Subpart Kb, "Standards of Performance for Volatile Organic Liquid Storage Vessels." The Superior terminal also has diesel engines subject to NSPS in 40 CFR 60 Subpart IIII for stationary compression ignition internal combustion engines and the National Emission Standards for Hazardous Air Pollutants in 40 CFR 63 Subpart ZZZZ for reciprocating internal combustion engines. The Superior terminal currently operates as a Title I Prevention of Significant Deterioration and Title V major source. Currently, the Applicant is working on an application for an air permit to accommodate the potential increased throughput of the terminal (Wisconsin DNR 2016). The Wisconsin permitting agency may require dispersion modeling to determine compliance of the Superior terminal with ambient air quality standards, depending on the resulting emissions increase and permit triggered.

As a result of the permitting and federal NSPS and NESHAP requirements, it would be expected that permanent operations of the Applicant's proposed project would result in minor, localized air quality impacts; and GHG emissions would contribute to global climate change.

Loss of Carbon Sequestration

Trees, like other green plants, are carbon sinks that use photosynthesis to convert CO_2 into sugar, cellulose, and other carbon-containing carbohydrates that they use for food and growth. The process by which carbon sinks remove CO_2 from the atmosphere is known as "carbon sequestration." Although forests do release some CO_2 from natural processes such as decay and respiration, a healthy forest typically stores carbon at a greater rate than it releases carbon (New York DEC 2016). The actual rate of carbon sequestration is highly variable and depends on several factors, including the species of tree, age of the tree, climate, forest density, and soil conditions.

Following construction, 981 acres of previously cleared forested land could be reforested to provide a carbon sequestration (storage) reservoir. The remaining 702 acres along the permanent right-of-way would remain cleared. The nature of the proposed tree removal is to permanently convert forested land within the permanent right-of-way and aboveground facility sites to a non-forested land use, which would result in a permanent loss of carbon sequestration.

Within the Northern Lake States, the Chicago Climate Exchange estimated the annual carbon accumulation on forested lands for six forest types: aspen-birch, elm-ash-cottonwood, maple-beech-birch, oak-hickory, spruce-fir, and white-red-jack pine (Chicago Climate Exchange 2009). For these forest types, 1.6 metric tons of CO_2 is annually sequestered in the non-soil components of the forest. Thus the annual carbon sequestration foregone annually on the 702 acres that are permanently deforested would be 1,260 tons.

Indirect Greenhouse Gas Emissions

In addition to the direct operations emissions presented in Table 5.2.7-8 (376 tons of CO_2e per year) and an annual loss of an estimated 1,262 tons of CO_2e of sequestration, the Project would result in indirect GHG emissions at power generation facilities that supply energy to power the pump stations needed for the line.

The pump stations for the project would be powered by electricity from existing local electric utilities, which would produce indirect air emissions (i.e., emissions not from the Applicant's proposed project itself, but from power plant emissions that generate the electricity the Project uses). The projected power consumption from operations of all pump stations would be 533,249 megawatt-hours (MWh) per year (Enbridge 2016b). This estimate includes the power consumption for the existing Line 3 pump stations. GHG emissions for electricity use for the power control area for each of the proposed pump stations were calculated using EPA's eGRID GHG emission factors:

- 1,894 pounds of CO_2e per MWh for the Otter Tail Power Company for the Donaldson, Viking, Plummer, and Clearbrook terminal pump stations; and
- 1,836 pounds of CO_2e per MWh for the Great River Energy for the Two Inlets, Backus, Palisade, and Cromwell pump stations.

Based on this data, the maximum indirect GHG emissions from pump station operations would be 497,112 tons of CO_2e per year (EPA 2015b). The maximum indirect GHG emissions from pump station operations associated only with the increased throughput would be 452,497 tons of CO_2e per year, after removing 44,615 tons of CO_2e per year that is associated with the existing Line 3 and considered part of the baseline in the existing environment (Enbridge 2017). The criteria pollutant emissions associated with the electric generating facilities would be authorized by applicable permits, ensuring compliance with ambient air quality standards. These facilities would also be subject to the GHG reduction requirements in the Clean Power Plan.

Social Cost of Carbon

The potential increased GHG emissions associated with the Project would contribute incrementally to global climate change, in conjunction with other regional, national and global sources of GHG emissions; when aggregated together on a global scale, emissions can have large cumulative effect on climate change.

EPA and other federal agencies use the SCC to estimate the climate benefits of rulemakings. The SCC is the total cost to society arising from man-made emissions of CO_2 and other GHGs. It is typically measured in U.S. dollars per metric ton of CO_2 or CO_2e. The SCC is meant to be a comprehensive estimate of climate change damages. It includes changes in net agricultural productivity; human health; property damages from increased flood risk; and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning. Given current modeling and data limitations, however, it does not include all important damages. Nonetheless, EPA (2016h) reports that the SCC is a useful measure to assess the benefits of CO_2 reductions.

Table 5.2.7-9 presents four SCC values developed by the Interagency Working Group, a group comprised of scientific and economic experts from the White House and federal agencies, including Council on Environmental Quality, National Economic Council, Office of Energy and Climate Change, and Office of Science and Technology Policy, EPA, and the Departments of Agriculture, Commerce, Energy, Transportation, and Treasury. Three values are based on the average SCC from three integrated assessment models, at discount rates of 2.5, 3, and 5 percent. The fourth value, which represents the 95th-percentile SCC estimate across all three models at a 3-percent discount rate, accounts for higher-than-expected impacts from temperature change farther out in the tails of the SCC distribution (White House 2015). The Interagency Working Group acknowledges that a 3-percent discount rate is the central (average) value (White House 2015). Thus, a 3-percent discount rate was used in this analysis.

Table 5.2.7-9. Social Cost of Carbon (in 2007 dollars per metric-ton CO_2)

Year	Discount Rate and Statistic			
	5% Average	3% Average	2.5% Average	3% 95th Percentile
2015	$11	$36	$56	$105
2020	$12	$42	$62	$123
2025	$14	$46	$68	$138
2030	$16	$50	$73	$152
2035	$18	$55	$78	$168
2040	$21	$60	$84	$183
2045	$23	$64	$89	$197
2050	$26	$69	$95	$212

Source: Whitehouse 2015.
CO_2 = carbon dioxide

Table 5.2.7-10 calculates the SCC using the 3-percent discount rate for the direct and indirect GHG emissions of the Applicant's proposed project over the 30-year life of the Project.

Table 5.2.7-10. Social Cost of Carbon (Fossil Greenhouse Gas Emissions) for the Applicant's Proposed Project (in 2007 dollars)

Year	30-Year SCC for Direct GHG Emissions[a]	30-Year SCC for Indirect GHG Emissions	30-Year SCC for Direct and Indirect GHG Emissions
30-Year Project Life (2020 to 2049)	$558,917	$672,806,234	$673,365,150

[a] Estimate does not include emissions associated with lost carbon sequestration
GHG = greenhouse gas, SCC = social cost of carbon

Life-Cycle Greenhouse Gas Emissions

The Project is part of a larger crude oil extraction, production, refining, and consumption system that is affected by changes in the availability and price of transportation to get crude oil from the point of extraction to the refineries that process the oil into refined products. An increase in the availability of options for transport via pipeline, for example, could lower the overall cost of transporting crude oil to market, improving its market prospects.

Similarly, increased upstream activity induced by the project could ultimately result in increased end-use of refined products, because, for example, gasoline becomes more abundant and cheaper as a result additional extraction and cheaper pipeline transport.

Addressing the GHG impact of these types of upstream and downstream changes requires a look at GHG emissions at each stage of the life-cycle of the crude oil—extraction to combustion and everything in between. The analysis below first addresses the question of whether and how much a single project like the Line 3 Project could affect upstream and downstream activity and then investigates the magnitude of life-cycle GHG emissions associated with potential upstream and downstream changes.

Potential for Upstream and Downstream Effects

Whether and how much a single project like the Line 3 Project would affect upstream and downstream depends on market dynamics that cannot be predicted with certainty. However, the potential for the additional heavy crude that the Project would accommodate to alter upstream and downstream activity was explored using information presented by the U.S. Energy Information Administration (EIA) in its most recent Annual Energy Outlook (AEO) and similar assessments in two other EISs for oil pipelines.

Each AEO includes long-term energy projections for the United States. AEO 2017 presents projections for U.S. energy markets through 2050 based on eight modeled cases (Reference, Low and High Economic Growth, Low and High Oil Price, Low and High Oil and Gas Resource and Technology, and No Clean Power Plan Implementation cases) (EIA 2017). These projections are not predictions of what will happen, but are modeled projections of what may happen given certain assumptions and methods. The Reference case projection includes consideration of continued improvement in known technologies as well as economic and demographic trends that are consistent with the current central views of leading economic forecasters and demographers.

AEO 2017 states that *overall* energy consumption, including petroleum products, is projected to remain relatively flat in the Reference case, rising 5 percent from the 2016 level by 2040. U.S. petroleum consumption was projected to remain below the 2005 level (about 21 million barrels per day [bpd], the highest recorded to date) through 2040 for all cases evaluated. The range of projections is bounded by the High Oil Price Economic Growth Case (about 15 million bpd) and the Low Oil Price Economic Growth Case (about 20 million bpd). EIA (2017) expects that petroleum consumption will remain relatively flat due to the increases in energy efficiency that would offset growth in the transportation and industrial sectors.

These findings are consistent with the projections reported in the Draft Supplemental EIS for the Line 67 Expansion, which states that "U.S. demand for liquids, including petroleum products and natural gas plant liquids among others, is generally believed to have plateaued at the consumption level in 2015, with some variance depending on price developments" (DOS 2017). In addition, the Final Supplemental EIS for the Keystone XL Project reported that "Approval or denial of any one crude oil transport project…remains unlikely to significantly impact the rate of extraction in the oil sands, or the continued demand for heavy crude oil at refineries in the United States" (DOS 2014).

Based on a review of these studies, it is difficult to determine with certainty that no upstream or downstream changes would occur as a result of the Project, therefore the following analysis describes life-cycle GHG emissions that could result if upstream or downstream changes did occur.

Life-Cycle Emission Estimates

A life-cycle analysis for GHGs tracks the total production of GHGs from their extraction from the earth to the end-use combustion of refined petroleum products or byproducts. Life-cycle stages for crude oil generally include the following (DOS 2017; NETL 2008):

- Life-Cycle Stage #1: Raw Material Acquisition
  - Begins with extraction of raw feedstocks (e.g., crude oil) from the earth and any partial processing of the raw materials that may occur.
  - Feedstocks include foreign and domestic crude oil, natural gas liquids, unfinished oils, and unconventional hydrocarbons (e.g., oil sands).

- Life-Cycle Stage #2: Raw Material Transport
  - Begins at the end of extraction/processing of the raw materials and ends at the entrance to the petroleum refineries.
  - Feedstocks are transported from both domestic and foreign sources to U.S. and foreign refineries.
- Life-Cycle Stage #3: Liquid Fuels Production/Refining
  - Begins at the entrance of the petroleum refinery with the receipt of crude oil (and other feedstock inputs) and ends at the entrance to the petroleum pipeline used to transport the liquid fuels to the bulk fuel storage depot.
  - Petroleum refinery operations are both foreign and domestic.
  - Emissions associated with acquisition and production of indirect fuel inputs such as purchased power and steam, purchased fuels such as natural gas and coal, and fuels produced in the refinery and subsequently consumed therein are included in this stage.
  - Emissions associated with onsite and offsite hydrogen production are included in this stage, including emissions associated with raw material acquisition for hydrogen plant feedstock and fuel.
  - Production of oxygenates is excluded from the analysis.
- Life-Cycle Stage #4: Product Transportation and Refueling
  - Begins at the exit of the domestic or foreign petroleum refinery and ends with dispensing the fuel into the vehicle/aircraft.
  - Includes the operation of the bulk fuel storage depot for gasoline and diesel and the airport fuel storage tanks.
  - Includes the operation of liquid fuel tanker trucks used to transfer the gasoline/diesel from the depot to the vehicle fueling stations and the transport of jet fuel from the airport fuel storage tanks to the aircraft by a refueling truck.
- Life-Cycle Stage #5: Combustion
  - Begins at the vehicle/aircraft fuel tank and ends with the combustion of the liquid fuel.
  - Includes emissions from combustion of coke sold as fuel for offsite use

Emissions at each stage of the life-cycle differ for different types of crude. For example, oil extracted from the Western Canadian Sedimentary Basin (WCSB) like the heavy crudes that would be carried by the proposed Line 3 pipeline, require greater energy input for extraction and upgrading than U.S. light crudes, and therefore create more GHG emissions at each stage during production. The Department of State's Line 67 Expansion Project EIS contains a detailed review of the life-cycle stages, sources of life-cycle GHG emissions, and sources of uncertainty in life-cycle GHG emissions for the types of oil that would be transported on both the 67 Expansion and the proposed Line 3 pipeline (DOS 2017). That document is incorporated by reference here, and a summary of the relevant per-barrel life-cycle GHG emissions is provided in Table 5.2.7-11. While Line 3 currently carries light WCSB crude, the Project would be capable of carrying both light and heavy WCSB crude.

While Table 5.2.7-11 provides a comparison of per-barrel life-cycle GHG emissions, the total magnitude of the life-cycle GHG impact of the Project depends on whether the expanded capacity of the Project induces entirely new upstream production and downstream consumption (no displacement) or simply replaces other sources of oil. If oil transported on the proposed Line 3 pipeline does displace other sources of crude oil to refineries, the total life-cycle GHG impact of the displacement depends on how much oil is displaced and of what type.

Table 5.2.7-11. Average Life-Cycle Greenhouse Gas Emissions for Various Crude Oils

Crude Oil Type	Life-Cycle GHG Emission Estimate[a] (kg CO_2-e/barrel of crude oil)
Heavy WCSB	584-632[b]
Light WCSB	513
Average U.S. Refinery Mix	521[c]
Venezuelan Heavy	558
Mexican Heavy	513
Iraqi Medium	484
Arab Medium	468
Canadian Conventional	464
U.S. Light Tight Oil	512
U.S. CO_2 EOR Medium	512
Nigerian Light	501
Iraqi Medium	484
Arab Medium	468

[a] Average from studies evaluated in DOS 2017
[b] Upper end of range represents results of GREET modeling conducted by DOS 2017
[c] Result of GREET modeling conducted by DOS 2017
EOR = enhanced oil recovery; WCSB = Western Canada Sedimentary Basin

The life-cycle GHG emission estimates provided below draw on the values in Table 5.2.7-11 to bookend the possible outcomes from full displacement to zero displacement. Baseline life-cycle GHG emissions for existing Line 3 are shown in Table 5.2.7-12, assuming current throughput of 390,000 bpd of WCSB light crude. Post-Project life-cycle GHG emissions were calculated assuming a worst case throughput of 760,000 bpd of WCSB heavy crude. Under these assumptions, if no displacement occurs, the Applicant's proposed project would result in 760,000 bpd of new WCSB heavy crude entering the market, resulting in a 193 million ton CO_2e/year incremental increase in emissions. If, rather the heavy crude transported on this line displaces lighter crude, for example the 390,000 bpd of WCSB light crude that the existing Line 3 provides to market as well as 370,000 bpd of another light crude (U.S. light tight), the result would be a 35 million ton CO_2-*e*/year incremental increase in emissions. If the heavy crude transported on the Applicant's proposed Project displaces other heavy Canadian crude (market-wide supply and demand are unaffected by the Project), no change in upstream and downstream emissions would occur.

Using the SCC estimates described above, the 30-year cost associated with the Project life-cycle emissions could range up to $120 billion.

Table 5.2.7-12. Average Life-Cycle Greenhouse Gas Emissions for Various Crude Oils

Scenario	Annual Life-Cycle GHG Emissions (million tons CO2*e*)	Incremental Annual Life-Cycle GHG Emissions (million tons CO2*e*)	30-Year SCC for Incremental Life-Cycle GHG Emissions (2007 dollars)
Existing Line 3 (390,000 bpd WCSB light)	80.5	0	0 billion
Applicant's Proposed Project (760,000 bpd WCSB Heavy[a]) - No displacement	273.5	193	287 billion
Applicant's Proposed Project (760,000 bpd WCSB Heavy) - Displaces 390,000 bpd WCSB Heavy & 370,000 U.S. Light Tight Oil	115.5	35	52 billion

[a] Western Canada Sedimentary Basin (WCSB) heavy value based on GREET Modeling (DOS 2017)

Note that there are assumptions and data limitations in the characterization of life-cycle GHG emissions that vary between studies. As a result, the GHG emissions can differ substantially from one study to the next. Since the studies reviewed do not consistently disclose the details of their analysis, and often rely on proprietary models and data, a thorough assessment of the reasons for this variability is not possible (Brandt et al. 2015; Cooney 2014; Ghandi et al. 2015; Keesom et al. 2009; NETL 2008, 2009; TIAX LLC and Math Pro Inc. 2009).

Applicant-Proposed Measures to Minimize Greenhouse Gas Emissions

Enbridge has indicated that the Project would use measures to reduce emissions of GHGs and save energy during construction and operation, such as the use of locally sourced pipe, establishment of field offices and worker camps in construction areas to reduce travel time of personnel, use of buses to transport workers to work sites to reduce the number of vehicles on the roads, and use of local accommodations and trade services wherever possible (Enbridge 2016f). During operations, the Applicant proposes to use high-efficiency pumps and motors to transport crude oil through the pipeline, which would minimize power requirements over the long term. The Applicant has also invested in renewable and alternative energy projects in Canada and the United States that will reduce GHG emissions (such as removing all cast-iron pipes from its natural gas delivery system) and increase energy conservation efforts (such as building new facilities to recognized green building certification standards).

5.2.7.3.2 Continued Use of Existing Line 3

Construction Impacts

Because existing Line 3 is already constructed and in operation, no initial construction activities are required. Therefore, there would be no construction impacts on air quality from continued use of the existing Line 3 pipeline. Construction activities related to future pipeline repairs, known as "integrity digs," are addressed under operations impacts below.

Stored Carbon Releases

Because no construction or tree removal would be associated with continued use of the existing Line 3, there would be no associated carbon releases.

Operations Impacts

Continued use of the existing Line 3 would continue transport of crude oil at the current average rate of 390,000 bpd, which is reduced from the operating capacity of the pipeline when it initially began operations. Air emissions associated with continued operations are ongoing and considered part of the existing environment; no incremental additional air emissions would occur.

Integrity digs to uncover and repair/replace pipeline sections would continue to occur along the pipeline. They involve construction activities similar to the initial pipeline construction but affect only a short segment of pipeline and last for a short period of time. Air quality impacts from integrity digs at any one location would be negligible, localized, and intermittent and temporary. Total air quality impacts from the integrity program would be negligible to minor and long-term.

Loss of Carbon Sequestration

Although the specific locations of integrity digs are not known, it was assumed that they would not involve permanent tree removal. Thus, no associated loss of carbon sequestration would be associated with continued use of the existing Line 3.

Life-Cycle Greenhouse Gas Emissions

Continued use of existing Line 3 would not induce upstream or downstream changes in emissions. Current, baseline level of life-cycle emissions per barrel of crude oil for existing Line 3 are provided in Table 5.2.7-12.

5.2.7.3.3 System Alternative SA-04

In general, the air quality impacts associated with construction and operation of SA-04 would be significantly higher to those described above for the Applicant’s proposed project. The system alternative SA-04 requires eight additional pump stations needing more power and generating almost two times the amount of indirect GHG emissions per year than the Applicant’s proposed project. The construction and operations emissions shown in Table 5.2.7-13 and 5.2.7.14, respectively, are considerably higher than the Applicant’s proposed project including higher VOC and hazardous air pollutant emissions at the Joliet terminal in Illinois.

Construction Impacts

Construction emissions would be a direct function of pipeline length because the same construction equipment would be used for SA-04 and the Applicant’s proposed project. Table 5.2.7-13 shows the estimated construction emissions for SA-04, assuming that it would be constructed in 15 spreads. The Applicant-proposed measures to minimize air impacts described for the Applicant’s proposed project also would be implemented for the system alternative; consequently, the air quality impacts during construction would be minor and temporary.

Table 5.2.7-13. Estimated Construction Emissions for the System Alternative SA-04

Emission Source Description	Direct Emissions (tons)							
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs	HAPs
On- and off-road diesel equipment combustion emissions	8.6	123.5	121.0	0.2	5.3	5.0	23,690.0	0.5
On- and off-road gasoline equipment combustion emissions	1.10	2.34	15.3	1.2	0.2	0.2	2,105.0	0.0
Fugitive emissions from paved roads	0.0	0.0	0.0	0.0	59.1	14.5	0.0	0.0
Fugitive emissions from unpaved roads	0.0	0.0	0.0	0.0	8.4	0.8	0.0	0.0
Emissions from open burning of wood debris	0.0	0.0	272.7	0.0	26.6	26.6	141.0	0.0
Blasting emissions[a]	--	--	--	--	--	--	--	--
Subtotal per spread	***9.7***	***125.8***	***409.0***	***1.4***	***99.6***	***47.1***	***25,936.0***	***0.5***
TOTAL EMISSIONS	**145.1**	**1,887.0**	**6,135.0**	**21.0**	**1,494.3**	**706.4**	**389,040.0**	**8.0**

Source: Enbridge 2017.

[a] Blasting emissions have not been quantified.

Note:

Total emissions represent emissions from 15 construction spreads (absent blasting).

CO = carbon monoxide, GHG = greenhouse gas, HAPs = hazardous air pollutants, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compounds

"--" = Emissions not estimated.

Stored Carbon Releases

During construction, SA-04 could require removal of trees from 99 acres of forested land in the construction work area that, when removed, would release GHGs. Using the same emission factor of 30.2 metric-tons of carbon per acre as used for the Applicant's proposed project, the amount of carbon that potentially would be released back into the atmosphere during construction tree removal is estimated at 12,033 tons of CO_2e.

Operations Impacts

Table 5.2.7-14 estimates the operations emissions for SA-04 based on 16 pump stations and 52 MLV sites. The table includes indirect GHG emissions from the purchase of electricity for pump station operations determined as a function of the pipeline length. Unlike the Applicant's proposed project, SA-04 would not go through the Clearbrook or Superior terminals. Instead, the pipeline would end at the Joliet terminal in Illinois. The operations of SA-04 would result in minor permanent impacts on air quality but comparatively higher than the Applicant's proposed project, and GHG emissions could contribute to global climate change. Note that the emissions from vehicle combustion and unpaved roads have not been quantified.

Table 5.2.7-14. Estimated Operations Emissions for the System Alternative SA-04

Emission Source Description	Direct Emissions (tons per year)								Indirect Emissions (tons per year)[a]
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs	HAPs	GHGs
Pump station fugitive emissions from pumps, piping components, sump tanks, and pig traps	6.5	0.0	0.0	0.0	0.0	0.0	0.1	0.2	N/A
Mainline valve fugitive emissions from piping components	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.007	N/A
Fugitive emissions from unpaved roads[b]	--	--	--	--	--	--	--	--	N/A
Vehicle combustion emissions[b]	--	--	--	--	--	--	--	--	N/A
Joliet terminal storage tank withdrawal losses from pipeline throughput and fugitive emissions from pumps, piping components, sump tanks, pig traps, and emergency generator	67.8	0.4	0.1	0.03	0.02	0.02	850.2	3.1	N/A
Pump stations indirect emissions from being powered by electricity from existing local electric utilities	--	--	--	--	--	--	--	--	946,670.5
TOTAL EMISSIONS	**74.5**	**0.4**	**0.1**	**0.03**	**0.02**	**0.02**	**850.3**	**3.3**	**946,670.5**

Source: Enbridge 2017.

[a] Because the projected power consumption from the pump stations and locations of pump stations are unknown, indirect GHG emissions for the 795 mile SA-04 were calculated based on 452,497 tons of CO_2e per year for the Applicant's preferred action over 380 total miles (i.e., 1,191 tons of CO_2e per year per mile).

[b] Air emissions from vehicles and unpaved roads have not been quantified for operations for SA-04.

Note:

Operations emissions are based on 16 pump stations and 52 mainline valve sites.

CO = carbon monoxide, GHGs = greenhouse gases, HAPs = hazardous air pollutants, N/A = not applicable, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compounds

"--" = Emissions not estimated.

Loss of Carbon Sequestration

Following construction of SA-04, 57 acres of previously cleared forested land could be reforested to provide a carbon sequestration (storage) reservoir. The remaining 41 acres along the permanent right-of-way would remain cleared and would not provide any future carbon sequestration. Using the same emission factor of 1.6 metric-tons of CO_2 per acre per year as used for the Applicant's proposed project, the amount of carbon that 41 acres would have sequestered is estimated at 74 tons of CO_2e per year.

Social Cost of Carbon

Table 5.2.7-15 calculates the SCC using the 3-percent discount rate for the direct and indirect GHG emissions for SA-04 over the 30-year life of the Project.

Table 5.2.7-15. Social Cost of Carbon (Fossil Greenhouse Gas Emissions) for the System Alternative SA-04 (in 2007 dollars)

Year	30-Year SCC for Direct GHG Emissions[a]	30-Year SCC for Indirect GHG Emissions	30-Year SCC for Direct and Indirect GHG Emissions
30-Year Project life (2020 to 2049)	$1,264,290	$1,407,581,446	$1,408,845,737

[a] Estimate does not include emissions associated with lost carbon sequestration.

GHG = greenhouse gas, SCC = social cost of carbon

Life-Cycle Greenhouse Gas Emissions

Like the Applicant's proposed project, SA-04 would be part of a larger crude oil extraction, production, refining, and consumption system that is affected by changes in the availability and price of transportation to get crude oil from the point of extraction to the refineries that process the oil into refined products. Similar to the Applicant's proposed project, SA-04 could stimulate additional upstream production and downstream consumption, or it could simply displace existing supplies of crude oil to the market. The possible outcomes and associated life-cycle GHG emissions for SA-04 are the same as those described in Section 5.2.7.3.1 for the Applicant's proposed project. Specifically, if no displacement occurs, system alternative SA-04 would result in 760,000 bpd of new WCSB crude entering the market, resulting in a 193 million ton CO_2e/year incremental increase in emissions. If, instead, the heavy crude transported on this line displaced lighter crude, for example the 390,000 bpd of WCSB light crude that the existing Line 3 provides to market as well as 370,000 bpd of another light crude (U.S. light tight), the result would be a 35 million ton CO_2e/year incremental increase in emissions. If the heavy crude transported on SA-04 displaced other heavy Canadian crude (market-wide supply and demand are unaffected by the Project), no change in upstream and downstream emissions would occur. Using the SCC estimates described above, the 30-year cost associated with the Project life-cycle emissions could range up to $120 billion.

5.2.7.3.4 Transportation by Rail

Construction Impacts

In order to transport crude oil via rail, temporary storage and offloading facilities likely would need to be constructed in Clearbrook and Superior. Air quality impacts associated with construction of the facilities would include emissions from fugitive dust and from fossil fuel-fired construction equipment. Although these emissions have not been quantified, construction is a temporary activity and associated air emissions likely would be negligible, localized, and intermittent.

Stored Carbon Releases

Because the specific location and configuration of temporary storage and offloading facilities are not known, the acreage of tree removal and associated release of carbon cannot be estimated. However, both the Clearbrook and Superior terminal locations are located in developed areas with limited forestation, so it was assumed that no carbon releases would be associated with construction of the storage and offloading facilities.

Operations Impacts

Transporting up to 760,000 bpd of crude oil would require up to 10 loaded trains per day (88,000 barrels for a full train of 110 tank cars). Assuming that 48 percent of the oil would be delivered to the Clearbrook terminal (129 miles one-way) and 52 percent of the oil would be delivered to the Superior terminal (355 to 382 miles one-way), total traffic is estimated to be 20,280,822,131 rail ton-miles per year (round trip loaded and empty). The emissions associated with transport of crude oil via rail are shown in Table 5.2.7-16. Note that emissions from operation of the storage and offloading facilities have not been quantified. It also should be noted that the rail route to the Superior terminal would intersect Bemidji and Brainerd, Minnesota, which were cited as having air quality conditions that were unhealthy for sensitive groups for 2 days in 2015.

Table 5.2.7-16. Estimated Operations Emissions Associated with Transportation by Rail

Facility	Direct Emissions (tons per year)						
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs
Rail combustion emissions	556.8	15,111.5	1,487.0	179.9	373.5	359.9	568,472.8

Source: Minnesota Department of Commerce 2015.

Notes:

Rail transportation emissions are calculated for 20,280,822,131 rail ton-miles per year, derived from five fully loaded trains to the Clearbrook terminal and five fully loaded trains to the Superior terminal, with empty trains on the return. The weight for a loaded train (110 tank cars at 143 tons each and 4 locomotives at 200 tons each) was estimated at 16,530 tons, and the weight of an empty train (110 tank cars at 45.5 tons each and 4 locomotives at 200 tons each) was estimated at 5,805 tons.

Air emissions for operation of storage and offloading facilities that would be required for transportation via rail have not been determined.

CO = carbon monoxide, GHG = greenhouse gas, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compounds

Loss of Carbon Sequestration

Because the specific location and configuration of temporary storage and offloading facilities are not known, the acreage of trees on forested land permanently cleared and unavailable for carbon sequestration cannot be estimated. However, both the Clearbrook and Superior terminal locations are in developed areas with limited forestation, so it was assumed that no loss of carbon sequestration would be associated with operation of the storage and offloading facilities.

Social Cost of Carbon

Using the 3-percent discount rate for the GHG emissions shown in Table 5.2.7-9 the SCC for the rail alternative over a 30-year period would be $845,248,443 (in 2007 dollars).

5.2.7.3.5 Transportation by Truck

Construction Impacts

In order to transport via truck, temporary storage and offloading facilities would likely need to be constructed in Clearbrook and Superior. Air quality impacts associated with construction of the facilities would include emissions from fugitive dust and from fossil fuel-fired construction equipment. Although these emissions have not been quantified, construction is a temporary activity and associated air emissions likely would be negligible, localized, and intermittent.

Stored Carbon Releases

Because the specific location and configuration of temporary storage and offloading facilities are not known, the acreage of tree removal and associated release of carbon cannot be estimated. However, both the Clearbrook and Superior terminal locations are in developed areas with limited forestation, so it was assumed that no carbon releases would be associated with construction of the storage and offloading facilities.

Operations Impacts

Absent a pipeline, transporting up to 760,000 bpd of crude oil would require up to 4,000 loaded tanker trucks per day and 4,000 returning empty tanker trucks per day (190 barrels per truck). Assuming that 48 percent of the oil would be delivered to the Clearbrook terminal (179 miles one-way) and 52 percent of the oil would be delivered to the Superior terminal (360 miles one-way), total traffic is estimated at 797,802,400 truck miles per year. Table 5.2.7-17 quantifies the operations emissions associated with transport of crude oil via truck. Note that emissions from operation of the facilities (loading and offloading) have not been quantified. It also should be noted that the truck route from the Gretna pump station to the Superior terminal goes through Duluth, Minnesota, which is designated as a maintenance area with respect to CO emissions (8-hour and 1-hour ambient air quality standards) and which has been cited for 2 days in 2015 for having air quality conditions that were unhealthy to sensitive groups. The truck route to the Superior terminal would also intersect Bemidji, Minnesota, which also was cited as having air quality conditions that were unhealthy for sensitive groups for 2 days in 2015.

Table 5.2.7-17. Estimated Operations Emissions Associated with Transportation by Truck

Facility	Direct Emissions (tons per year)						
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs
Truck combustion emissions	1,825.6	5,647.3	8,987.0	17.1	98.1	93.8	1,506,291.3
Fugitive emissions from paved roads	0.0	0.0	0.0	0.0	30,441.7	7,464.3	0.0
TOTAL EMISSIONS	**1,825.6**	**5,647.3**	**8,987.0**	**17.1**	**30,509.8**	**7,558.1**	**1,506,291.3**

Source: Minnesota Department of Commerce 2015.

Notes:

Truck transportation emissions are calculated for 797,802,400 truck miles per year, derived from 1,920 round trips to the Clearbrook terminal and 2,080 round trips to the Superior terminal each day.

Air emissions for operation of storage and offloading facilities that would be required for transportation via truck have not been determined.

CO = carbon monoxide, GHG = greenhouse gas, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compound

Loss of Carbon Sequestration

Because the specific location and configuration of temporary storage and offloading facilities are not known, the acreage of trees on forested land permanently cleared and unavailable for carbon sequestration cannot be estimated. However, both the Clearbrook and Superior terminal locations are in developed areas with limited forestation, so it was assumed that no loss of carbon sequestration would be associated with operation of the storage and offloading facilities.

Social Cost of Carbon

Using the 3-percent discount rate for the GHG emissions over a 30-year period, the SCC for the truck alternative would be $2,239,668,011 (in 2007 dollars).

Life-Cycle Greenhouse Gas Emissions

In this EIS the analysis of alternative transportation modes (train and by truck) assumes demand exists and is driving the use of these alternative modes of transport. Under this assumption, the alternative transport scenarios do not have the potential to stimulate upstream or downstream changes. Therefore, no change in production/consumption and associated life-cycle emissions is anticipated for these alternative transport modes.

5.2.7.3.6 Existing Line 3 Supplemented By Rail

Construction Impacts

No new construction would occur with continued use of the existing Line 3 pipeline. Impacts on air quality from construction of rail facilities would be the same as those described above for the rail alternative.

Operations Impacts

Under this alternative, the operations impacts would be identical to those described above for the continued use of existing Line 3 combined with approximately half of the emissions for the rail alternative because the number of train transits would be reduced as shown in Table 5.2.7-18.

Table 5.2.7-18. Estimated Operations Emissions Associated with Continued Use of Existing Line 3 Supplemented by Rail

Facility	Direct Emissions (tons per year)						
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs
Continued use of existing Line 3[a]	--	--	--	--	--	--	--
Transportation by rail[b]	278.4	7,555.8	743.5	90.0	186.7	179.9	284,236.4
TOTAL EMISSIONS	**278.4**	**7,555.8**	**743.5**	**90.0**	**186.7**	**179.9**	**284,236.4**

Notes:

[a] Air emissions associated with integrity digs for continued use of existing Line 3 have not been quantified.

[b] Air emissions associated with rail transportation are calculated at half of the emissions of the rail alternative; note that air emissions for operation of storage and offloading facilities that would be required for transportation via rail have not been determined.

CO = carbon monoxide, GHG = greenhouse gas, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compound

"--" = Emissions not estimated.

Social Cost of Carbon

Using the 3-percent discount rate for the GHG emissions over a 30-year period, the SCC for the truck alternative would be $422,624,221 (in 2007 dollars).

Life-Cycle Greenhouse Gas Emissions

In this EIS the analysis of alternative transportation modes (train and by truck) assumes demand exists and is driving the use of these alternative modes of transport. Under this assumption, the alternative transport scenarios do not have the potential to stimulate upstream or downstream changes. Therefore, no change in production/consumption and associated life-cycle emissions is anticipated for these alternative transport modes.

Continued use of existing Line 3 would not induce upstream or downstream changes in emissions. Current, baseline level of life-cycle emissions for existing Line 3 are provided in Table 5.2.7-12.

5.2.7.3.7 Existing Line 3 Supplemented By Truck

Construction Impacts

No new construction would occur with continued use of the existing Line 3 pipeline. Impacts on air quality from construction of truck facilities would be the same as those described above for the transportation by truck alternative.

Operations Impacts

Under this alternative, the impacts would be identical to those described above for the continued use of existing Line 3 combined with approximately half of the emissions for the truck alternative because the number of truck transits would be reduced as shown in Table 5.2.7-19.

Table 5.2.7-19. Estimated Operations Emissions Associated with Continued Use of Existing Line 3 Supplemented by Truck

Facility	Direct Emissions (tons per year)						
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs
Continued use of existing Line 3[a]	--	--	--	--	--	--	--
Transportation by truck[b]	912.8	2,823.6	4,493.5	8.5	15,254.9	3,799.1	753,145.6
TOTAL EMISSIONS	**912.8**	**2,823.6**	**4,493.5**	**8.5**	**15,254.9**	**3,799.1**	**753,145.6**

[a] Air emissions associated with integrity digs for continued use of existing Line 3 have not been quantified.

[b] Air emissions associated with truck transportation are calculated at half of the emissions of the truck alternative; note that air emissions for operation of storage and offloading facilities that would be required for transportation via truck have not been determined.

CO = carbon monoxide, GHG = greenhouse gas, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compound

"--" = Emissions not estimated.

Social Cost of Carbon

Using the 3-percent discount rate for the GHG emissions over a 30-year period, the SCC for the truck alternative would be $1,119,833,958 (in 2007 dollars).

Life-Cycle Greenhouse Gas Emissions

In this EIS the analysis of alternative transportation modes (train and by truck) assumes demand exists and is driving the use of these alternative modes of transport. Under this assumption, the alternative transport scenarios do not have the potential to stimulate upstream or downstream changes. Therefore, no change in production/consumption and associated life-cycle emissions is anticipated for these alternative transport modes.

Continued use of existing Line 3 would not induce upstream or downstream changes in emissions. Current, baseline level of life-cycle emissions for existing Line 3 are provided in Table 5.2.7-12.

5.2.7.4 Summary and Mitigation

5.2.7.4.1 Summary

Overall construction impacts on air quality would be minor, localized, and intermittent and temporary for the Applicant's proposed project and SA-04. This is primarily due to the nature of pipeline construction where the construction activity moves along the pipeline route, thus limiting the exposure of residents and resources in any one area. Construction impacts on air quality due to rail or truck storage and offloading facilities in Clearbrook and Superior would be temporary and negligible. Finally, there are no predicted construction air quality impacts associated with continued use of the existing Line 3 because no construction would be required.

Table 5.2.7-20 provides the construction emissions (for those that can be quantified) for the Applicant's proposed project and the CN Alternatives. When comparing the Applicant's proposed project and SA-04, SA-04 would generate approximately twice the total amount of construction emissions than the Applicant's proposed project because it is twice as long. However, emission rates at any specific location would be the same for either route.

Table 5.2.7-20. Construction Emissions for the Applicant's Proposed Project and Certificate of Need Alternatives

Route/Certificate of Need Alternative	Direct Emissions (tons)							Stored Carbon Releases (tons)
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs	GHGs
Applicant's proposed project	67.7	880.8	2,863.3	9.8	697.3	329.6	181,552.0	85,658
Continued use of existing Line 3[a]	--	--	--	--	--	--	--	--
System alternative SA-04	145.1	1,887.0	6,135.0	21.0	1,494.3	706.4	389,040.0	12,033.1
Transportation by rail[b]	--	--	--	--	--	--	--	--

Table 5.2.7-20. Construction Emissions for the Applicant's Proposed Project and Certificate of Need Alternatives

Route/Certificate of Need Alternative	Direct Emissions (tons)							Stored Carbon Releases (tons)
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs	GHGs
Transportation by truck[b]	--	--	--	--	--	--	--	--
Continued use of existing Line 3 supplemented by rail[b]	--	--	--	--	--	--	--	--
Continued use of existing Line 3 supplemented by truck[b]	--	--	--	--	--	--	--	--

[a] No construction emissions would be associated with continued operation of the existing Line 3.

[b] Construction emissions associated with building rail and truck storage and offloading facilities have not been quantified.

CO = carbon monoxide, GHGs = greenhouse gases, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SO_2 = sulfur dioxide, VOCs = volatile organic compounds

"--" = Emissions not estimated.

During construction, both the Applicant's proposed project and SA-04 would require removal of trees that, when removed, would release GHGs. The Applicant's proposed project would affect more forested lands than SA-04 and thus would release more GHGs. The rail and truck alternatives would be expected to require very little to no tree removal for construction of storage and offloading facilities, and thus would not be expected to release GHGs. Because continued use of the existing Line 3 would involve no construction, it would not affect trees or their potential to release GHGs.

Air quality impacts during operations of the Applicant's proposed project and CN Alternatives would all be minor and permanent, with the exception of continued use of the existing Line 3. Continued use of existing Line 3 would result in air emissions from the ongoing integrity program; the impacts on air quality would be negligible to minor and long term. Overall, air quality impacts from continued use of existing Line 3 would be less than other alternatives because it is already in operation and no new pumping capacity would be installed.

Table 5.2.7-21 presents the operations emissions (for those that can be quantified) for the Applicant's proposed project and CN Alternatives. For the pipeline alternatives, the table includes indirect GHG emissions from electricity purchased for operation of the pump stations and the associated SCC for direct and indirect GHG emissions. When comparing the Applicant's proposed project and the other CN Alternatives, the Applicant's proposed project would generate the least direct air emissions along the Project route (pipeline route right-of-way or transportation route) and would have the least effect on air quality. Direct air emissions for rail and truck transportation would be significantly higher along the rail and truck routes than those for the pipeline routes. Because the pipeline alternatives would use electric power pumps for pipeline operation, as does existing Line 3, no significant new point source emissions for power generation would be created for the Applicant's proposed project, SA-04, or continued use of existing Line 3. Instead, generation of electricity to operate the pumps would be spread through the state's existing local electric utility grid. Other emissions during operations of the pipeline alternatives would consist of small, limited sources. Because SA-04 is significantly longer than the Applicant's proposed project, the total energy requirements and related emissions are more than double.

It should be noted that, under normal circumstances, air emissions from additional truck traffic on interstate freeways would be unlikely to decrease local air quality. However, during inclement weather conditions, where traffic delays and congestion may occur, trucks idling during delays may cause temporary increases in localized pollutant concentrations. This effect also may temporarily occur in the vicinity of the Clearbrook and Superior terminals, where up to 2,080 trucks per day (truck transport alternative) would be queuing to enter the terminal and discharge their cargo. Furthermore, it is unknown how the truck traffic would affect the CO maintenance in Duluth, Minnesota.

During operations, both the Applicant's proposed project and SA-04 would require previously forested land along the permanent rights-of-way to remain cleared of trees. These trees, if not removed, would sequester GHGs. The Applicant's proposed project would affect more forested lands than SA-04 and thus would remove more sequestration potential. Although specific locations have not been identified, the rail and truck alternatives and integrity digs associated with continued use of existing Line 3 would be expected to require very little to no permanent tree removal, and thus would not affect overall sequestration.

Table 5.2.7-22 summarizes the construction- and operations-related impacts on air quality that would be expected for the Applicant's proposed project and CN Alternatives. No effects on achievement of the NAAQS would be expected to occur from operation of the Applicant's proposed project or any of the CN Alternatives, with the potential exception of truck emissions in the vicinity of the Clearbrook or Superior terminals and passing through Duluth, Minnesota. Construction and operation of the Applicant's proposed project and CN Alternatives would directly contribute to global GHG emissions and associated climate change, which collectively could lead to a threat to public health and welfare. For further information about the impacts of climate change, refer to Chapter 12.

5.2.7.4.2 Mitigation

Beyond the Applicant-proposed measures described above for the Applicant's proposed project, additional measures to reduce impacts on air quality could include:

- Burning small and dry brush piles only;
- Operating construction equipment as far as possible from sensitive receptors (e.g., residences, schools, and hospitals);
- Limiting construction equipment idling to the extent practical when not in use; and
- Following equipment manufacturer-recommended operations and good combustion practices, including not tampering engines to increase horsepower and using ultra-low sulfur diesel.

Further mitigation for GHG emissions could include compensatory measures such as:

- Investment in new terrestrial carbon storage programs (forest establishment, other types of vegetation restoration)

- Purchase of GHG offset credits
- Investment in renewable energy development
- Contributing resources to regional and local climate adaptation programs.

Table 5.2.7-21. Operations Emissions and Social Cost of Carbon for the Applicant's Proposed Project and Certificate of Need Alternatives

Certificate of Need Alternative	Direct Emissions (tons per year)							Indirect Emissions (tons per year)	30-Year SCC for Direct and Indirect GHG Emissions[a]	Loss of Carbon Sequestration (tons per year)
	VOCs	NOx	CO	SO_2	PM-10	PM-2.5	GHGs	GHGs		GHGs
Applicant's proposed project	21.0	0.004	0.03	0.002	0.1	0.01	375.9	452,496.6	$673,365,150	1,262.3
Continued use of existing Line 3[b]	--	--	--	--	--	--	--	--	--	--
System alternative SA-04[c]	74.5	0.4	0.1	0.03	0.02	0.02	850.3	946,670.5	$1,408,845,737	74.3
Rail alternative[d]	556.8	15,111.5	1,487.0	179.9	373.5	359.9	568,472.8	--	$845,248,443	--
Truck alternative[d]	1,825.6	5,647.3	8,987.0	17.1	30,509.8	7,558.1	1,506,291.3	--	$2,239,688,011	--
Continued use of existing Line 3 with rail[d]	278.4	7,555.8	743.5	90.0	186.7	179.9	284,236.4	--	$422,624,221	--
Continued use of existing Line 3 with truck[d]	912.8	2,823.6	4,493.5	8.5	15,254.9	3,799.1	753,145.6	--	$1,119,833,958	--

[a] Social cost of carbon is quantified in 2007 dollars.

[b] Air emissions associated with integrity digs for continued use of existing Line 3 have not been quantified.

[c] Air emissions from vehicles and unpaved roads for SA-04 have not been quantified.

[d] Air emissions for operation of storage and offloading facilities that would be required for transportation via rail or truck have not been determined.

CO = carbon monoxide, GHGs = greenhouse gases, NOx = nitrogen oxide, PM-10 = suspended particulate matter less than or equal to 10 microns in diameter, PM-2.5 = fine PM less than or equal to 2.5 microns in diameter, SCC = social cost of carbon, SO_2 = sulfur dioxide, VOCs = volatile organic compounds

"--" = Emissions not estimated.

Table 5.2.7-22. Summary of Potential Impacts on Air Quality for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Direct and indirect emissions	Temporary/minor impacts	No new impact	Temporary/minor impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts
GHGs	GHG emissions contribute to overall global climate change	No new impact	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change
Operations Impacts							
Direct and indirect emissions	Permanent/minor impacts	Temporary/ negligible impacts (*from activities associated with pipeline integrity work at any one location)* Long-term/ negligible to minor impacts *(for the integrity program)*	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts
GHGs	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change	GHG emissions contribute to overall global climate change

[a] **The individual rows in this should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on on the factors represented by the individual rows is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.**

[b] **Information in this table should be coupled with an understanding of the quanitative estimates and qualitative descriptions of impacts that are contained in the text in this section on pages 5-456 through 5-475. This table, for example, provides a general assessment of the duration and magnitude of impacts from construction emissions of criteria pollutants; however, a more complete discussion of the quantitative and qualitative impacts that could occur as a result of construction emissions of criteria pollutants is contained in the impacts discussion in the text.**

Table 5.2.7-22. Summary of Potential Impacts on Air Quality for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

[c] **The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-456 to 5-466. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[d] **Continued use of existing Line 3 will occur within the existing mainline corridor. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on page 5-466. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[e] **SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-467 to 5-470. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[f] **The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-470 to 5-471. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

[g] **The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-472 to 5-473. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.**

5.2.7.5 References

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5.3 SOCIOECONOMIC ENVIRONMENT

The states and counties crossed by the Applicant's proposed project and CN Alternatives contribute to regional and statewide economies through the production of a variety of goods and services. Project actions have the potential to positively or negatively affect these economies, or may have no or negligible effects. This section discusses the existing conditions and assesses potential Project-related impacts with respect to commodity production; recreation and tourism; and employment, income, and tax revenues.

5.3.1 Commodity Production

The primary commodities produced along the Applicant's proposed project and the CN Alternatives that would be affected by construction or operations of the Project include agricultural commodities, forestry products, and mining products. Construction of Project facilities and permanent maintenance of a cleared right-of-way and Project facilities during operations may displace some capacity for production of these commodities.

The analysis of impacts on commodity production during construction and operation of the Applicant's proposed project and CN Alternatives considered the following issues:

- Disturbance and loss of agricultural land and lost yields,
- Restrictions in agricultural commodity distribution by rail,
- Disturbance and loss of forested land and timber resources, and
- Disturbance and loss of land used for mining and commodity reserves.

The above issues do not apply to the Applicant's proposed project and each CN Alternative uniformly. Reduction in land available for agricultural, forest, and mining production primarily relates to the Applicant's proposed project and to SA-04, where extensive new pipeline construction would occur. Continued use of the existing Line 3 and transportation by rail or truck would not require construction of new right-of-way, and alternative transportation modes would affect only minimal land area for loading and offloading facilities. A summary and comparison of the impacts for the Applicant's proposed project and CN Alternatives are included at the end of the section.

5.3.1.1 Regulatory Context and Methodology

5.3.1.1.1 Regulatory Context

Commodity production is commonly regulated by state-level laws and statutes that protect agricultural, timber, and mineral resources.

North Dakota

There are no state-specific laws or statutes for forest or farmland preservation in North Dakota; however, North Dakota Century Code § 38-08 lays out the mineral rights and protection for development of minerals.

Minnesota

Several Minnesota statutes provide for the protection and management of land used to produce commodities. Minnesota Statutes § 17.80 – 17.84 set the state policy on agricultural land preservation and conservation. One of the main goals is "[…] to minimize the disruption of agricultural production in accordance with local social, economic and environmental considerations of the agricultural community." Minnesota Statute § 89.002 establishes the policies for managing forest resources of state forest lands, providing for the responsible and sustainable use of forest products. The provision for leasing State-owned lands and mineral rights for nonferrous metallic minerals and other minerals, other than iron ore, is found in Minnesota Statutes § 93.25. Furthermore, state-owned lands and mineral rights administered by the Commissioner of Natural Resources may be leased to remove sand, gravel, clay, rock, marl, peat, and black dirt under Minnesota Statute § 92.50.

Iowa

Iowa Statute § 352.5 establishes methods for preserving agricultural lands for agricultural production, while Iowa Statute § 479B.20 establishes land restoration standards for agricultural lands both during and after pipeline construction. Iowa Statute § 427C.2 sets forth the procedures for establishing a forest reservation. Iowa Administrative Code 208 "provides for the reclamation and conservation of land affected by the mining of gypsum, clay, stone, sand, gravel, or other ores or mineral solids, except coal, and thereby to preserve natural resources, protect and perpetuate the taxable value of property, and protect and promote the health, safety, and general welfare of the people of this state."

Illinois

In Illinois, the Farmland Preservation Act establishes procedures whereby the Illinois Agriculture Department works with other state agencies, planning commissions, and county governments to help reduce the extent to which farmland is affected by conversion or development. Department policy is not designed to limit or stop development, but to minimize its impact on agricultural land—both in terms of acres lost and secondary impacts that may adversely affect farming operations. In addition, Illinois Compiled Statutes § 505.2 sets forth "the policy of the State to conserve, protect and to encourage the development and improvement of its agricultural lands for the production of food and other agricultural products." Illinois Compiled Statutes § 1537.2 establishes the procedures through which forests are managed, and Illinois DNR manages active mineral leases through Illinois Compiled Statutes § 67.1700.

Wisconsin

Wisconsin Statutes § 91.01 – 91.86 set the state policy on agricultural land preservation and conservation. Section 26.35 identifies privately owned forests that are likely to produce highly valued timber products, and Section 26.42 establishes a "forestry diversification program [that] shall promote and assist the development and use of industrial and commercial products from forestry products." Mining and mineral rights are administered under Wisconsin Statutes § 107.00 – 1107.25.

5.3.1.1.2 Methodology

The ROI for the analysis of impacts on commodities consists of all land currently used in the production of agricultural, timber, or mineral products—or land with the potential to be used for these purposes—that could be disturbed or removed from production by the Applicant's proposed project and CN Alternatives in North Dakota, Minnesota, Iowa, Illinois, and Wisconsin. This includes the permanent pipeline right-of-way and the construction work area. Impacts on commodity production were evaluated by:

- Using GIS data resources to identify and inventory all land in the ROI currently being used, or with the potential to be used, in the production of agricultural, timber, or mineral production in the counties crossed by the Applicant's proposed project and CN Alternatives.
- Construction and operations impacts for the Applicant's proposed project were estimated by overlaying construction and operations footprints provided by the Applicant on GIS layers of commodity production lands. While integrity digs and subsequent pipeline repair activities would likely occur during the lifespan of the Applicant's proposed project as standard operation and maintenance activities, these activities have not been factored in as they are not imminent in the foreseeable future.
- Construction and operations impacts from continued use of the existing Line 3 pipeline were qualitatively addressed along the existing Line 3 right-of-way for integrity digs and subsequent pipeline repair, and the potential for these actions to occur on commodity production land, especially agricultural land.
- Temporary construction impacts for system alternative SA-04 were estimated by overlaying a standardized 120-foot-wide construction work area centered on SA-04. Operations impacts were estimated by overlaying a standardized 50-foot-wide permanent right-of-way centered on SA-04 on GIS layers of commodity production lands.
- Although the precise routes and facility locations for the rail and truck alternatives are not known, construction and operations impacts for the rail and truck alternatives were qualitatively evaluated based on commodity production lands in the vicinity of the Clearbrook and Superior terminals, where offloading facilities would likely be constructed, and assumptions on the routes that trains and trucks may use to transport oil to those terminals (Figure 4.2-2).
- For the acreages of land identified for each commodity type that would be disturbed or lost, a range of estimates of lost yield and market value of the affected commodities (where applicable) was provided, along with a qualitative statement on the duration and magnitude of impacts on the productivity of commodity lands associated with construction and operation of the Applicant's proposed project and the CN Alternatives.

Various state and federal database layers were obtained to identify agricultural land, forested land, and mineral resources. Acreages of agricultural and forested lands were obtained using the NLCD 2011 Classification System (Homer et al. 2015). Acreages of farmland soil were obtained using the NRCS database to identify prime farmland and farmlands of statewide importance (NRCS 2011). For mining, acreages of active lease land and acreages of land with potential sand and gravel deposits were obtained from Minnesota DNR and USGS. Based on the geographic extent of impacts on the land used in the production of each commodity, a qualitative assessment of the relative magnitude (i.e., negligible, minor, or major) and duration (temporary, short term, or long term) of the impacts in terms from disturbance/loss of agricultural, timber, and mining lands is provided.

No single dataset provides a complete indication of all relevant impacts to commodity production, but together the various datasets used in this section provide a reasonably comprehensive indication of the potential impacts. For example, NRCS data was used to assess acreage of farmland soil impacted. While this dataset provides an indication of potential impacts to land with current and future

agricultural value, it does not provide an indication of the type and extent of actual cultivation underway and must be considered in conjunction with crop production data to determine the specific impacts to agricultural commodity production.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with an understanding of the qualitative descriptions of impacts that are contained in the text in this section. Tables in this section provide counts, for example, of miles and acres of land used for commodities production crossed; however, a more complete discussion of the qualitative nature of impacts that could occur to different types of commodities is contained in the text of this section.

5.3.1.2 Existing Conditions

Agricultural land is defined in this EIS as cultivated cropland and grassland, and includes activities such as crop harvesting, livestock grazing, dairy production, and organic farming. It also includes land with areas of soils that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, i.e., "prime farmland" as defined by the U.S. Department of Agriculture Natural Resource Conservation Service.; or areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods (i.e., farmland of statewide importance). Collectively, these soils are referred to as "farmland soils." Farmland soils can include agricultural land as defined above or land that is not currently being used for agricultural production but has high potential for future productivity.

Commercially productive forested land is land that is actively managed for the sustainable harvest of timber and includes the following land cover types: deciduous, evergreen, and mixed forest. This land is currently being used in the production of timber or has timber resources that could be harvested in the future. The forest industry is an important part of the economies of Minnesota and Wisconsin. In Minnesota, the forest industry provided 86,775 jobs and had an output of $17.1 billion in 2011 (Minnesota DNR 2011). In Wisconsin, the forest industry provided more than 64,000 jobs and had an output of $24.7 billion in 2014 (Wisconsin DNR 2014).

Mineral resources in the states that would be crossed by the Applicant's proposed project and CN Alternatives include non-metallic (e.g., sand, gravel, and crushed stone) and metallic minerals (e.g., iron ore, nickel, and titanium). Access to reliable transportation for export of commodities produced in Minnesota and its neighboring states is also critical to achieving the highest economic yield for the commodities produced.

5.3.1.2.1 Applicant's Proposed Project

Agricultural Land

Table 5.3.1-1 presents the agricultural land and soil characterized as prime farmland or farmland of statewide significance located within the ROI for the Applicant's proposed project. The construction work area includes approximately 2,150 acres classified as prime farmland or farmland of statewide importance and approximately 2,284 acres classified as agricultural land. An additional approximately 487 acres of farmland soil and 554 acres of agricultural land are within the footprint of ATWS, access roads, valve sites, and pump stations. As the designation is based on soil characteristics and not land use, some of the farmland soil may be in active production, while some may not be actively farmed. In total, approximately 2,636 acres of farmland soil, and 2,838 acres of agricultural land are located within the ROI for the Applicant's proposed project (Table 5.3.1-1).

To illustrate this acreage in terms of market value, Table 5.3.1-2 presents the total dollar value ($2016 thousands) of the yield (i.e., the average yield per acre per year multiplied by the acres crossed) by crop type. In total, the market value of the crops that could be grown on affected lands for the Applicant's proposed project is approximately $938,000 (including footprints for the ATWS, pump stations, valve sites, and access roads).

Forested Land

Table 5.3.1-3 presents the total acres of forested land crossed by the Applicant's proposed project. In total, approximately 1,859 acres of forested land is present within the ROI for the Applicant's proposed project (including footprints for the ATWS, pump stations, valve sites, and access roads).

Table 5.3.1-4 presents the current market value of the timber within the ROI for the Applicant's proposed project, which is approximately $354,000 based on the assumption that an acre of forested land produces 7.8 cords of wood and the average value per cord across all species is $24.40 (USFS 2008; Minnesota DNR 2008).

Table 5.3.1-1. Agricultural Land and Farmland Soils Crossed by the Applicant's Proposed Project (acres)

Agricultural Land Type	North Dakota[a]		Minnesota[b]		Wisconsin[a]		Construction Work Area Subtotal		ATWS	Temp. Access Roads	Perm. Access Roads	Pump Stations	Valves[c]	Total[d]	
	Con	Op	Con	Op	Con	Op	Con	Op						Con	Op
Agricultural Land															
Cultivated crops	363	151	1336	575	<1	<1	1699	726	327	2	20	20	2	2,070	768
Grass/pasture-land	5	2	577	259	3	1	585	262	121	1	45	16	1	768	323
Agricultural land total	**368**	**153**	**1,913**	**833**	**3**	**1**	**2,284**	**988**	**448**	**3**	**65**	**36**	**3**	**2,838**	**1,092**
Farmland															
Prime farmland	122	51	862	378	0	0	984	429	181	8	60	4	1	1,238	495
Farmland of statewide importance	4	2	1046	455	116	48	1,165	505	134	12	67	17	3	1398	592
Farmland soils total	**126**	**53**	**1,907**	**833**	**116**	**48**	**2,150**	**934**	**315**	**19**	**127**	**21**	**4**	**2,636**	**1,087**

Sources: Homer et al. 2015 for agricultural land; NRCS 2011 for prime farmland and farmland of statewide importance.

[a] Con = 120-foot-wide construction footprint, Op = 50-foot-wide permanent right-of-way.

[b] Enbridge-provided footprints: Con = construction work area, Op = operations right-of-way.

[c] Includes valve sites and valve driveways. Since valve sites are within the permanent right-of-way, total Project impacts may be slightly overestimated due to double counting.

[d] Con = sum of pipeline construction work area, additional temporary workspaces (ATWS), pump stations, valves, and temporary and permanent access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, valves, and pump stations.

Note:

Values in the table may not sum to subtotals and totals due to rounding.

ATWS = additional temporary workspace; Con = construction work area; Op = operations permanent right-of-way

Table 5.3.1-2. Market Value of Crops Crossed by the Applicant's Proposed Project ($2016 thousands)

Crop Type	North Dakota		Minnesota		Wisconsin		Construction Work Area Subtotal		ATWS	Temp Access Roads	Perm Access Roads	Pump Stations	Valves	Total[c]	
	Con	Op	Con	Op	Con	Op	Con	Op						Con	Op
Alfalfa	$0.0	$0.0	$49.1	$21.9	$0.0	$0.0	$49.1	$21.9	$6.3	$0.1	$2.7	$2.6	$0.3	$61.1	$27.5
Barley	$4.6	$2.0	$6.7	$2.7	$0.0	$0.0	$11.3	$4.7	$1.5	$0.0	$0.0	$1.6	$0.2	$14.6	$6.5
Buckwheat	$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
Corn	$12.6	$5.1	$59.7	$25.3	$0.1	$0.1	$72.4	$30.5	$10.9	$0.1	$0.6	$0.2	$3.0	$87.3	$34.3
Dry beans	$5.4	$2.2	$33.6	$14.3	$0.0	$0.0	$39.0	$16.5	$2.9	$0.2	$2.0	$0.2	$1.2	$45.5	$19.9
Oats	$0.4	$0.1	$1.6	$0.7	$0.0	$0.0	$2.0	$0.8	$0.1	$0.0	$0.2	$0.2	$0.1	$2.5	$1.3
Other hay/ non alfalfa	$0.1	$0.0	$7.3	$3.2	$0.0	$0.0	$7.4	$3.2	$0.7	$0.0	$0.4	$0.1	$2.3	$10.9	$6.1
Potatoes	$0.0	$0.0	$31.0	$11.5	$0.0	$0.0	$31.0	$11.5	$7.7	$0.0	$1.2	$0.0	$0.0	$39.9	$12.7
Rye	$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
Soybeans	$47.7	$19.9	$253.8	$108.7	$0.0	$0.0	$301.5	$128.6	$37.3	$0.0	$3.2	$2.4	$32.8	$377.2	$166.8
Spring wheat	$23.8	$9.9	$96.6	$41.1	$0.0	$0.0	$120.4	$51.0	$20.9	$0.0	$1.1	$0.4	$1.2	$144.1	$53.8
Sugarbeets	$23.7	$9.9	$92.6	$37.3	$0.0	$0.0	$116.3	$47.2	$22.3	$0.0	$0.2	$0.3	$0.6	$139.6	$48.3
Sunflower	$2.4	$1.0	$4.7	$1.9	$0.0	$0.0	$7.1	$2.9	$1.1	$0.0	$0.0	$0.0	$0.1	$8.3	$3.1
Winter wheat	$0.0	$0.0	$6.3	$2.8	$0.0	$0.0	$6.3	$2.8	$0.8	$0.0	$0.1	$0.0	$0.0	$7.2	$2.9
TOTAL	**$120.7**	**$50.2**	**$642.9**	**$271.4**	**$0.2**	**$0.1**	**$763.8**	**$321.7**	**$112.6**	**$0.5**	**$11.6**	**$8.1**	**$41.7**	**$938.2**	**$383.0**

Source: U.S. Department of Agriculture, National Agricultural Statistical Service 2016.

Note:

Values in the table may not sum to subtotals and totals due to rounding.

ATWS = additional temporary workspace; Con = construction work area; Op = operations permanent right-of-way

Table 5.3.1-3. Forested Land Crossed by the Applicant's Proposed Project (acres)

Forested Land Type	North Dakota		Minnesota		Wisconsin		Construction Work Area Subtotal		ATWS	Temp Access Roads	Perm Access Roads	Pump Stations	Valves	Total[c]	
	Con	Op	Con	Op	Con	Op	Con	Op						Con	Op
Deciduous forest	2	1	1,349	594	65	28	1,416	622	97	31	73	2	2	1,621	699
Evergreen forest	1	0	176	71	1	0	177	71	18	4	15	1	1	215	88
Mixed forest	0	0	18	8	1	1	19	8	1	0	2	0	0	23	10
TOTAL	**3**	**1**	**1,543**	**673**	**67**	**29**	**1,612**	**701**	**116**	**35**	**89**	**3**	**3**	**1,859**	**797**

Source: Homer et al. 2015.

ATWS = additional temporary workspace; Con = construction work area; Op = operations permanent right-of-way

Table 5.3.1-4. Market Value of Forested Land Crossed by the Applicant's Proposed Project ($2016 thousands)

Forested Land	North Dakota		Minnesota		Wisconsin		Construction Work Area Subtotal		ATWS	Temp Access Roads	Perm Access Road	Pump Stations	Valves	Total	
	Con	Op	Con	Op	Con	Op	Con	Op						Con	Op
Deciduous forest	$0.3	$0.1	$257.2	$113.2	$12.4	$5.2	$269.8	$118.6	$18.4	$5.9	$13.8	$0.5	$0.4	$308.9	$133.2
Evergreen forest	$0.1	$0.1	$33.5	$13.5	$0.2	$0.1	$33.8	$13.6	$3.5	$0.7	$2.8	$0.1	$0.1	$41.0	$16.6
Mixed forest	$0.0	$0.0	$3.5	$1.5	$0.1	$0.1	$3.6	$1.6	$0.3	$0.0	$0.4	$0.0	$0.0	$4.3	$2.0
TOTAL	**$0.4**	**$0.2**	**$294.1**	**$128.2**	**$12.7**	**$5.4**	**$307.2**	**$133.8**	**$22.2**	**$6.7**	**$17.0**	**$0.6**	**$0.5**	**$354.2**	**$151.8**

Sources: Minnesota DNR 2008; USFS 2008.

ATWS = additional temporary workspace; Con = construction work area; Op = operations permanent right-of-way

Mineral Lands

Table 5.3.1-5 presents the total estimated acres of land with active mining areas within the ROI for the Applicant's proposed project. Table 5.3.1-6 presents the acres that contain undeveloped sand, gravel, and mineral resources. These resources include glacial lake sediments with potential commercially important deposits of sand and gravel. Less than 1 acre of land within active mineral areas is located within the ROI in Minnesota, and no land within active mineral areas are located within the ROI in North Dakota or Wisconsin.

In total, approximately 513 acres of land with potentially valuable sand and gravel resources is located within the ROI for the Applicant's proposed project (including footprints for the ATWS, pump stations, valve sites, and access roads) (Table 5.3.1-6).

Table 5.3.1-5. Active Mineral Leases within ROI of the Applicant's Proposed Project (acres)

Name	North Dakota		Minnesota		Wisconsin		Applicant's Proposed Project Total	
	Con	Op	Con	Op	Con	Op	Con	Op
Active metallic and non-metallic leases	0.0	0.0	0.5	<0.1	0.0	0.0	0.5	<0.1

Source: Minnesota DNR 2016.

Con = construction work area; Op = operations permanent right-of-way

Table 5.3.1-6. Land with Potential Sand and Gravel Resources within ROI of the Applicant's Proposed Project (acres)

Resource Type	North Dakota		Minnesota		Wisconsin		Construction Work Area Subtotal		ATWS	Temp Access	Perm Access Roads	Pump Stations	Valves	Total	
	Con	Op	Con	Op	Con	Op	Con	Op						Con	Op
Glacial lake sediment (sand and gravel) total	0	0	442	191	0	0	442	191	63	0.0	7	0	1	513	200

Source: USGS 2006.

ATWS = additional temporary workspace; Con = construction work area; Op = operations permanent right-of-way

5.3.1.2.2 Continued Use of Existing Line 3

The existing Line 3 permanent right-of-way includes approximately 752 acres of active agricultural land (cropland and grass/pastures) but does not contain any timber commodities, as trees are not permitted within pipeline permanent right-of-way. Similarly, mining is not permitted in the permanent right-of-way for the existing Line 3 pipeline.

5.3.1.2.3 System Alternative SA-04

Agricultural Land

Table 5.3.1-7 presents the agricultural land crossed by system alternative SA-04. In total, approximately 10,155 acres of agricultural land within the ROI and 4,281 acres of agricultural land within the anticipated permanent right-of-way is currently devoted to agricultural production. Approximately 5,167 acres of farmland soil is within the ROI and approximately 2,156 acres of farmland soil are located within the permanent right-of-way. Farmland soil may or may not be in active production of agricultural goods.

Table 5.3.1-7. Agricultural Land Crossed by System Alternative SA-04 (acres)

Land/Soil Type	Construction Work Area	Permanent Right-of-Way
Cultivated crops	10,051	4,210
Grass/pastureland	104	72
Agricultural land total	**10,155**	**4,281**
Prime farmland	4,479	1,868
Farmland of statewide importance	688	287
Farmland soil total	**5,167**	**2,155**

Sources: Homer et al. 2015 for agricultural lands; NRCS 2011 for prime farmland and farmland of statewide importance

Note:

Impacts on agricultural land resulting from access roads, additional temporary workspaces (ATWS), and valve information is not included because the exact location of these facilities has not been determined for SA-04

Table 5.3.1-8 presents the total dollar value of the recent annual yield (i.e., the average yield per acre per year multiplied by the acres crossed) by crop type. In total, crops in the construction work area for system alternative SA-04 provide a total market value of approximately $5.2 million, with the majority (83 percent) coming from corn and soybean production. The current total market value of the yield of crops within the permanent right-of-way for SA-04 is approximately $2.1 million (Table 5.3.1-8).

Table 5.3.1-8. Market Value of Crops Crossed by System Alternative SA-04 ($2016)

Crop Type	Construction Work Area	Permanent Right-of-Way
Alfalfa	$22,209	$9,229
Barley	$21,498	$9,361
Corn	$2,599,370	$1,084,209
Dry beans	$129,445	$55,644
Durum wheat	$19	$8
Oats	$1,240	$493
Potatoes	$48,373	$20,161
Soybeans	$1,576,581	$659,211
Spring wheat	$155,902	$65,680
Sugarbeets	$434,946	$181,921
Sunflower	$18,506	$7,769
Winter wheat	$2,265	$984

Table 5.3.1-8. Market Value of Crops Crossed by System Alternative SA-04 ($2016)

Crop Type	Construction Work Area	Permanent Right-of-Way
TOTAL	**$5,010,355**	**$2,094,674**

Source: U.S. Department of Agriculture, National Agricultural Statistical Service 2016.

Forested Land

Table 5.3.1-9 presents the total acres of forested land in the construction work area for SA-04. Nearly all of the approximately 99 acres of forested land in the construction work area is deciduous forest (i.e., maple, many oaks, and elm, aspen, and birch). Approximately 40 acres of forested land would be located within the permanent right-of-way for SA-04.

Table 5.3.1-9. Forested Land Crossed by System Alternative SA-04 (acres)

Forest Land Type	Construction Work Area	Permanent Right-of-Way
Deciduous forest	97	40
Evergreen forest	1	<1
Mixed forest	1	<1
TOTAL	**99**	**40**

Source: Homer et al. 2015.

Table 5.3.1-10 presents the current market value of the timber within the construction work area for SA-04, which is approximately $19,000. This is based on the assumption that an acre of forested land produces 7.8 cords of wood and the average value per cord across all species is $24.40 (USFS 2008; Minnesota DNR 2008).

Table 5.3.1-10. Market Value of Forested Land Crossed by System Alternative SA-04 ($2016)

Forest Land Type	Construction Work Area[a]	Permanent Right-of-Way[b]
Deciduous forest	$18,450	$7,662
Evergreen forest	$133	$57
Mixed forest	$133	$57
TOTAL	**$18,717**	**$7,776**

Source: Homer et al. 2015.

[a] 120-foot-wide construction footprint

[b] 50-foot-wide permanent right-of-way

Note:

Assumes that an acre of forested land produces 7.8 cords of wood and the average value per cord across all species is $24.40

Mineral Lands

No land with active mineral areas is located within the construction work area for SA-04 in Minnesota or Illinois. Approximately 31 acres of land with known oil and gas resources present ("trust land"), occurs in the construction work area for SA-04 in North Dakota. In Iowa, 0.4 acre of land with active coal mining is located in the construction work area for SA-04, along with 2,393 acres of land with potential sand and gravel resources (USGS 2006), of which 840 acres is located within the permanent right-of-way.

5.3.1.2.4 Transportation by Rail

While no specific rail transport lines/locations have been identified, some agricultural and forested lands are present in the immediate vicinity of the Clearbrook and Superior terminals that could be affected by construction of rail offloading facilities. No active mines are in the immediate vicinity of the Clearbrook or Superior terminals.

The existing rail system currently carries approximately 25 percent by weight and value of all freight transiting through Minnesota (MNDOT 2015, Figure B.1 Mode Share by Weight and B.2 Mode Share by Value). This includes unit train crude oil shipments from the Bakken Oil fields to the Twin Cities area (on the order of 39 trains weekly on Burlington Northern Santa Fe) and shipments from Canadian sources. Crude oil shipments are only one type of commodity that relies on rail transportation; general freight, food and farm products, chemicals, equipment, metallic ores, coal, metallic products, and hazardous materials are routinely shipped by rail.

Farm product commodities are a significant component of state rail freight traffic. Approximately 4 million tons entered Minnesota in 2012, and these shipments are forecasted to approximately double to 8 million tons by 2040. Farm products outbound from Minnesota by rail likewise are expected to increase between 2012 and 2040, growing from 12 million to approximately 26 million tons (MNDOT 2015, Figure B.1). Overall, commodity transportation by rail is expected to grow from its current level of approximately 250 million tons per year in 2012 to approximately 470 million tons per year in 2040. By 2040, farm products are forecasted to be the largest outbound commodity class by weight (MNDOT 2015, Figure B.1).

Among all commodity types shipped by rail, grain commodities are particularly sensitive to the availability of rail transportation. Grain shipments must be scheduled to consider cyclical factors, including harvest periods, storage, and international market prices, to maximize economic yield. Competition with other commodities for rail capacity and congestion in the rail system can affect commodity shipments and economic yield.

5.3.1.2.5 Transportation by Truck

While no specific locations have been identified, some agricultural and forested lands are present in the immediate vicinity of new truck offloading facilities and associated road access at the Clearbrook and Superior terminals. No active mines are present in the immediate vicinity of the Clearbrook or Superior terminals.

5.3.1.2.6 Existing Line 3 Supplemented by Rail

The existing conditions for continued use of existing Line 3 supplemented by rail are identical to those described for continued use of the existing Line 3 pipeline and the rail alternative.

5.3.1.2.7 Existing Line 3 Supplemented by Truck

The existing conditions for continued use of existing Line 3 supplemented by truck are identical to those described for continued use of the existing Line 3 pipeline and the truck alternative.

5.3.1.3 Impact Assessment

Potential impacts on land used in the production of commodities from construction and operation of the Applicant's proposed project and CN Alternatives include impacts on agricultural productivity and commercial forestry through the loss of both current and future productivity from removal of crops, disruption of farmland soils, and clearing of trees. This also could affect the corresponding economies, depending on the total market value of the commodities lost and the overall size of the relevant commodity market in the counties crossed. Land that is currently being mined for mineral resources could temporarily be disrupted during construction, and land containing undeveloped potential mineral resources would not be accessible within the permanent right-of-way. The extent and magnitude of these impacts are influenced by the overall geographic scope of the impact and whether the land would recover or be available for future production. Use of the regional rail system to transport crude oil also may affect distribution of commodities to regional distribution points.

The duration of potential Project impacts on commodity production along new pipeline rights-of-way could range from temporary during active construction to permanent (e.g., aboveground facilities, a new corridor through forested areas). During construction, the greatest impacts on commodity production would be caused by clearing of vegetation. Operations impacts would be limited to the addition of aboveground facilities and reduced production from the permanent removal of trees on cleared forested land. In general, agricultural areas would return to their preconstruction condition relatively quickly, whereas forested lands would not be permitted to regrow within the permanent right-of-way.

5.3.1.3.1 Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

<u>Disturbance and Loss of Agricultural Land and Lost Yields</u>

Impacts of construction activities on agricultural land (i.e., cropland and hay/pastures) include removal of crops and grasslands and deferral of production of commodities on lands under active cultivation. Construction activities such as clearing, trench excavation and backfilling, and vehicular traffic also could affect farmland soils (including prime farmland and farmland of statewide importance) through compaction, erosion, interference with drainage, and soil mixing. To prevent soil compaction, drainage alteration, and damage to crops, operation of equipment on agricultural lands would be limited to access routes agreed upon with landowners. Approximately 2,284 acres of agricultural land would be affected along the Applicant's proposed project. Construction of the Applicant's proposed project would cross approximately 2,150 acres of farmland soils (Table 5.3.1-1). The Applicant would implement measures to avoid and minimize potential impacts on soil productivity in accordance with the Agricultural Protection Plan (Appendix F). These measures include erosion control, topsoil segregation, rock removal, and measures to avoid compaction or loosen compacted soils. In temporary construction work areas and along the permanent right-of-way, adherence to the Agricultural Protection Plan would be expected to lead agricultural activity prevented for one growing season, resulting in short-term minor losses to agricultural productivity.

The Agricultural Protection Plan (Appendix F) provides additional measures that would be applied specifically to organic agricultural lands, such as organic-certified farms or farms that are in active transition to organic-certified status, in order to address the unique management and certification requirements of these operations. Two organic farms have been identified within the construction footprint of the Applicant's proposed project. Both organic farms are located east of Clearbrook in Minnesota, and both landowners have signed easement agreements (Enbridge 2016). The Applicant would continue to work with affected landowners to identify organic farms that have not yet been identified and would implement measures in the Agricultural Protection Plan accordingly.

The current market value of crops within the construction work area for the Applicant's proposed project is approximately $764,000; and the total value is approximately $938,000 including the value of crops within the footprint of ATWS, temporary access roads, valve sites, and pump stations (Table 5.3.1-2). This amount represents less than 1 percent of the total market value of agricultural products in the counties that would be crossed by the Applicant's proposed project. Applicant-proposed measures to reduce these impacts include compensating all landowners for lost crops and any documented damage that may be caused by construction activities. Considering the relatively small market value of agricultural commodity losses and the Applicant-proposed measures to compensate landowners and reduce damage to soils, construction of the Applicant's proposed project would result in a short-term negligible impact on the local agricultural economy.

Disturbance and Loss of Forested Lands and Timber Resources

During construction, trees from forested areas would be cleared within the construction work area, which would result in loss of timber production. The Applicant would compensate each state's respective DNR for any merchantable timber loss on state-managed forested lands, and compensation on private lands would be agreed upon by the Applicant and the landowner during easement acquisition.

Following construction activities, trees would not be allowed to re-establish within the permanent right-of-way or facility areas, but would be allowed to regenerate naturally within the remainder of the construction work areas, temporary access roads, and ATWS. However, the area within the temporary construction work area for the Applicant's proposed project could take up to 50 years to regenerate harvestable timber. Construction activities likely would result in long-term to permanent minor impacts on land used for timber production. Based on the value of the annual lost growth, the present value of the future growth foregone is approximately $2.5 million, with the majority of the impact occurring in Minnesota. When compared to the present value of the timber harvest market over the same time period (50 years, $662 million), the impact of construction on the associated local timber industry is likely to be long term to permanent and minor.

Disturbance and Loss of Land used for Mining

The only active mining lease along the Applicant's proposed project is in Minnesota, where less than 1 acre of land with active mineral leases is within the ROI of the Applicant's proposed project; therefore, impacts on productivity would be temporary and negligible. In addition, approximately 513 acres of land with potentially valuable sand and gravel resources is located within the construction footprint for the Applicant's proposed project (Table 5.3.1-6). These resources are in a relatively undeveloped state and are located at an average depth below the surface of between 5 and 450 feet (USGS 2006). Construction activities would temporarily prevent development of these resources for the duration of construction, but mineral resources outside of the permanent right-of-way and permanent facilities would be expected to be available for extraction after construction was complete. Impacts from construction on future exploration or mining of resources in the construction work areas are likely to be temporary and negligible. If future discovery of metallic mineral resources occurs where the pipeline crosses state lands, realignment of the pipeline would be handled under standard licensing clauses.

Operations Impacts

Disturbance and Loss of Agricultural Land and Lost Yields

During operation, the easement for the permanent right-of-way would include 988 acres of agricultural land (cropland and grass/pastureland), the majority of which would be located along the existing Mainline corridor and would return to agricultural use post construction. Following final restoration, agricultural activities would be able to resume on agricultural lands, with the exception of land within the permanent footprint of pump stations, MLVs, and permanent access roads that would be converted to industrial/developed land uses. Approximately 104 acres of agricultural land in Minnesota would be converted to industrial/developed land from permanent access roads, pump stations, and valves (Table 5.3.1-1). Enbridge has not proposed aboveground facilities in North Dakota or Wisconsin. As part of easement negotiations, landowners would be compensated for loss of the land. Conversion of 104 acres of agricultural land compared to the 2,838 acres of agricultural land within the ROI results in a permanent minor impact.

The current market value of crops on agricultural land that would be converted to other land uses (permanent access roads, valves, and pump stations) is approximately $61,400 (Table 5.3.1-2). The present value of this annual loss into perpetuity would be approximately $2.1 million. The annual loss of commodities from agricultural land removed from agricultural use relative to the overall value of agricultural products sold in the affected counties would be small; therefore, the impact on the local agricultural economy would be permanent and negligible.

The permanent right-of-way easement for the Applicant's proposed project includes approximately 429 acres of prime farmland and 505 acres of farmland of statewide importance (Table 5.3.1-1). Approximately 153 acres of prime farmland and farmland of statewide importance would be permanently converted to other land uses in Minnesota for permanent access roads, pump stations, and valves and would no longer be available for current or future production (Table 5.3.1-1). Following final restoration, the remaining lands disturbed during construction are expected to continue to be available for current and future agricultural uses. Conversion of 153 acres of prime farmland compared to the 2,636 acres of prime farmland within the ROI results in a permanent negligible impact.

Disturbance and Loss of Forested Lands and Timber Resources

To provide for ongoing pipeline inspection and maintenance, forested lands would not be allowed to reestablish within the permanent right-of-way. The permanent right-of-way easement for the Applicant's proposed project includes approximately 797 acres of forested land, of which approximately 87 percent is deciduous forest (Table 5.3.1-3). This land would be permanently restricted from use for commercial timber production. The Applicant would compensate Minnesota DNR for any merchantable timber loss on state-managed forested lands, and compensation on private lands would be agreed upon by the Applicant and the landowner during easement acquisition (Enbridge 2016). Conversion of 797 acres of forested land compared to the 1,858 acres of forested land within the ROI results in a permanent minor impact (Table 5.3.1-3).

The current market value of this timber is approximately $152,000 (Table 5.3.1-4). Assuming that this annual loss is continued into perpetuity, the present value of the foregone production is approximately

$5.1 million, compared to the present value of annual timber harvest in Minnesota into perpetuity, which is approximately $1.6 billion. Permanent conversion of 797 acres of forested land during operation of the Applicant's proposed project therefore would result in a permanent minor impact on the local timber economy.

Disturbance and Loss of Land Used for Mining

Operation of the pipeline is not expected to affect land with active mineral leases. Approximately 200 acres of land (including pump stations, access roads, and valves) with potential sand and gravel resources are located within the permanent right-of-way in Minnesota and would be removed from future mining activities. These resources are in a relatively undeveloped state, and the resource potential is unknown. Permanent conversion of 200 acres of land with potential sand and gravel resources compared to the 513 acres of land within the ROI, as well as the relatively undeveloped state of the resources, results in a permanent minor impact (Table 5.3.1-6).

5.3.1.3.2 Continued Use of Existing Line 3

Construction Impacts

Continued use of existing Line 3 would not require any future construction or conversion of agricultural lands or lands of prime farming soils. Therefore, there would be no construction impacts on current or future commodity production.

Operations Impacts

The existing Line 3 operations right-of-way includes over 752 acres of active crop and pasture land but does not contain any timber or mineral commodities, as timber production and mining activities are not permitted within this area. Agricultural lands within the existing Enbridge Mainline corridor could be affected by ongoing integrity maintenance digs and subsequent pipeline repair activities, which could prevent crop production in these areas by removing existing crops or reducing the productivity of agricultural soils. Such impacts would be short term, localized, and negligible.

5.3.1.3.3 System Alternative SA-04

Construction Impacts

Disturbance and Loss of Agricultural Land and Lost Yields

The types of construction impacts in agricultural areas for SA-04 would be similar to those described for the Applicant's proposed project, including removal of crops and grasslands, reduction in the productivity of soils from soil erosion and interference with agricultural drainage (if present), mixing of topsoil and subsoil, and compaction and rutting of soil. Approximately 10,155 acres of agricultural land would be affected along SA-04. Construction of SA-04 also would cross 4,479 acres of prime farmland soils and 688 acres of farmland of statewide importance (Table 5.3.1-7). It is assumed that the Applicant's Agricultural Protection Plan (Appendix F) or a similar variation would be implemented to reduce impacts on agricultural land. Applicant-proposed measures include erosion control, topsoil segregation, rock removal, measures to avoid compaction or loosen compacted soils, and compensation to all landowners for lost crops. In temporary construction work areas and along the permanent right-of-way, agricultural activity typically would be prevented for one growing season, resulting in short-term minor losses of agricultural land currently being used for agricultural production.

The current market value of crops within the construction work area for SA-04 is approximately $5.0 million (Table 5.3.1-8). This amount represents less than 1 percent of the total market value of agricultural products in the counties that would be crossed by the system alternative (U.S. Department of Agriculture, National Agricultural Statistics Service, 2016); therefore, it is likely that construction of SA-04 would result in a temporary, minor impact on the local agricultural economy.

Disturbance and Loss of Forested Lands and Timber Resources

The types of construction impacts in forested areas would be similar to those described for the Applicant's proposed project, including loss of timber production from clearing of trees in the construction work areas. Approximately 99 acres of forested land would be affected along SA-04 (Table 5.3.1-9). Clearing trees within forested lands would result in long-term to permanent impacts within the construction work area. Over time (decades), natural growth and succession would restore the temporary construction work area to a forested community. Construction activities would result in long-term to permanent, minor impacts on land used for timber production.

The value of the annual lost growth of forested land within the construction work area is approximately $19,000 (Table 5.3.1-10). Assuming that this value is lost annually over 50 years, the present value of the future growth foregone is approximately $158,000, with the majority of the impact occurring in Minnesota. When compared to the present value of the timber harvest market over the same time period (50 years, $662 million), the impact of construction on the associated local timber industry is likely to be long term and negligible.

Disturbance and Loss of Land Used for Mining

No active mineral areas are located within the ROI for SA-04 in Minnesota or Illinois; therefore, no impacts on mining would occur in these states. Approximately 31 acres of land with known oil and gas resources occurs within the ROI for SA-04 in North Dakota and 0.4 acre of land with active coal mining is located in the ROI for SA-04 in Iowa, along with 2,393 acres of land with potential sand and gravel resources. Construction activities would temporarily prevent development of these resources for the duration of construction, but mineral resources outside of the permanent right-of-way and permanent facilities could be available for extraction after construction was complete. Construction-related impacts on potential exploration or mining of resources in the construction work area are likely to be temporary and negligible. If future discovery of metallic mineral resources occurs where the pipeline crosses state lands, realignment of the pipeline would be handled under standard licensing clauses.

Operations Impacts

Disturbance and Loss of Agricultural Land and Lost Yields

During operation, the easement for the permanent right-of-way would include 4,281 acres of agricultural land, which would continue to be used for agricultural purposes post construction (Table 5.3.1-7). Following final restoration, agricultural activities would be able to resume across this land, with the exception of land used for aboveground facilities (pump stations, MLVs, and permanent access roads) that would be permanently converted to industrial/developed land uses. The exact amount of agricultural land that would be converted to industrial/developed land has not been determined for SA-04 but would be no more than approximately 128 acres for MLVs and pump stations. As part of easement negotiations, landowners likely would be compensated for the loss of this land. Conversion of 128 acres of agricultural land compared to the 10,155 acres of agricultural land within the ROI results in a permanent minor impact. Although the exact crop yield and dollar value is unknown, as with the Applicant's proposed project, it is likely that conversion of this land would result in a permanent negligible impact on the local agricultural economy.

The permanent right-of-way for SA-04 includes 1,868 acres of prime farmland and 287 acres of farmland of statewide importance (Table 5.3.1-7). Following final restoration, agricultural activities on farmland soil would be able to resume across this land, resulting in no additional impacts during continued operation of the pipeline. As with agricultural land, the exact amount of farmland soil that would be converted to industrial/developed land has not been developed but would be no more than approximately 128 acres for MLVs and pump stations. Conversion of 128 acres of farmland soils compared to the 4,478 acres of farmland soils within the ROI results in a permanent minor impact.

Disturbance and Loss of Forested Lands and Timber Resources

To provide for ongoing inspection, monitoring, and maintenance, forested lands would not be allowed to reestablish within the permanent right-of-way. The permanent right-of-way easement for SA-04 would include approximately 40 acres of forested land, nearly all of which is deciduous forest. This land would be permanently removed from the ability to commercially produce timber for use in the wood product industries. Conversion of 40 acres of forested land compared to the 98 acres of forested land within the ROI results in a permanent minor impact on land that could be used in the production of timber products.

The current market value of this timber is approximately $8,000 (Table 5.3.1-10). Assuming that this annual loss is continued into perpetuity, the present value of the foregone production is approximately $256,000, compared to the present value of annual timber harvest in Minnesota into perpetuity ($1.6 billion). Although permanent, given the size of the dollar value loss relative to the overall size of the timber harvest, permanent conversion of this land would result in a permanent minor impact on the local timber economy.

Disturbance and Loss of Land Used for Mining

Operation of the pipeline is expected to have a minor effect on land in active mineral areas. Approximately 840 acres of land with potential sand and gravel resources would be located within the permanent right-of-way for SA-04 in Minnesota; this land would be removed from future mining activities. These resources are in a relatively undeveloped state and their resource potential is unknown. However, the width of the right-of-way is a small area relative to the expanse of areas with mineral resource potential. Conversion of 840 acres of land with potential sand and gravel resources compared to the 2,393 acres of land with potential sand and gravel resources within the ROI, as well as the relatively undeveloped state of the resources, results in a permanent minor impact.

5.3.1.3.4 Transportation by Rail

Construction Impacts

Disturbance and Loss of Agricultural Land and Lost Yields

Less than 200 acres of agricultural land (hay/pasture and cultivated crops) is present in the areas adjacent to the Clearbrook and Superior terminals that would likely be considered for development of the rail offloading facilities and new or expanded rail lines. Impacts of construction activities on agricultural land would include permanent removal of crops and grasslands, resulting in permanent minor losses to agricultural land. The impact resulting from loss of market value of the crops that could be grown on this land is expected to be negligible.

Disturbance and Loss of Forested Lands and Timber Resources

Some forested land (evergreen forest and deciduous forest) is present in the general areas that are likely to be considered for development of rail offloading facilities and new or expanded rail lines; these areas would be permanently cleared for development of facilities. Such clearing likely would result in permanent negligible impacts on land used for timber production.

Disturbance/Loss of Land Used for Mining

No active mining areas have been identified within the areas that are likely to be developed for rail offloading facilities and new or expanded rail lines. As no information has been found on potential sand and gravel resources in these areas, impacts from construction for the rail alternative, while permanent, are anticipated to be negligible.

Operations Impacts

Disturbance and Loss of Agricultural Land and Lost Yields

While no specific locations have been identified, the development of rail loading/offloading facilities and new rail lines near Neche, Clearbrook, and Superior would permanently convert up to 200 acres of land used for agriculture to industrial/developed use. This would result in a loss of commodity production in these areas of agricultural lands. Since the amount of land required for rail facilities is small compared to the amount of agricultural land in the region that is currently in agricultural use, or is suitable for agricultural use, potential impacts on agricultural land from operation of the rail alternative are anticipated to be permanent and minor. The market value of the crops that could be grown on this land is expected to be negligible.

In addition to direct impact from lost production resulting from expansion of the rail yards, an indirect impact from the loss of economic value could result from delays in transport of agricultural commodities by rail.

Transportation of crude oil from near Gretna to Clearbrook and Superior would involve loading and dispatch of 10 unit trains (each train consisting of 110 rail cars) per day onto the rail network in Minnesota. These unit trains would be dedicated to a single service and would return empty from Clearbrook and Superior. Since the overall round trip to Clearbrook or Superior would take more than a single day, some multiple of the 10 trains per day loaded and dispatched would be required to provide the required service. The unit trains would be required to operate on Class 1 rail lines because of their weight and cargo type. Likely routes for these transits have been identified in the description of alternatives (see Chapter 4).

It is likely that the increase in traffic (some multiple of 10 trains per day) operating on the rail system may cause congestion during certain periods. Congestion may develop as a result of seasonal demands for rail capacity. For example, the record 2008/2009 grain harvest in Western Canada saw shippers increase demand for rail cars and experience delays in delivery of their cargos to ports (Freight Monitor 2014). The U.S. Surface Transportation Board also has developed a concern over rail congestion and its potential to affect agricultural production, and has initiated an oversight proceeding (STB 2014).

In view of the underlying projections for increased use of the rail system for commodity transportation, the importance of the timely movement of commodities to market distribution points, and the incremental rail traffic required for the rail alternative, some degree of rail system congestion would likely occur. These impacts could affect commodity producers. Although they may be temporary (either seasonal in response to commodity shipment schedules or resolved through capacity additions to the rail system), impacts from delays in transport of agricultural commodities by rail would be minor to major.

An analysis of rail system operations to determine the specific constraints to rail system infrastructure or operations is not possible within the context of this analysis.

Disturbance and Loss of Forested Lands and Timber Resources

The forested land present in the general areas likely to be considered for development of rail loading and offloading facilities and new or expanded rail lines would be permanently converted to industrial/developed use, resulting in permanent loss of potential timber production. Since the amount of land required for rail facilities is small compared to the amount of forested land in the region, impacts on forested land and timber resources from operation of this alternative are anticipated to be permanent and minor.

Disturbance and Loss of Land Used for Mining

While land used for mining has not been determined within the areas that could be developed for rail facilities and new or expanded rail lines, the amount of land required for such facilities compared to the amount of land in the region containing mineral resources is small. Potential impacts on land used for mining from operation of the rail alternative therefore are expected to be permanent and negligible.

5.3.1.3.5 Transportation by Truck

Construction Impacts

Disturbance and Loss of Agricultural Land and Lost Yields

Up to 140 acres of agricultural land (hay/pasture and cultivated crops) is present in the general areas likely to be considered for development of new truck offloading facilities and associated road access. Impacts of construction activities on agricultural land include removal of crops and grasslands and prevention of the production of commodities on agricultural land, resulting in permanent minor losses to agricultural land. The market value of the crops that could be grown on this land is expected to be negligible.

Disturbance and Loss of Forested Lands and Timber Resources

Some forested land (evergreen forest and deciduous forest) is present in the general areas likely to be considered for development of new truck offloading facilities and associated road access. These areas would be cleared for development of facilities. Construction of the transportation by truck alternative likely would result in permanent, minor impacts on land used for timber production.

Disturbance and Loss of Land Used for Mining

While land used for mining has not been identified within the areas that could be developed for truck facilities and access roads, the amount of land required for such facilities compared to the amount of land in the region containing mineral resources is small. Potential impacts on land used for mining from construction of the truck alternative therefore are expected to be permanent and negligible.

Operations Impacts

The use of tanker trucks required to transport the oil would result in millions of highway miles driven by tank trucks per year, adding congestion to highways and increasing risks to public safety.[20] The increased volume of trucks on local highways that already carry a substantial volume of commercial traffic could lead to delays in the movement of commodities (agriculture, timber, and mining) by truck to market. Overall, operations under the truck alternative would be expected to result in a permanent minor impact on commodity production.

Disturbance and Loss of Agricultural Land and Lost Yields

While no specific locations have been identified, development of truck offloading facilities and access roads would permanently convert up to 140 acres of land used for agriculture to industrial/developed use. This would result in loss of commodity production on these areas of agricultural lands. Since the amount of land required for truck facilities is small compared to the amount of agricultural land in the region that is currently in agricultural use, or is suitable for agricultural use, potential impacts on agricultural land from operation of this alternative are anticipated to be permanent and minor. The market value of the crops that could be grown on this land is expected to be negligible.

Disturbance and Loss of Forested Lands and Timber Resources

The forested land present in the general areas likely to be considered for development of truck loading and offloading facilities and access roads would be permanently converted to industrial/developed use, resulting in an indefinite loss of potential timber production. Since the amount of land required for truck facilities is small compared to the amount of forested land in the region, impacts on forested land and timber resources from operation of the truck alternative are anticipated to be permanent and minor.

Disturbance and Loss of Land Used for Mining

While land used for mining has not been determined within the areas that could be developed for truck facilities and access roads, the amount of land required for such facilities compared to the amount of land in the region containing mineral resources is small. Potential impacts on land used for mining from operation of the truck alternative therefore are expected to be permanent and negligible.

5.3.1.3.6 Existing Line 3 Supplemented by Rail

Impacts associated with continued use of the existing Line 3 supplemented by rail would be the same as those described above for continued use of the existing Line 3 and the rail alternative. This combined alternative would require the same installation of additional rail offloading facilities as described above, thus the impacts would be the same as those described for the rail alternative—with the exception that fewer trains would be needed to transport the oil. This would reduce the potential for railway congestion. The overall impact of this alternative on commodity production would be minor and permanent.

[20] Transporting 760,000 bpd of oil by tanker truck would require 4,000 tanker trucks per day; 1,920 trucks would travel from near Gretna to the Clearbrook terminal, and 2,080 trucks would travel from near Gretna to the Superior terminal (see discussion in Section 4.2.6.2).

5.3.1.3.7 Existing Line 3 Supplemented by Truck

Impacts associated with continued use of the existing Line 3 supplemented by truck would be the same as those described above for continued use of the existing Line 3 and the truck alternative. This combined alternative would require the same installation of additional loading and offloading truck facilities as described for the truck alternative and would result in similar impacts, except that fewer trucks would be required to transport the oil. This would reduce the potential for highway congestion. The overall impact of this alternative on commodity production would be minor and permanent.

5.3.1.4 Summary and Mitigation

5.3.1.4.1 Summary

The analysis of potential impacts on commodities from construction and operation of the Applicant's proposed project and CN Alternatives is summarized in Table 5.3.1-11. Overall, there would be negligible to minor impacts on agricultural commodities along the Applicant's proposed project and all of the CN Alternatives — with one exception. The potentially significant addition of rail traffic carrying crude oil could cause congestion in the rail system at times when agricultural commodities seek to move to regional distribution points. Such congestion may delay commodity delivery. Because the analysis was not able to evaluate rail system operations, the potential for this impact to occur has been identified but cannot be quantified. Although impacts may be temporary (either seasonal in response to commodity shipment schedules or resolved through capacity additions to the rail system), delays in transport of agricultural commodities by rail could result in minor to major impacts.

The duration of impacts on agricultural lands and farmland soils ranged from short term or temporary for the Applicant's proposed project and SA-04, to long-term or permanent for impacts from land converted to rail/truck offloading facilities for the alternatives involving truck or rail—for both the construction and operations phase (with the exception that continued use of the existing Line 3 has no construction-related impacts). Agricultural lands within pipeline right-of-way would experience only short term impacts because once construction is completed, cultivation can be initiated or resume, even within the permanent right-of-way. In contrast, impacts on forested lands would be long term because reforestation would be restricted or forest replacement would require a long time. No active mines are anticipated to be affected by construction or operation of the Applicant's proposed project or the CN Alternatives.

While overall impacts are negligible to minor, comparison of the Applicant's proposed project and the CN Alternatives to each other reveal some differences in effects.

Acreage of agricultural or forested lands that would be impacted for the rail and truck alternatives or continued use of the existing Line 3 supplemented by rail or truck are minimal (on the order of 100–200 acres), and no agricultural or forested lands would be affected by continued use of the existing Line 3. Therefore, any of these alternatives would substantially avoid impacts on commodity production for both the construction and operations phases.

The Applicant's proposed project and SA-04 would involve construction over long distances and therefore would affect commodity production. There would be some short-term or limited impacts on agricultural production, primarily deferral of a crop for a growing season that would be offset with monetary compensation by the Applicant. Consequently, there little or no economic loss would be anticipated. Unlike impacts on agricultural production, impacts on forested land would be long term or permanent; therefore, the difference in acreage of forest lands affected by the route options is more significant. For both the construction and operations phases, the Applicant's proposed project would affect substantially greater acreage of forested lands than SA-04. This includes lands cleared for construction but allowed to re-forest and lands cleared and restricted from future forest production. The Applicant's proposed project would result in long-term impacts on 1,612 acres of forested land within the construction work area and permanent impacts on 797 acres of forested land (701 acres of forested land within the permanent right-of-way and 96 acres lost to pump stations, valves, and permanent access roads). SA-04 would cause long-term impacts on 98 acres of forested land within the construction work area and permanent impacts on 41 acres of forested land within the permanent right-of-way. Forestry resources would be least affected by continued use of the existing Line 3, the rail or truck alternatives, and continued use of Line 3 supplemented by either rail or truck. Effects on forestry resources would be measurably increased by SA-04 and the Applicant's proposed project.

Neither the Applicant's proposed project nor any of the CN Alternatives would affect active mining except SA-04, where only 0.4 acre would be affected. Unmined sand and gravel resources could be affected by construction and operation along the Applicant's proposed project and SA-04. The Applicant's proposed project could restrict future development of 513 acres of potential sand and gravel reserves during construction and would restrict the potential future development of 200 acres of these resources. SA-04 would affect 2,393 acres of potential sand and gravel resources during construction and would permanently restrict future development of 840 acres. However, given the depth of these reserves and limited information on their potential to become viable sand and gravel resources, impacts on market value are considered to be negligible. Impacts on mining resources would be least affected by continued use of the existing Line 3, the rail or truck alternative, and continued use of the existing Line 3 supplemented by either rail or truck.

Overall effects on commodities would be minimized by continued use of the existing Line 3, the truck alternative, or use of the existing Line 3 supplemented by truck. The Applicant's proposed project and SA-04 would increase effects because they would require construction and a permanently cleared right-or-way. The CN Alternatives, including rail transportation, could affect commodity economics if congestion in the rail system occurred as described.

5.3.1.4.2 Mitigation

The Applicant proposes several measures to minimize or avoid impacts on commodity production that are discussed in the Agricultural Protection Plan (Appendix F). Beyond these Applicant-proposed measures, no mitigation has been identified.

Table 5.3.1-11. Summary of Potential Impacts on Commodity Production for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c,d]	Continued Use of Existing Line 3[e]	System Alternative SA-04[f,g]	Transportation by Rail[h]	Transportation by Truck[i]	Existing Line 3 Supplemented by Rail[e,h]	Existing Line 3 Supplemented by Truck[e,i]
Construction Impacts							
Disturbance and loss of agricultural land	Short-term/minor impacts • 2,284 acres of agricultural land Short- to long-term/minor impacts • 2,150 acres of farmland soils	No impact	Short-term/minor impacts • 10,155 acres of agricultural land Short- to long-term/minor impacts • 5,167 acres of farmland soils	Permanent/minor impacts • <200 acres of agricultural land	Permanent/minor impacts • <140 acres of agricultural land	Permanent/minor impacts • <200 acres of agricultural land	Permanent/minor impacts • <140 acres of agricultural land
Lost agricultural land yields	Temporary/ negligible impacts • $764,000 market value of crops	No impact	Temporary/ negligible impacts • $5.1 million	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts
Disturbance and loss of forested lands and timber resources	Long-term to permanent/minor impacts • 1,612 acres of forested areas • $2.5 million market value of timber	No impact	Long-term to permanent/minor impacts • 98 acres of forested areas • $158,000 market value of timber	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts

Table 5.3.1-11. Summary of Potential Impacts on Commodity Production for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c,d]	Continued Use of Existing Line 3[e]	System Alternative SA-04[f,g]	Transportation by Rail[h]	Transportation by Truck[i]	Existing Line 3 Supplemented by Rail[e,h]	Existing Line 3 Supplemented by Truck[e,i]
Disturbance and loss of land used for mining	Temporary/ negligible impacts • 513 acres of land with potential sand and gravel resources No impact on active mines	No impact	Temporary/ negligible impacts • 2,393 acres of land with potential sand and gravel resources • 0.4 acre of active coal mine area in Iowa	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts	Temporary/ negligible impacts
Operations Impacts							
Disturbance and loss of agricultural land	Permanent/ negligible impacts • 104 acres of agricultural land • 153 acres of farmland soils	Short-term/minor impacts • 752 acres of agricultural land	Permanent/ negligible impacts • 128 acres of agricultural land • 128 acres of farmland soils	Permanent/minor impacts • <200 acres of agricultural land	Permanent/minor impacts • <140 acres of agricultural land	Permanent/minor impacts • <200 acres of agricultural land	Permanent/minor impacts • <140 acres of agricultural land
Lost agricultural land yields	Permanent/ negligible impacts • $61,400 market value of crops	Short-term/ negligible impacts	Permanent/negligible impacts within facilities footprint No additional lost yield on land within the permanent easement	Permanent/ negligible impacts • Increased rail congestion that could affect commodity producers	Permanent/ negligible impacts • Increased highway congestion that could affect commodity producers	Permanent/ negligible impacts • Increased rail congestion that could affect commodity producers	Permanent/ negligible impacts • Increased highway congestion that could affect commodity producers

Table 5.3.1-11. Summary of Potential Impacts on Commodity Production for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c,d]	Continued Use of Existing Line 3[e]	System Alternative SA-04[f,g]	Transportation by Rail[h]	Transportation by Truck[i]	Existing Line 3 Supplemented by Rail[e,h]	Existing Line 3 Supplemented by Truck[e,i]
Disturbance and loss of forested lands and timber resources	Permanent/minor impacts • 797 acres of forested areas • $5.1 million market value of timber	No impact	Permanent/ minor impacts • 41 acres of forested areas • $7,700 market value of timber	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts	Permanent/minor impacts
Disturbance and loss of land used for mining	Permanent/ negligible impacts • 200 acres of land with sand and gravel resources No impact on active mines	No impact	Permanent/ negligible impacts • 840 acres of land with sand and gravel resources • 0.4 acre of active coal mine area in Iowa	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts

Table 5.3.1-11. Summary of Potential Impacts on Commodity Production for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c,d]	Continued Use of Existing Line 3[e]	System Alternative SA-04[f,g]	Transportation by Rail[h]	Transportation by Truck[i]	Existing Line 3 Supplemented by Rail[e,h]	Existing Line 3 Supplemented by Truck[e,i]

[a] No single dataset in this summary table provides a complete indication of all relevant impacts to commodity production. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, NRCS data was used to assess acreage of farmland soil impacted. While this dataset provides an indication of potential impacts to land with current and future agricultural value, it does not provide an indication of the type and extent of actual cultivation underway and must be considered in conjunction with crop production data to determine the specific impacts to agricultural commodity production. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-498 through 5-5-507. The table above, for example provides acreages of agricultural land and potential value of crops within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to cropland is contained in the text of this section.

[c] Enbridge-provided footprints: Construction = construction work area; Operation = operations permanent right-of-way

[d] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-498 to 5-501. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on page 5-501. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] Construction = 120-foot-wide construction footprint (except RA-07 is 205 feet wide), Operations = 50 foot-wide permanent right-of-way; SA-04 does not include access roads, ATWS, or aboveground facilities as the exact location of these facilities has not been determined for SA-04.

[g] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-501 to 5-503. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[h] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-503 to 5-504. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[i] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-506. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

5.3.1.5 References

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5.3.2 Recreation and Tourism

Recreational activities contribute to the local economy through the influx of tourists, purchases of gear and related equipment, and trip-related spending (e.g., gas, lodging, and food).

The issues of concern related to recreation and tourism are the loss of recreation-based spending and the associated effects on the recreational economies in the counties that would be crossed. This potential loss could come from a decrease in recreation-based visitation because of access limitations, such as trail closings or road detours, during construction and operation of the Project. This section assesses the potential for construction and operation of the Applicant's proposed project and CN Alternatives to affect the recreation economy. Impacts on recreation and tourism that could occur during construction and operation include:

- Limitations to recreation access, and
- Changes to the recreational economy.

This section first describes the existing conditions within an area along the Applicant's proposed project and each of the CN Alternatives where recreation and tourism could be affected by construction or operation of the Project. Impacts on access to recreation resources and effects on the recreation economy are assessed and compared to each other for the Applicant's proposed project and the CN Alternatives (continued use of the existing Line 3, system alternative SA-04, transportation by rail, transportation by truck, and existing Line 3 supplemented by rail or truck). Potential impacts on recreation and tourism associated with an unanticipated release of crude oil are discussed in Chapter 10.

5.3.2.1 Regulatory Context and Methodology

5.3.2.1.1 Regulatory Context

The Applicant's proposed project and CN Alternatives involve actions in North Dakota, Minnesota, Iowa, Illinois, and Wisconsin. The applicable regulations for each state are summarized below.

North Dakota

Several regulations in the North Dakota Century Code address pipelines; however, no specific regulations concern the impact of pipelines on access to recreational lands or impacts on recreation-based economies in the state.

Minnesota

Minnesota Administrative Rules Part 7853.0130, Subpart B provides the criteria the Commission must consider in assessing the need for the Project, including "the effect of the proposed facility upon the natural and socioeconomic environments compared to the effects of reasonable alternatives." Impacts on recreation and tourism are part of the socioeconomic environment the Commission considers in their decision about whether there are more reasonable and prudent alternatives to the proposed Project (Minn. R. 7853.0130, Subp. B) and whether the benefits outweigh the consequences of granting a CN for the proposed Project (Minn. R. 7853.0130, Subp. C).

In addition, Minnesota Administrative Rules Part 7853.0600, Subpart 2(J) requires listing of "state critical areas, state WMAs; state scientific and natural areas; state wild, scenic, and recreational rivers; state parks; state scenic wayside parks; state recreational areas; state forests; state trails; state canoe and boating rivers; state zoos, and designated trout lakes through which the route passes, as mapped on the inventory of significant resources by the State Planning Agency."

Iowa

Iowa Administrative Code Chapter 479(B) gives the Iowa utilities board primary authority over the routing of pipelines. No specific regulation in the chapter addresses recreational land or recreation-based economies. Iowa Statute 199—13 provides the standards related to hazardous liquid pipelines. There is only mention of recreational facilities under Iowa Statute 199—24.4(476A), which regulates electric power generation and transmission lines. Section 3, "Community Impact" in the "Application for a Certificate—Contents," states that the applicant shall include "an identification and analysis of the effects the construction, operation and maintenance of the proposed facility have on the site impact area including, but not limited to, the following: a. A forecast of the permanent impact of the construction, operation, and maintenance of the proposed facility on commercial and industrial sectors, housing, land values, labor market, health facilities, sewage and water, fire and public protection, recreational facilities, schools and transportation facilities."

Illinois

Under the Public Utilities Act in Illinois, § 15-401,"Licensing" states that "in its determination of public convenience and necessity for a proposed pipeline or facility designed or intended to transport crude oil and any alternate locations for such proposed pipeline or facility, the Commission shall consider, but not be limited to, the following: … (3) any evidence presented by the Department of Natural Resources regarding the impact of the proposed pipeline or facility on any conservation areas, forest preserves, wildlife preserves, wetlands, or any other natural resource."

Wisconsin

There is no specific provision for recreational land under Wisconsin Statute § 295.53(3)(a). However, the Statutes state the following under Subchapter 2 for Oil and Gas: "In the environmental impact report, the applicant shall provide a description of the proposed mining project, the present environmental conditions in the area and the anticipated environmental impacts of the proposed mining project, the present socioeconomic conditions in the area and the anticipated socioeconomic impacts of the proposed mining project, details of any wetlands mitigation program under s. 295.60 (8), any measures for navigable waters under s. 295.605 (4), any proposed changes to the forest designations specified in sub. (4)(c), and the alternatives to the proposed mining project."

5.3.2.1.2 Methodology

The ROI for the analysis of recreation and tourism impacts is twofold. It narrowly focuses on the public recreational lands and recreational waterbodies directly crossed by construction and operations areas for the Applicant's proposed project and the CN Alternatives in order to qualitatively assess effects of Project-related changes to recreation-based visitation. It also broadly includes the counties through which the Applicant's proposed project and the CN Alternatives pass to assess whether the Project-related changes would affect county-level recreational visitation and, subsequently, the local recreation-based economy. The counties where Project-related impacts would occur represent the relevant local recreational economies that are likely to be the most sensitive to Project-related actions.

The analysis was undertaken by first identifying and inventorying in GIS all public recreational lands, trails, and waterbodies in the counties crossed by the Applicant's proposed project and the CN Alternatives. The following construction and operations footprints were overlaid to quantify resources affected by construction and operation:

- The route and estimated footprints for the pipeline and associated facilities for the Applicant's proposed project,
- The 120-foot-wide construction footprint and 50-foot-wide permanent right-of-way for system alternative SA-04,
- The permanent right-of-way for the existing Line 3 pipeline, and
- The estimated footprints of required facilities and existing potential routes for the rail and truck alternatives.

The geographic extent (in acres) of expected restricted access to recreational land, including recreational waterbodies, land-based trails, and scenic byways, from the construction work areas, permanent rights-of-way, and associated aboveground facilities was determined by analyzing the number of crossings and crossing methods described by the Applicant. The analysis assumed that access would be restricted to the affected resource over the entire construction work area for the duration of construction. The analysis assumed that access along the permanent right-of-way for pipelines and at any aboveground facilities associated with pipelines, continued operations of existing Line 3, and rail and truck transportation would be restricted during operations.

Current statistics on visitation to the specific recreation areas identified in this analysis and any associated recreational spending were not available; consequently, quantitative estimates of economic impacts could not be developed. However, a qualitative assessment was developed to assess the magnitude of the associated loss of tourism that may result from the disruption of recreational activities and characterize the direction and magnitude of potential impacts on the regional recreation/tourism economy at the county level.

The methodology for assessing potential impacts on the local recreational economy in each affected county in the ROI involved (1) identifying physical impacts on land and water primarily used for recreational purposes; (2) assessing whether the magnitude and duration of access restrictions were likely to change recreational visitation at the county level; and (3) evaluating whether the change would be large enough to affect the local recreational economy (i.e., county-level recreation-based tourism spending). For a physical access restriction to measurably affect the recreational economy of a county, a significant amount of people would have to stop taking trips or take substantially fewer trips within the county as a whole instead of choosing to recreate at another site within the county or recreating at the affected site, but in a different area.

Recreational land and waterbodies within the ROI for the Applicant's proposed project and CN Alternatives were identified using GIS datasets and layers in the following federal- and state-level data sources:

- PAD-US,
- DNR water trails,
- DNR snowmobile trails,

- DNR state-designated trails,
- DNR hunter walking trails, and
- State-designated trout streams.

No single one of these datasets provides a complete indication of all relevant impacts to recreation and tourism, but together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, while the state-designated trout stream dataset provides an indication of impacts to trout fishing, it does not provide information about other important recreational uses like hunting. Other datasets, like DNR hunter walking trails, must also be considered for a more complete understanding of recreational impacts.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with an understanding of the qualitative descriptions of impacts that are contained in the text in this section. Tables in this section provide counts, for example, of state-designated trout streams crossed; however, a more complete discussion of the qualitative nature of impacts that could occur to recreational uses related to those streams is contained in the text of this section.

5.3.2.2 Existing Conditions

This section identifies recreational resources that could be affected by the Applicant's proposed project and CN Alternatives. Changes to these resources could reduce or restrict recreational use, which could affect recreational spending at the county level. This section does not discuss current recreational use or spending at the county level since publicly available, accurate, and consistent data were not available for each of the resources discussed. For context, an estimate of the approximate acreages or total size of the resources are provided where appropriate for the Applicant's proposed project and each CN Alternative.

Parks and Forests

Recreational use of parks, forests, and special management areas includes a variety of outdoor activities such as camping, hiking, skiing, horseback riding, off-road vehicle riding, snowmobiling, boating, bicycling, fishing, hunting, and wildlife watching. Parks include all parks or protected areas that are managed by state or federal agencies. Similarly, forests include forested land that is protected and maintained by state and federal agencies primarily for recreational enjoyment. Recreational activities in parks and forests can take place in developed areas that include a variety of recreational facilities (e.g., parking, trails, restroom, campsites, and boat launches) or in areas that are less developed, with few to no facilities.

Special Management Areas

Special management areas include other protected areas or areas set aside for conservation. For this analysis, special management areas include areas open to the public for recreation, such as wildlife refuges, WMAs, and other public management areas. These areas, considered as undeveloped open lands, are available for informal recreational use with limited modern facilities. Typically, these special management areas are used to hunt, fish, trap, or watch wildlife.

State-Designated Land-Based Trails

State-designated land-based trails include multi-use trails, hunter walking trails, and state-managed snowmobile trails. These trails are designated for a variety of recreational uses, such as walking, jogging, hiking, bicycling, horseback riding, hunting, and snowmobile use.

State-Designated Water Trails and Trout Streams

Water trails are marked routes on navigable waterways (e.g., rivers, lakes, canals, and coastlines) for recreational use of small, non-motorized boats (e.g., kayaks, canoes, rafts, and rowboats). There are 35 water trails in Minnesota (MN DNR 2017.). State-designated trout streams provide an important source of recreational activity for anglers. Minnesota has 687 designated trout streams, totaling 3,782 miles.

Scenic Byways

Under the National Scenic Byways Program, the Secretary of Transportation designates scenic byways, recognized as “roadways having outstanding qualities of scenic, historic, cultural, natural, recreational, and archeological qualities” (23 U.S. Code 162, TEA-21). As of 2010, 151 byways in 46 states were recognized as America’s Byways that represent the most scenic and rarest of landscapes, culture, and history preserved in the United States.

The following sections describe the existing conditions for recreational resources within the ROI for the Applicant’s proposed project and CN Alternatives.

5.3.2.2.1 Applicant’s Proposed Project

This section describes existing conditions in North Dakota, Minnesota, and Wisconsin for the resources noted in the previous section. Information enabling comparison of the CN Alternatives to the Applicant’s proposed project is provided below.

Parks, Forests, and Special Management Areas

Table 5.3.2-1 lists by county the miles and acres of parks, forests, and special management areas (both state and federal) that would be crossed by the Applicant’s proposed project. The Applicant’s proposed project would not cross any federal or state parks but would cross the North Country National Scenic Trail. In addition, it would cross approximately 33 miles of state land, all in Minnesota. The total amount of land used for recreational purposes in the ROI for the Applicant’s proposed project is 531 acres; the total area of park, forest, and special management area units crossed at some point by the Applicant’s proposed project is 714,633 acres (Table 5.3.2-1).

State-Designated Land-Based Trails

The Applicant’s proposed project would cross three state-designated multi-use trails in Minnesota, one trail in Wisconsin (58th Street Trail), and no trails in North Dakota (see Figure 5.3.2-1). Two of the trails in Minnesota would be crossed once (Paul Bunyan State Trail in Cass County and Willard Munger State Trail in Carlton), while a hunter walking trail would be crossed twice in Aitkin County. The Applicant’s proposed project would also cross one snowmobile trail in North Dakota, 19 snowmobile trails in Minnesota, and no snowmobile trails in Wisconsin.

State-Designated Water Trails and Trout Streams

The Applicant's proposed project would cross five state-designated canoe and boating trails in Minnesota and no water trails in North Dakota or Wisconsin. Four of the rivers (Red River of the North in Kittson County, Red Lake River in Pennington County, Crow Wing River in Wadena County, and the Pine River in Cass County) would be crossed once, and the Mississippi River would be crossed twice(once in Clearwater County and again in Aitkin County) (see Figure 5.3.2-1). Each of the rivers that would be crossed range in length from 60 miles (Pine River) to over 500 miles (Red River of the North).

The Applicant's proposed project would cross six state-designated trout streams in Minnesota (King Creek and an unnamed stream in Carlton County, Straight River in Hubbard County, Spring Brook in Cass County, Blackhoof River in Carlton County, and LaSalle Creek in Hubbard County) and no trout streams in Wisconsin or North Dakota.

Table 5.3.2-1. Parks, Forests, and Special Management Areas Crossed by the Applicant's Proposed Project

State/County	Name	Total Size (acres)	Centerline (miles)	Construction Work Area (acres)	Permanent Right-of-Way (acres)	ATWS	Temp Access Road	Perm Access Road	Valves[a]	Con Total[b] (acres)	Op Total[b]
North Dakota											
None	None	0	0.0	0	0	0	0	0	0	0	0
Minnesota											
Aitkin County	Grayling Marsh WMA	9,627	1.1	14	6	1	0	0	0	15	6
Aitkin County	Lawler WMA	235	0.3	3	2	0	0	0	0	3	2
Cass County	Foot Hills State Forest	46,896	3.1	42	19	5	7	1	0	55	20
Aitkin County	Hill River State Forest	124,204	8.0	103	48	5	0	6	0	114	54
Wadena County	Huntersville State Forest	33,963	7.1	97	43	8	4	7	0	116	50
Cass County	Land O'Lakes State Forest	49,890	9.6	130	58	9	17	5	0	161	63
Hubbard County	Mississippi Headwaters State Forest	45,290	1.8	25	11	4	0	7	0	36	17
Hubbard County	Paul Bunyan State Forest	150,113	0.0	0	0	0	0	0	0	0	0
Aitkin County	Savanna State Forest	238,954	0.8	9	5	0	0	0	0	9	5
Aitkin County	Waukenabo State Forest	15,461	1.4	16	8	1	0	1	0	17	9
Subtotal		***714,633***	***33.2***	***439***	***200***	***33***	***28***	***27***	***0***	***526***	***226***
Wisconsin											
None	None	0	0.0	0	0	0	0	0	0	0	0
TOTAL	-	***714,633***	***33.2***	**439**	**200**	**33**	***28***	***27***	**0**	***526***	***226***

Table 5.3.2-1. Parks, Forests, and Special Management Areas Crossed by the Applicant's Proposed Project

State/County	Name	Total Size (acres)	Centerline (miles)	Construction Work Area (acres)	Permanent Right-of-Way (acres)	ATWS	Temp Access Road	Perm Access Road	Valves[a]	Con Total[b] (acres)	Op Total[b]

Source: USGS GAP 2016.

Notes:

Acres for the construction work area and the permanent right-of-way are based on Enbridge-provided footprints for the Applicant's proposed project and a 120-foot-wide construction footprint and 50-foot-wide permanent right-of-way for system alternative SA-04.

[a] Includes valve sites and valve driveways. Because valve sites are within the permanent right-of-way, total Project impacts may be slightly overestimated from double counting.

[b] Con = sum of pipeline construction work area, additional temporary workspaces (ATWS), pump stations, valves, and temporary and permanent access roads; Op = sum of pipeline permanent right-of-way, permanent access roads, valves, and pump stations

Perm = permanent; Temp = temporary; WMA = wildlife management area

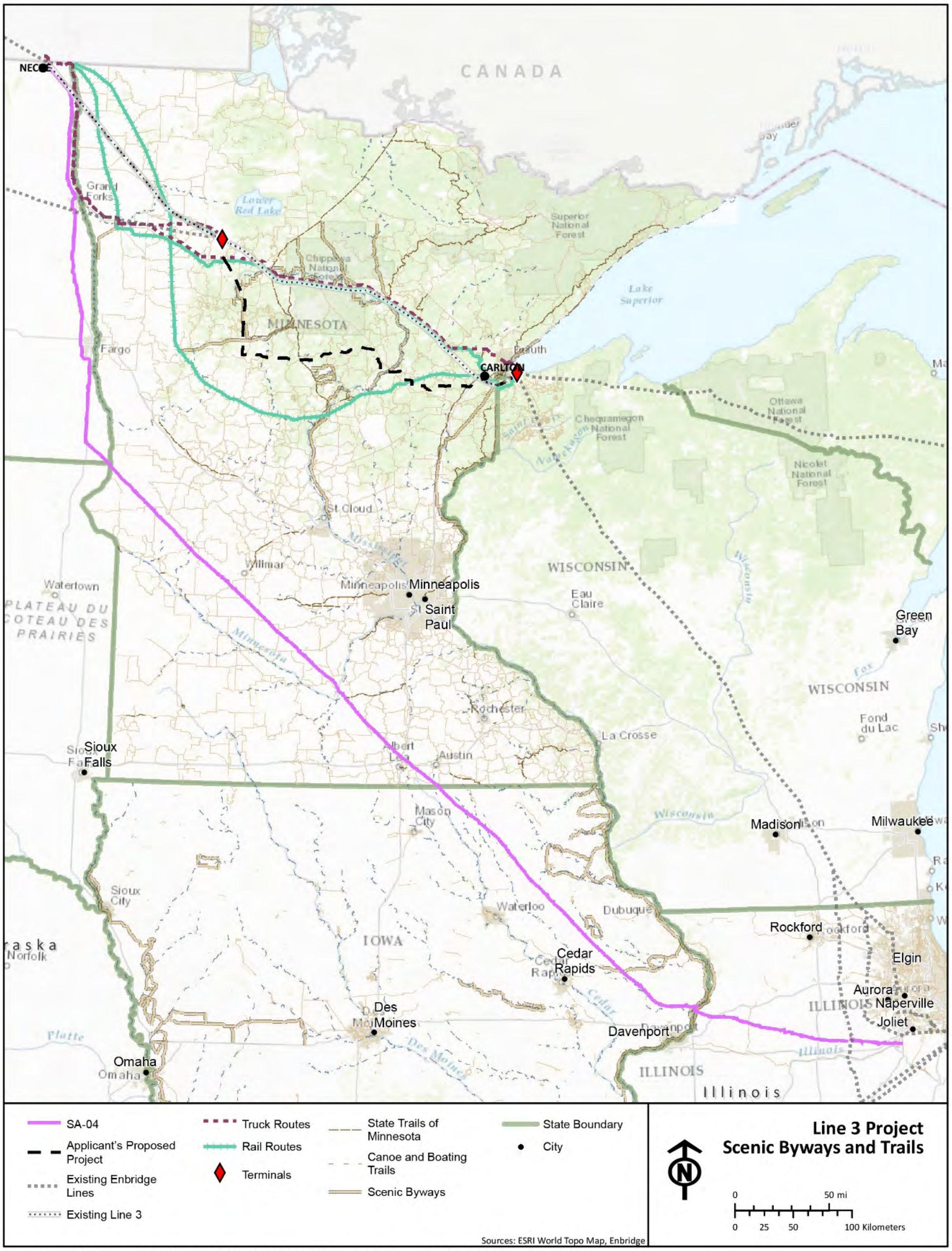

Figure 5.3.2-1 State-Designated Multi-Use, Canoe and Boating Trails Crossed by the Applicant's Proposed Project and Certificate of Need Alternatives

Scenic Byways

In North Dakota, there are 10 scenic byways; Minnesota has 21 (8 of which are national byways), and Wisconsin has 4. Each highway crosses several of the finest cultural, historic, recreational, and scenic locations in each state. The Applicant's proposed project would cross one national byway in Minnesota (the Great River Road) twice, once in Clearwater County and again in Aitkin County, and three state-designated byways in Minnesota (Lake Country in Hubbard County, Veterans Memorial in Carlton County, and King of Trails). The route would not cross any designated byways in North Dakota or Wisconsin (see Figure 5.3.2-2).

5.3.2.2.2 Continued Use of Existing Line 3

Parks, Forests, and Special Management Areas

The existing Line 3 pipeline crosses federally owned land, including the Chippewa National Forest, and state forests and WMAs in Minnesota. The route crosses Bowstring State Forest, Fond du Lac State Forest, Mississippi Headwaters State Forest, Clearwater River WMA, and Little Otter Creek WMA.

State-Designated Land-Based Trails

The existing Line 3 pipeline does not cross any state-designated multi-use trails in North Dakota or Minnesota and crosses one multi-use trail in Wisconsin. The existing Line 3 pipeline crosses one snowmobile trail in North Dakota, 16 snowmobile trails in Minnesota, and no snowmobile trails in Wisconsin.

State-Designated Water Trails and Trout Streams

The existing Line 3 crosses four state-designated canoe and boating trails in Minnesota and no water trails in North Dakota or Wisconsin. Three of the rivers (Red River of the North in Kittson County, Red Lake River in Pennington County, and St. Louis River in St. Louis County) are crossed once, and the Mississippi River is crossed two times (once in Clearwater County and again in Aitkin County).

The existing Line 3 crosses three state-designated trout streams in Minnesota (Clearwater River in Beltrami County, Necktie River in Hubbard County, and Little Otter Creek in Carlton County) and no trout streams in Wisconsin or North Dakota.

Scenic Byways

The existing Line 3 crosses one national byway in Minnesota (the Great River Road) three times, once in Beltrami County and twice in Cass County, and two state-designated byways in Minnesota (Edge of the Wilderness in Itasca County and Veterans Memorial in Carlton County). It does not cross any designated byways in North Dakota or Wisconsin.

Figure 5.3.2-2. Scenic Byways Crossed by the Applicant's Proposed Project and Certificate of Need Alternatives

5.3.2.2.3 System Alternative SA-04

Parks, Forests, and Special Management Areas

SA-04 would cross 55 miles of federal land and about 1 mile of state land (a state park trail and a special management area). The geographic extent of the construction work area of SA-04 includes crossing 55 miles of a federal special management area and 1 mile of a state management area in North Dakota and 12.1 miles of a federal special management area in Illinois. The total amount of land within the construction work area includes approximately 972 acres of federal special management areas and 6.3 acres of state special management areas. The majority (795 acres) of this land is within the Dakota Tallgrass Prairie Wildlife Area in Richland County, North Dakota (refer to Table 5.3.2-2). The remaining land area (177 acres) is in Illinois along the Illinois and Michigan Canal. Of the parks and special management areas crossed by SA-04, approximately 42 percent (408 acres) would be located within the permanent right-of-way. The majority of this land (334 acres) is in North Dakota. The total amount of land used for recreational purposes in the ROI for SA-04 is 978 acres; the total land available for recreation in the forests and WMAs that would be crossed is 432,800 acres (Table 5.3.2-2).

State-Designated Land-Based Trails

SA-04 would cross one state-designated multi-use trail in Minnesota (Sakatah Singing Hills State Trail in Blue Earth County), three trails in Illinois (Great River Trail in Rock Island County, Hennepin Canal Feeder in Whiteside County, and Illinois and Michigan (I&M) Canal Path in LaSalle County), and one trail in Iowa (Clinton-Camanche Mississippi River Trail in Clinton County) (refer to Table 5.3.2-2). SA-04 would cross 15 snowmobile trails in North Dakota and 10 in Minnesota.

State-Designated Water Trails and Trout Streams

SA-04 would cross three state-designated canoe and boating trails in Minnesota (Cedar River in Mower County, Chippewa River in Swift County, and Minnesota River in Nicollet County) and four in Iowa (Little Cedar River in Mitchell County, Little Wapsipinicon River in Fayette County, Mississippi River in Clinton County, and Wapsipinicon River in Chickasaw County) (see Figure 5.3.2-1).

SA-04 would cross an unnamed trout stream three times and the Seven Mile Creek once, both located in Nicollet County in Minnesota. SA-04 does not cross any trout streams in Iowa, North Dakota, or Illinois.

Scenic Byways

SA-04 would cross three national byways in Iowa and on the border of Iowa and Illinois (Grant Wood, Great River Road, and Green River Road) (see Figure 5.3.2-2).

Table 5.3.2-2. Parks, Forests, and Special Management Areas Crossed by System Alternative SA-04 (acres)[a]

State/County	Name	Total Area (acres)	Centerline (miles)	Construction Work Area (acres)	Permanent Right-of-Way (acres)
North Dakota					
Richland County	Dakota Tallgrass Prairie Wildlife Management Areas	185,000	54.9	795	331
Pembina County	Pembina County Waterfowl Production Area	640	0.4	5	2
Subtotal		***185,640***	***55.3***	***800***	***333***
Illinois					
Whiteside County	Hennepin Canal State Park	6,030	<0.1	1	0
LaSalle, Grundy, Will	Illinois and Michigan Canal	1,130	12.1	177	74
Morrison	Upper Mississippi River National Wildlife Refuge	240,000	<0.1	0	0
Subtotal		***247,160***	***12.1***	***178***	***74***
TOTAL-		**432,800**	**67.4**	**978**	**407**

Source: USGS GAP 2016.

[a] Access road, additional temporary workspaces (ATWS), and valve information is not available because the exact location of permanent facilities has not been determined for SA-04.

Notes:

Values in the table may not sum to totals and subtotals because of rounding.

SA-04 would not cross parks, forests, or special management areas in Iowa.

Acres for the construction work area and the permanent right-of-way are based on Enbridge-provided footprints for the Applicant's proposed project and a 120-foot-wide construction footprint and 50-foot-wide permanent right-of-way used for system alternative SA-04.

5.3.2.2.4 Transportation by Rail

The rail alternative includes construction of a new offloading facility in Clearbrook, Minnesota; an offloading facility in Superior, Wisconsin; and upgrades and expansion of existing rail infrastructure. The land that would be permanently converted for facility construction and expansion is not currently designated for recreational purposes (i.e., state forest, park, or special management area). It is mostly mixed-use, industrial, and agricultural land. However, the likely rail transportation routes pass through areas used for recreation, as shown in Figure 5.3.2-1 and 5.3.2-2. These areas include several rivers such as the Red Lake River in Polk and Pennington counties, the Mississippi River in Beltrami and Cass counties, the St. Louis River in St. Louis and Carlton counties, and the Otter Tail River in Otter Tail County. Rail routes also include several smaller streams that are designated for trout fishing such as Union Creek in Wadena County, the Crow Wing River in Morrison County, the Red River and Moose Horn River in Carlton County, and Whitley's Creek in Crow Wing County. Rail routes pass through two popular tourist destinations (the Detroit Lakes and Brainerd Lakes). The rail route would intersect the Paul Bunyan State Trail in Beltrami and Crow Wing counties, as well as the Willard Munger State Trail in Carlton County. The route also would intersect the Great River Road, a national scenic byway in several locations (Beltrami, Crow Wing, Cass, and Itasca counties), and the Veteran's Memorial highway in Carlton County. The route would come within 1,000 feet of the Lake Country Highway in Becker County.

5.3.2.2.5 Transportation by Truck

The truck alternative includes constructing a new offloading facility in Clearbrook, Minnesota; an offloading facility in Superior, Wisconsin; and new local access roads to these facilities. The land that would be permanently converted for facility construction and is mostly mixed-use, industrial, and agricultural land, and does not have land designated for recreational use. The roads likely to be traveled by trucks transporting crude oil for this alternative are located in areas used for recreation, as shown in Figure 5.3.2-1. These areas include the Red Lake River in Polk County and the International Historic Highway, a state-designated scenic byway also in Polk County, which would be crossed by the first leg of the truck route (Interstate 29). The second leg of the route begins on US Highway 2 in Bagley and continues all the way to Superior. The route crosses through the Mississippi Headwaters State Forest, the Paul Bunyan State Trail, the Great River Road Scenic Byway, and the Mississippi River in Beltrami County. It also runs parallel to the Necktie River, a trout fishing stream in Hubbard County, and crosses over Cass Lake in Cass County to intersect with the Great River Road and Mississippi River again in Cass County. The truck route runs parallel to the Mississippi River again in Itasca County and the St. Louis River in St. Louis County. In St. Louis County, it crosses 10 trout streams and the Saginaw Grade State Trail.

5.3.2.2.6 Existing Line 3 Supplemented by Rail

The existing conditions for the combined existing Line 3 and rail alternative are similar to those described above for continued use of the existing Line 3 pipeline and the rail alternative.

5.3.2.2.7 Existing Line 3 Supplemented by Truck

The existing conditions for the combined existing Line 3 and truck alternative are similar to those described above for continued use of the existing Line 3 pipeline and the truck alternative.

5.3.2.3 Impact Assessment

5.3.2.3.1 Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

<u>Limitations to Recreation Access</u>

Parks, Forests, and Special Management Areas

Based on a review of relevant maps and satellite imagery, it was determined that most state forest land within the construction work areas does not include developed recreational areas (i.e., areas with facilities such as parking, campsites, boat launches, and hiking trails). This is also true for the WMAs because they are primarily designated for undeveloped recreational use. Generally, the land affected by construction of the pipeline consists of open public land available for informal recreation and does not include any developed areas, with the exception of off-road trails, all-terrain vehicles trails, and snowmobile trails.

During construction, impacts on parks, forests, and special management areas within the construction work areas include removal of existing vegetation, grading, excavation, pipeline installation, and reconstruction (for trails). Access to the affected land would be limited or restricted during this time. The Applicant may need to temporarily close or restrict access to non-motorized and off-road trails within state forests during construction of the pipeline across any trails. Enbridge would cross trails using either the bore or open-cut methods. With use of a bore crossing, no impacts on the trail are expected. If the open-cut method is used, Enbridge would complete pipeline installation activities across trails within 48 hours.

Construction in any location could last for several days to several weeks depending on a variety of factors such as land use type, topography, weather, and other environmental conditions; therefore, limited use, access restrictions, as well as noise and visual disturbance could occur during this timeframe. When construction activities are completed, recreational activities on the affected acres could resume as normal. Additional detail on noise and visual disturbance is provided in Sections 6.2.2 and 6.2.3, respectively.

At the county level, the majority of the land disturbed during construction (158 acres) would occur in state forests and WMAs in Aitkin County (Table 5.3.2-1). Based on a review of forest and WMA maps, the disturbed land represents a very small portion (less than 1 percent) of the total amount of land that remains available in each forest and WMA that would be crossed by the pipeline. In total, over 388,000 acres of land in the same forests and WMAs in Aitkin County would not be affected and would remain available for recreation during construction. This is also true in Cass County (216 acres affected of 96,876 total), Wadena County (116 acres out of 33,963 total), and Hubbard County (36 acres of 45,290 total). Therefore, impacts on access to forests and WMAs are anticipated to be temporary and minor, because restrictions would be confined to small portions of the total land available for recreation, and any closures would be limited to these areas during and immediately following construction.

State-Designated Land-Based Trails

For a short time during pipeline installation, construction-related activities would affect public access and use of land-based trails where the pipeline crosses the trail. The Applicant proposes to use the bore or open-cut method at trail crossings. If the latter is used, trail use at the intersection with the pipeline would be suspended for 48 hours during construction. After completion of pipeline installation, the Applicant would restore the trail surface to allow passage.

Based on a review of the trail route map for the 120-mile Paul Bunyan and the 90-mile Willard Munger state trails, the pipeline crossing would occur in areas with no designated public access or facilities. The crossing of the Paul Bunyan State Trail would occur near the middle of the trail just south of Backus, which does not include any public access points or recreational facilities. The pipeline would also cross the Willard Munger State Trail just north of Mahtowa, in an area with no public access points or recreational facilities. Construction-related impacts on these trails likely would result in a temporary restriction on recreational access during pipeline installation where the pipeline crosses over. Based on the overall length of the trails and alternative locations to access them, a temporary negligible impact on the recreational access of state trails is likely.

For the Hunter Walking Trail, the Applicant has stated that access would be maintained during the hunting season. Noise and visual disturbance may continue to affect the recreational experience in the affected areas during construction; however, restrictions in access at the pipeline crossing would no longer be necessary. Therefore, impacts on the recreational access to the Hunter Walking Trail would be temporary and negligible. Overall, impacts on the recreational access of state-designated land-based trails are anticipated to be temporary and negligible, since impacts are confined to the area where the pipeline crosses the trail and any restrictions to access at these intersections would be limited to during and immediately following construction.

State-Designated Water Trails and Trout Streams

The Applicant's proposed project would cross five state-designated canoe and boating trails and six state-designated trout streams in Minnesota. No water trails or trout streams would be crossed by the Applicant's proposed project in North Dakota or Wisconsin. This assessment focuses on state-designated water trails as these are expected to have the highest number of visitors and would result in larger impacts on county tourism if use was disrupted.

For the Red River of the North in Kittson County, the Red Lake River in Pennington County, the Crow Wing River in Wadena County, and the Mississippi River in Clearwater and Aitkin counties, the Applicant has proposed using HDD crossing methods to prevent any disturbance of the river during construction. Therefore, public use of these rivers would not be interrupted, resulting in no impacts.

The Applicant does not propose using HDD methods to cross the Pine River. Depending on the crossing method, impacts may include temporary limits on access where the pipeline crosses over, construction noise, and downstream turbidity. Public use and access to the Pine River where the pipeline crosses over would be temporarily interrupted to allow installation of the pipeline. After the pipeline installation is completed, river users would be allowed to cross the construction area. Based on a review of the trail route map, the pipeline crossing would occur near the end of the trail (on or around River Mile 45 of 59 miles), which does not include any public access points or recreational facilities. Construction-related impacts on the Pine River likely would result in a temporary restriction on recreational access during pipeline installation where the pipeline crosses over. Based on the overall length of the Pine River and alternative sites to access the river, a temporary minor impact on recreational access to the Pine River is likely.

For trout streams, the Applicant has specified the use of HDD crossing methods for the Straight River and no impacts on recreational use of this waterbody are expected. Applicant-proposed methods for crossing King Creek (wet open cut), Spring Branch (dry crossing), Blackhoof River (dry crossing) and the unnamed stream (no method proposed) are also listed in Appendix G, as are the applicant-proposed alternative crossing methods for these streams. Depending on the crossing type, impacts could include temporary limits on access. Restrictions would likely be limited to where the pipeline crosses over, resulting in temporary minor impacts on recreational access to these streams.

The Applicant has proposed to develop a site-specific crossing plan for La Salle Creek. The Applicant also has consulted with Minnesota DNR regarding lessons learned related to construction methods and alignment at La Salle Creek by other third-party pipeline operators, including the potential for an unanticipated release of drilling fluid used during HDDs (i.e., a frac-out) (Enbridge 2016). The construction method and alignment at the La Salle Creek crossing have been modified as a result of Minnesota DNR's concerns.

Overall, restrictions on recreational use of trout streams are likely to be temporary and limited to the duration of pipeline installation. In addition, the Applicant has proposed no in-channel work during peak trout season in each waterbody. Because impacts on these streams would be temporary and would not occur during designated trout fishing seasons, temporary minor impacts on recreational access to trout streams are anticipated.

Scenic Byways

The Applicant's proposed project would cross three scenic byways (the Great River Road, the Lake Country, and Veterans Memorial byways) using a bore or HDD, which would avoid road closures and any direct impacts on the roads. As a result, construction would not disrupt use of the byways, resulting in no impacts. Impacts associated with aesthetic changes along scenic byways are discussed in Section 6.2.3.

<u>Changes to the Recreational Economy</u>

Parks, Forests, and Special Management Areas

Construction could disrupt the activities or alter the recreational experience of people who regularly use the affected areas for specific recreational purposes. These impacts would be temporary and minor, and would be limited to small portions of the overall recreational area. (See discussion above for "Recreational Access Limitations.") A review of state forest and WMAs maps revealed that the majority of the land crossed by the Applicant's proposed project does not include developed recreational areas (e.g., facilities and trails), which are more likely to attract visitors from outside of the area. Therefore, it is likely that impacts would be limited to local people who live in and around the immediate area.

During construction, local recreational users could re-locate to undisturbed areas throughout each of the state forests and WMAs, given the overall size of these areas relative to the area affected by the construction footprint (531 acres of land disturbed for construction of 715,273 acres of total land available) (Table 5.3.2-1). Construction-related impacts would likely result in a temporary, negligible impact on the number of recreation-based trips people take to state forests and WMAs because construction impacts would be temporary (several days to several weeks depending on a variety of factors such as land use type, topography, weather, and other environmental conditions) and limited to areas with little opportunities for developed recreation. In addition, a variety of substitute or alternative sites both within the affected forest or WMA and in the county as a whole would be available to recreational users. Given the temporary nature of the activity and the opportunity to recreate in a variety of other places within each affected state forest and WMA, a loss of recreation-based visitation sufficient to measure in terms of recreational spending at the county-level is not expected. The impact on the recreational economies in each of the counties that would be crossed is expected to be temporary and negligible.

State-Designated Land-Based Trails

Construction-related impacts are likely to be confined to a specific segment of the affected trails for only a short period of time, and general access to the trails would not be restricted. Consequently, the change in overall recreation-based visitation to trails at the county level would not be large enough to measurably affect the amount of recreation-based tourism spending in any one county. Potential impacts on the recreational economy at the county level would be temporary and negligible.

State-Designated Water Trails and Trout Streams

Only the Pine River would be affected temporarily by construction of the Applicant's proposed project where the pipeline crosses the waterbody. Therefore, construction-related impacts on the recreational use of state-designated water trails likely would not be large enough to measure in terms of recreational spending at the county-level. Potential impacts on the recreational economies in the counties that would be crossed would be temporary and negligible.

As previously stated, impacts on trout streams would not occur during designated trout fishing seasons; therefore, impacts on the recreational use of trout streams likely would be temporary and negligible. Subsequently, temporary negligible impacts on the recreational economy at the county level are expected.

Scenic Byways

The Applicant's proposed project would cross scenic byways using a bore or HDD, which would avoid road closures and any direct impacts on the roads. Therefore, there would be no impacts on the recreational economy.

Operations Impacts

Limitations to Recreation Access

Parks, Forests, and Special Management Areas

Operation of the pipeline would involve periodic inspection, pipeline maintenance activities, and mowing to maintain appropriate vegetation. Access to parks, forests, and special management areas would not be restricted or limited as a result of maintenance mowing and inspections during operations. Aboveground facilities, MLVs, and permanent access roads also would not limit recreational access to parks, forests, or special management areas. Therefore, no impacts on recreational use of parks, forests, or special management areas are expected from operation of the pipeline for the Applicant's proposed project.

State-Designated Land-Based Trails

Access and use of state-designated trails that would be crossed by the Applicant's proposed project would not be affected during maintenance mowing and inspection activities during operations. Aboveground facilities, MLVs, and permanent access roads would not limit recreational access to state-designated land-based trails. Therefore, no impacts on recreational use of land-based trails are expected during operation of the pipeline.

State-Designated Water Trails and Trout Streams

Access and use of state-designated canoe routes and other waterbodies that would be crossed by the Applicant's proposed project would not be affected during maintenance mowing and inspection activities during operations. Aboveground facilities, MLVs, and permanent access roads would not affect recreation use of water trails and trout streams. Therefore, no impacts on recreational use of state-designated water trails or trout streams are expected during operations.

Scenic Byways

Access and use of federally and state-designated scenic highways that would be crossed by the Applicant's proposed project would not be affected during maintenance mowing and inspection activities during operations. Aboveground facilities, MLVs, and permanent access roads would not affect recreational use. Therefore, no impacts on recreational use of scenic byways are expected during operations.

<u>Changes to the Recreational Economy</u>

Parks, Forests, and Special Management Areas

Because there would be no impacts on recreational use of forests or special management areas during operations for the Applicant's proposed project, there would be no impacts on the recreational economy in any of the affected counties.

State-Designated Land-Based Trails

Because there would be no impacts on recreational use of land-based trails during operations, there would be no impacts on the recreational economy in any of the affected counties.

State-Designated Water Trails and Trout Streams

Because there would be no impacts on recreational use of state designated water trails and trout streams during operations for the Applicant's proposed project, there would be no impacts on the recreational economy in any of the affected counties.

Scenic Byways

Because there would be no impacts on recreational use of scenic byways during operations for the Applicant's proposed project, there would be no impacts on the recreational economy in any of the affected counties.

5.3.2.3.2 Continued Use of Existing Line 3

Construction Impacts

No construction would be required for continued use of the existing Line 3, with no associated construction-related impacts on recreation and tourism resources.

Operations Impacts

<u>Limitations to Recreation Access</u>

Potential impacts on the use of recreational land or waterbodies could occur from integrity digs and subsequent pipeline repair if these activities occurred at crossings of recreational lands, including forests, land-based trails, and water trails. Impacts could include temporary access restrictions for the duration of inspections and repair work, which would occur only within the permanent right-of-way (except for access roads). The limited areal extent of such work and its short duration would result in no impacts on temporary, localized, and negligible impacts on recreational access depending on the location of the digs.

<u>Changes to the Recreational Economy</u>

Due to the localized nature of integrity digs and subsequent repairs and their limited duration, no impacts are expected on the local recreational economy during continued operation of the existing Line 3 pipeline.

5.3.2.3.3 System Alternative SA-04

Construction Impacts

As discussed in Section 4.3.1, SA-04 would be constructed and operated in the same manner as the Applicant's proposed project. However, the route would be within the jurisdiction of other states and other local governments for approximately 544 miles, or 68 percent of the total route. The system alternative is over twice the length of the Applicant's proposed project and would cross more recreational land and waterbodies than the Applicant's proposed project.

<u>Limitations to Recreation Access</u>

Parks, Forests, and Special Management Areas

After reviewing satellite imagery and maps, it was determined that recreational use in the areas crossed by SA-04 in North Dakota and Minnesota is likely limited to more informal recreation, such as hunting, wildlife watching, fishing, and trapping. The geographic extent of the construction work area primarily crosses open land with limited modern facilities (795 acres within the Dakota Tallgrass Prairie WMA). The remaining areas crossed (115 acres) occur in Illinois along the Illinois and Michigan Canal, which provides recreational uses in mostly developed areas, including boating, camping, fishing, and hiking.

At the county level, the majority of the land disturbed during construction (795 acres) would occur in a WMA within Richland County, North Dakota (Table 5.3.2-2). However, a review of national wildlife refuge maps revealed that the disturbed land represents a very small portion (less than one-half of a percent) of the total amount of land that remains available in the WMA. In total, over 185,000 acres of land would remain unaffected and available during construction within the Dakota Tallgrass WMA in Richland County. This is also true in Pembina County, North Dakota within the Pembina County Waterfowl Production Area (5 acres affected of 640 total); in Whiteside County (1 acre affected of 6,030 total); and in LaSalle, Grundy and Will Counties in Illinois (177 acres of 1,130 total). Impacts on access to parks, forests, and special management areas are anticipated to be temporary and minor because access limitations would be confined to small portions of the total land available for recreation, and any closures would be limited to these areas during and immediately following construction.

State-Designated Land-Based Trails

SA-04 would cross the Sakatah Singing Hills State Trail in Minnesota, three trails in Illinois (Great River Trail, Hennepin Canal Feeder, and I&M Canal Path), and the Clinton-Camanche Multi-Purpose Regional Trail l in Iowa. Based on a review of the trail route map for the Sakatah Singing Hills trail, the pipeline crossing would occur at the end of the 39-mile trail, just east of Mankato, in an area with no designated public access points or recreational facilities. The pipeline also crosses the 66-mile Great River trail in Illinois just south of Albany in a location that does not include any public access points or recreational facilities. This is also true for the Hennepin Canal Feeder, a 155-mile trail, also in Illinois. SA-04 crosses the west side of the 62-mile I&M Canal Path trail near the Marseilles Dam, affecting the trail head.

Construction impacts in recreation areas would be similar to those described for the Applicant's proposed project, including temporary restrictions on public access and use of land-based trails where the pipeline crosses over for a short time during pipeline installation. Based on the limited number of crossings and temporary nature of the impacts, it is likely that construction-related impacts on the recreational use of land-based trails along SA-04 would be temporary and negligible.

State-Designated Water Trails and Trout Streams

SA-04 would cross three state-designated canoe and boating trails in Minnesota (Cedar River, Chippewa River, and Minnesota River) and four in Iowa (Little Cedar River, Little Wapsipinicon River, Mississippi River, and Wapsipinicon River). Although the crossing methods have not been identified, they were assumed to be similar to those described for the Applicant's proposed project. For most rivers, the Applicant has proposed using HDD crossing methods to prevent any disturbance of the river during construction. Public use of these rivers would not be interrupted when HDD is used. Where the Applicant does not propose using HDD methods, impacts may include temporary limits on access where the pipeline crosses over. Based on the limited number of crossings and overall lengths of the rivers relative to where they intersect with the pipeline (i.e., offering ample opportunities for public access) it is expected that construction would result in temporary, minor impacts on recreational access.

In Minnesota, SA-04 would cross two trout streams (one stream would be crossed three times); no trout streams would be crossed in Iowa, Illinois, or North Dakota. Although the crossing methods are unknown, they were assumed to be similar to those described for the Applicant's proposed project. HDD crossings would result in no impacts, and other crossing methods could include temporary limits on access where the pipeline crosses over. Furthermore, the Applicant has proposed no in-channel construction during trout season. Based on the limited number of crossings of trout streams (only two and only in Minnesota), it is likely that construction-related impacts on the recreational use of trout streams would be temporary and minor.

Scenic Byways

SA-04 would cross three national byways in Iowa and on the border of Iowa and Illinois (Grant Wood, Great River Road, and Green River Road) (see Figure 5.3.2-2). The Applicant would cross each of the scenic byways using a bore or HDD, which would avoid road closures and any direct impacts on the roads. As a result, construction would not disrupt use of the byways along SA-04, resulting in no impacts on recreational access.

<u>Changes to the Recreational Economy</u>

Parks, Forests, and Special Management Areas

Construction of a pipeline along SA-04 could disrupt access to recreation sites and could affect the activities or alter the recreational experience of people who regularly use the affected areas for specific recreational purposes. These impacts would likely be temporary and localized, and limited to small portions of the overall recreational site (i.e., 978 acres of 432,800 acres available). A review of relevant maps and satellite imagery revealed that the majority of the land crossed by the route does not include developed recreational areas (e.g., facilities and trails) that are more likely to attract visitors from outside of the area. It is likely, therefore, that impacts would be limited to local people who live in and around the immediate area. During construction, it also is likely that local recreational users could temporarily re-locate to undisturbed areas throughout each of the state forests, parks and WMAs, given the overall size of these areas relative to the area affected by the construction footprint. Overall, construction-related impacts on the recreational economy would be temporary and negligible because (1) construction would move through an area relative quickly (several days to several weeks) and would be limited to areas with very little opportunities for developed recreation; and (2) a variety of substitute or alternative sites—within the affected park, forest, or WMA and in the county as a whole—would be available for recreational users.

Given the temporary nature of the construction activity and the opportunity to recreate in a variety of other places in the county, it is not expected that the loss of recreation-based visitation would be large enough to measure in terms of recreational spending at the county-level, resulting in a temporary, negligible impact on the recreational economies in each of the counties crossed.

State-Designated Land-Based Trails

Since construction-related impacts would be confined to specific segments of trails and general access to trails would not be limited, the change in overall recreation-based visitation to trails at the county level would not be large enough to measurably affect the amount of recreation-based tourism dollars the county receives. Subsequently, this would result in a temporary and negligible impact on the recreational economy at the county level.

State-Designated Water Trails and Trout Streams

Because of the limited number of crossings with associated impacts and the temporary nature of the impacts, it is likely that construction-related impacts on the recreational use of state-designated water trails would not be large enough to measure in terms of recreational spending at the county-level, resulting in a temporary, negligible impact on the recreational economy.

Based on the limited number of trout stream crossings (only two and only in Minnesota), it is likely that construction-related impacts on the recreational use of trout streams would be temporary and negligible, with a corresponding temporary, negligible impact on the recreational economy of the affected counties.

Scenic Byways

The Applicant would anticipate crossing each of the scenic byways using a bore or HDD, which would avoid road closures and any direct impacts on the roads. As a result, construction impacts on scenic byways would not affect the recreational economy of the affected counties.

Operations Impacts

<u>Limitations to Recreation Access</u>

Parks, Forests, and Special Management Areas

Operation of the SA-04 pipeline would involve periodic inspection, pipeline maintenance activities, and mowing to maintain appropriate vegetation. Recreation access would not be restricted or limited as a result of these activities. Aboveground facilities, MLVs, and permanent access roads would not limit recreational access to state parks, forests, or special management areas. Therefore, temporary, negligible impacts on recreational use of parks, forests, and special management areas are expected during operation of the pipeline.

State-Designated Land-Based Trails

Operation of the pipeline would involve periodic inspection, pipeline maintenance activities, and mowing to maintain appropriate vegetation. Access and use of state-designated trails that would be crossed by SA-04 would not be affected during operational activities. Aboveground facilities, MLVs, and permanent access roads would not affect recreational access to state-designated land-based trails. Therefore, no impacts on recreational use of land-based trails are expected during operation.

State-Designated Water Trails and Trout Streams

Access and use of state-designated canoe routes and other waterbodies that would be crossed by SA-04 would not be affected during maintenance mowing and inspection operation activities. Aboveground facilities, valves, and permanent access roads would not affect the recreational use of state-designated water trails and trout streams. Therefore, no impacts on recreational use of state designated water trails and trout streams are expected during continued operation of the pipeline.

Scenic Byways

Access and use of federally and state-designated scenic highways that would be crossed by SA-04 would not be affected during maintenance mowing and inspection operation activities. Aboveground facilities, MLVs, and permanent access roads would not affect recreational use of scenic byways. Therefore, no impacts on recreational use of scenic byways are expected during operation.

Changes to the Recreational Economy

Parks, Forests and Special Management Areas

Since recreational use of parks, forests, and special management areas would not be affected during operations, there would be no impacts on the recreational economy in any of the counties crossed.

State-Designated Land-Based Trails

Since recreational use of state-designated land-based trails would not be affected during operations, there would be no impacts on the recreational economy in any of the counties crossed.

State-Designated Water Trails and Trout Streams

Since recreational use of state designated water trails and trout streams would not be affected during operations, there would be no impacts on the recreational economy in any of the counties crossed.

Scenic Byways

Because recreational use of scenic byways would not be affected during operations, there would be no impacts on the recreational economy in any of the counties crossed.

5.3.2.3.4 Transportation by Rail

Construction Impacts

Limitations to Recreation Access

The rail alternative includes construction of a new offloading facility in Clearbrook, Minnesota; an offloading facility in Superior, Wisconsin; and upgrades and expansion of existing rail infrastructure. The land that would be permanently converted for facility construction and expansion is not currently designated for recreational purposes. It is mostly mixed-use, industrial, and agricultural land. Therefore, construction activities associated with transportation by rail would not affect recreational use.

Changes to the Recreational Economy

Because none of the new or expanded loading/offloading facilities or railway spurs would be constructed on land used for recreational purposes, construction activities for the transportation by rail alternative would not affect the local recreational economy.

Operations Impacts

Limitations to Recreation Access

Continued shipment of crude oil via rail would not be expected to affect recreational use of parks, forests, special management areas, land-based trails, water trails, trout streams, or scenic byways. Consequently, no impact on overall recreational visitation would result. However, one of the rail routes (Superior South) crosses through the Detroit Lakes and the Brainerd Lakes areas, which are popular vacation destinations for people inside and outside of Minnesota. An increase from 3 to 10 unit trains per day would increase the average daily gate down-time and obstruction of local traffic at rail crossings. Gate down-time is a function of train speeds, which vary by both regulation and rail system operational requirements (waiting on passing tracks, dispatch within various segments of each route, and train crew work schedules). As discussed in Section 5.3.3, gate down-time ranges from 2.3 minutes at 50 mph typical in rural areas to 3.0 minutes at 35 miles per hour, which may be typical in populated areas. In rural areas with little roadway traffic, the increase in blockage of at-grade crossings would have a minor but permanent impact on people who visit these areas on vacation. Therefore, with respect to access to these areas as a tourist destination, it is expected that operation of the rail line to transport crude oil would result in a permanent, minor impact.

Changes to the Recreational Economy

While the increased rail traffic is likely to have a permanent, minor impact on access to two popular tourist destinations because of an increase in blockage of at-grade crossings, it is not expected that this would deter people from choosing these areas as a vacation destination. Therefore, it is expected that continued operation of the rail line would have a permanent, negligible impact on the recreational economy in Becker or First Island counties.

5.3.2.3.5 Transportation by Truck

Construction Impacts

Limitations to Recreation Access

The truck alternative includes construction of a new offloading facility in Clearbrook, Minnesota; an offloading facility in Superior, Wisconsin; and new local access roads to these facilities. The land that would be permanently converted for facility construction and expansion is not currently designated for recreational purposes. It is mostly mixed-use, industrial, and agricultural land. Therefore, construction activities associated with transportation by truck would not affect recreational use.

Changes to the Recreational Economy

Because construction associated with the truck alternative would not affect recreational use, there would be no construction-related impact on the recreational economies in the counties crossed.

Operations Impacts

Limitations to Recreation Access

Shipment of crude oil via truck would not be expected to affect access to the recreational use of parks, forests, special management areas, land-based trails, or waterbodies, thereby causing no impact on overall recreational access. The increase in traffic along major truck routes and the increase in future traffic density (see Section 5.3.3.3.5) indicate that the potential for congestion along portions of the route may result in minor permanent impacts and major temporary impacts on traffic movement, thus affecting the mobility of people who drive on these truck routes. If the increased volume of tanker trucks leads to congestion along intersections with scenic byways or leads commuters to use scenic byways to avoid the truck routes, the potential exists for permanent, negligible to minor impacts on motorists along the scenic byways. A variety of alternate scenic highways do not intersect with potential truck routes, and trucks transporting crude oil primarily would travel on major interstates and avoid scenic byways. Therefore, it is likely that transportation of oil by truck would result in a permanent negligible impact on access to scenic byways.

Changes to the Recreational Economy

Shipment of crude oil via truck would not be expected to affect recreational use of parks, forests, special management areas, land-based trails, or waterbodies, thereby causing no impact on recreational economies at the county level. The potential permanent negligible impact on the access to some scenic byways would not be large enough to measurably affect the amount of recreation-based tourism spending at the county-level. Subsequently, this would result in a permanent, negligible impact on the recreational economy at the county level.

5.3.2.3.6 Existing Line 3 Supplemented by Rail

Construction Impacts

Limitations to Recreation Access

No construction-related impacts on recreation and tourism would result from continued use of the existing Line 3 pipeline because it is already built. As previously noted, none of the new or expanded loading/offloading facilities for rail transport would be constructed on land used for recreational purposes. Therefore, construction impacts from continued use of the existing Line 3 pipeline supplemented by transportation by rail would not affect recreational access.

Changes to the Recreational Economy

No construction-related impacts on recreation and tourism would result from continued use of the existing Line 3 pipeline because it is already built. As previously noted, none of the new or expanded loading/offloading facilities or railway spurs would be constructed on land used for recreational purposes. Therefore, construction impacts from continued use of the existing Line 3 pipeline supplemented by transportation by rail would not affect the recreational economy at the county level.

Operations Impacts

Limitations to Recreation Access

No impacts on the use of recreational land or waterbodies would be associated with continued operations of the existing Line 3 pipeline unless integrity maintenance digs are required at crossings of recreational lands. Impacts on recreation and tourism during integrity digs and subsequent excavation and repair work for continued use of Line 3 would be the same as those described above for the existing Line 3 alternative. Impacts of integrity digs are expected to be temporary, localized, and limited to the permanent right-of-way, resulting in no impact to a negligible impact (depending on the location of the dig) on recreational access.

Shipment of crude oil via rail would not be expected to affect recreational use of parks, forests, special management areas, land-based trails, water trails, trout streams, or scenic byways. Consequently, no impact on overall recreational access would result, with the exception of the increase in blockage of at-grade crossings in the Detroit and Brainerd Lakes areas. The impact would be minor but a permanent impact on people who visit these areas on vacation.

Changes to the Recreational Economy

Due to the small areas that could be affected by integrity digs during continued operation of the Line 3 pipeline and their temporary duration, no impacts are expected on the local recreational economy. In addition, rail transport would not be expected to affect recreational use of parks, forests, special management areas, land-based trails, water trails, trout streams, or scenic byways. Consequently, no impact on overall recreational visitation or on recreational economies at the county level would result. While the increased rail traffic is likely to have a permanent minor impact on access to two popular tourist destinations caused by increased blockage of at-grade crossings, it is not expected that people would be deterred from choosing these areas as a vacation destination. Consequently, continued operation of the rail line is expected to result in a permanent, negligible impact on the recreational economy in either Becker or First Island counties.

5.3.2.3.7 Existing Line 3 Supplemented by Truck

Construction Impacts

Limitations to Recreation Access

Continued use of the existing Line 3 pipeline would not result in construction-related impacts on state parks, forests, special management areas, state-designated land-based trails, water trails, trout streams or scenic byways because it is already built. As previously noted, none of the new or expanded loading/offloading facilities for truck transport would be constructed on land used for recreational purposes. Therefore, construction-related impacts associated with transportation by truck would not affect recreational access.

Changes to the Recreational Economy

Continued use of the existing Line 3 pipeline would not result in construction-related impacts on the local recreational economy because it is already built. Subsequently, construction for the truck alternative would not affect the recreational economy.

Operations Impacts

Limitations to Recreation Access

No impacts on access to recreational land or waterbodies would be associated with continued operations of the existing Line 3 unless integrity maintenance digs are required at crossings of recreational lands. Continued operation of the existing Line 3 could affect recreational land from integrity digs along the existing pipeline. Impacts of integrity digs are expected to be temporary, localized, and limited to the permanent right-of-way, thereby resulting in no impacts on temporary negligible impacts on recreational use. If the increased volume of tanker trucks leads to congestion along intersections with scenic byways, the quality of the experience for motorists could be reduced. However, the volume of trucks under this alternative would be less than under transportation by truck alone and is not anticipated to result in such congestion. Consequently, impacts the recreational access to scenic byways would be permanent but negligible.

Changes to the Recreational Economy

Due to the small areas that could be affected by integrity digs during continued operation of the Line 3 pipeline and their temporary duration, no impacts are expected on the local recreational economy. In addition, truck transport would not be expected to affect recreational use of parks, forests, special management areas, land-based trails, water trails, trout streams, or scenic byways, thereby causing no impact on recreational economies at the county level. Transportation by truck could result in a permanent negligible impact on recreational use of scenic byways from potential (but unlikely) increased congestion. Because it is unlikely that this impact would be large enough to measure in terms of recreational spending at the county-level, the impact on local recreational economies would be permanent but negligible.

5.3.2.4 Summary and Mitigation

5.3.2.4.1 Summary

Table 5.3.2-3 presents the results of the analysis of potential impacts on access to recreational resources and subsequent impacts on recreational economies at the county-level from construction and operation of the Applicant's proposed project and the CN Alternatives. The Applicant's proposed project and system alternative SA-04 would have temporary and negligible to minor impacts on recreational access to state forests and WMAs, but these anticipated impacts would not be large enough to measure in terms of recreational spending at the county level. Impacts on the recreational economies for the two pipeline routes would be temporary and negligible. The affected recreation areas represent a small (less than one-half of a percent) portion of the total land area that remains available for recreational use. This is also true for impacts on state-designated land, water-based trails, and scenic byways. Based on the limited number of crossings compared to the overall trail/route length, the Applicant's proposed crossing methods, and plans to limit construction during designated hunting and fishing seasons, both the Applicant's proposed project and SA-04 would result in temporary negligible impacts on access to these resources and therefore on recreational spending at the county level. Construction impacts from all of the other CN Alternatives would not affect recreational access to the described resources.

The analysis also found that recreational economies would not be affected unless construction for integrity digs on recreational land occurred during operations along the existing Line 3. Therefore, depending on the location of the digs, there would either be no impact or temporary negligible impacts.

Recreation access would not be affected during operation of pipelines; therefore, the recreational economy would not be affected in the counties that would be crossed during operations. A potential exception is if the increased volume of trucks on the road or rail traffic would affect access to scenic byways or vacation destinations such as the Brainerd Lakes or Detroit Lakes areas. It is unlikely that this impact would deter people from using scenic byways altogether or keep them from vacationing in the Brainerd Lakes or Detroit Lakes areas. Therefore, operations for the rail and truck alternatives would result in permanent but negligible impacts on the recreational economies. This finding is also true for operations associated with the combined rail/truck alternatives.

5.3.2.4.2 Mitigation

Given the findings that impacts on recreational access and recreational economies would be negligible to minor, no mitigation measures were identified to further reduce impacts.

Table 5.3.2-3. Summary of Potential Impacts on Recreation and Tourism for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Line 3 Supplemented by Rail[d,f]	Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Recreation access limitations to parks, forests, and special management areas during construction	Temporary/minor impacts • 526 acres	No impact	Temporary/minor impacts • 978 acres	No impact	No impact	No impact	No impact
Recreation access limitations to state-designated trails and trout streams during construction	Temporary/ negligible to minor impacts • 20 snowmobile/ ATV trail crossings • 4 land trail crossings • 1 water trail crossing • 6 trout stream crossings No impact • HDD crossing methods • 4 water trails	No impact	Temporary/ negligible impacts • 25 snowmobile/ ATV trail crossings • 5 land trail crossings • 7 water trail crossings • 4 trout stream crossings (2 streams)	No impact	No impact	No impact	No impact
Recreation access limitations to scenic byways	No impact	No impact	No impact	No impact	No impact	No impact	No impact

Table 5.3.2-3. Summary of Potential Impacts on Recreation and Tourism for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Line 3 Supplemented by Rail[d,f]	Line 3 Supplemented by Truck[d,g]
Changes to the recreational economy during construction	Temporary/no impact to negligible impacts	No impact	Temporary/no impact to negligible impacts	No impact	No impact	No impact	No impact
Operations Impacts							
Recreation access limitations to parks, forests, and special management areas during operations	Temporary/no impact to negligible impacts	Temporary/no impact to negligible impacts during integrity digs	Temporary/no impact to negligible impacts	No impact	No impact	Temporary/no impact to negligible impacts during integrity digs	Temporary/no impact to negligible impacts during integrity digs
Recreation access limitations to state-designated trails and trout streams during operations	Negligible	No impact	Negligible	No impact	No impact	No impact	No impact
Recreation access limitations to scenic byways	No impact	No impact	No impact	No impact	Permanent/ negligible to minor impacts	No impact	Permanent/ negligible impacts
Recreation access limitations to tourist destinations	No impact	No impact	No impact	Permanent/minor impacts	No impact	Permanent/minor impacts	No impact
Changes to the recreational economy during operations	No impact	No impact	No impact	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts

Table 5.3.2-3. Summary of Potential Impacts on Recreation and Tourism for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Line 3 Supplemented by Rail[d,f]	Line 3 Supplemented by Truck[d,g]

ATV = all-terrain vehicle

[a] No single dataset in this summary table provides a complete indication of all relevant impacts to recreation and tourism. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, while the state-designated trout stream dataset provides an indication of impacts to trout fishing, it does not provide information about other important recreational uses hiking. Other datasets, like DNR trails, must also be considered for a more complete understanding of recreational impacts.The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-498 through 5-507. The table above, for example, describes temporary access restrictions that could occur for certain recreational resources within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to is contained in the text of this section.

[c] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-498 to 5-501. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on page 5-501. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-501 to 5-503. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-503 to 505. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-505 to 506. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

5.3.2.5 References

Minnesota Department of Natural Resources (MNDNR). 2017. Minnesota State Water Trails. http://www.dnr.state.mn.us/watertrails/index.html. Accessed July 2017.

U.S. Geological Survey, Gap Analysis Program (USGS GAP). 2016. Protected Areas Database of the United States (PAD-US). Version 1.4 Combined Feature Class. May.

5.3.3 Population

Population in the vicinity of the Applicant's proposed project and the CN Alternatives may be affected by construction of new facilities and operation of new or existing facilities. The population analysis focuses on how populations may be affected by the direct increase in Project-related workers. It does not consider indirect population changes from increased local economic activities. The analysis of effects on local populations includes changes in local workforces and disruption to local populations by the following potential impacts:

- Increases in local workforces from the influx of non-local workers temporarily or permanently moving to an area to support construction or operations. Changes in workforce population may affect demand on emergency services, increase traffic congestion from commuting, and the availability of housing;
- Disruptions to high-population areas and other populated areas in proximity to construction work areas from noise, dust, and vibrations from construction and operations equipment; disruptions to traffic and services such as water and gas during construction, and permanent displacement of residences and structures during operations.
- Increased disturbance of population areas along existing rail and highway routes from additional train and truck use of rail lines and highways, and their effects on local infrastructure.

Potential impacts on populations from pipeline crude oil releases are discussed in Chapter 10.

This section first describes the existing populations within an area along the Applicant's proposed project and each of the CN Alternatives where populations could be affected by construction and operation of the Applicant's proposed project or one of the CN Alternatives (the ROI). The potential impacts of construction and operation for the Applicant's proposed project and the CN Alternatives on those populations are assessed next. A summary and comparison of potential impacts are included at the end of the section, followed by potential mitigation measures to reduce impacts.

5.3.3.1 Regulatory Context and Methodology

5.3.3.1.1 Regulatory Context

In Minnesota, the Commission must consider the existence and density of populated areas when routing a crude oil pipeline in the state (Minn. R. 7852.1900, Subp. 3[a]). North Dakota, Illinois, and Iowa do not have a state-specific environmental review process or any regulations that specifically address population in the determination of energy infrastructure. No specific standards related to the proximity of populated areas to pipeline facilities were identified other than compliance with local planning and zoning ordinances. See Section 6.2.1 for a discussion of planning and zoning.

5.3.3.1.2 Methodology

The analysis for impacts on population is broken into two components: impacts associated with the non-local workforce re-locating to communities near the Project, and impacts associated with construction and operation of the pipeline near densely populated areas.

The additional pipeline workforce may affect communities during construction or operation if existing infrastructure and services are not adequate. Additionally, routing a pipeline through population centers or areas of high population density is difficult because these areas have more infrastructure in place such as roads, structures, and utilities. A greater number of people potentially would be affected by noise, dust, population increase, and traffic during construction in these areas, which may exacerbate the magnitude and duration of impacts compared to less populated areas.

Non-Local Workforce

The net change to local populations from the influx of non-local workers was assessed by:

- Gathering current population statistics from the U.S. Census Bureau for the counties that would be crossed by the Applicant's proposed project and the CN Alternatives;
- Estimating the total population increase that could result from workers moving to the counties with their families;
- Identifying the areas where the total population increase in a county could be 10 percent or more, and the expected impacts of the increase; and
- Qualitatively assessing impacts related to population increases based on the percent and duration of change in population.

The ROI for the assessment of non-local workforce effects is the counties that are crossed by the Applicant's proposed project and the CN Alternatives (continued use of existing Line 3, system alternative SA-04, transportation by rail, transportation by truck, and Line 3 supplemented by rail or truck). County-level data provide a summary of populations potentially affected by the influx of the construction workforce. Workers re-locating to the area would commute to work from various communities near, but not necessarily along, the pipeline route. The counties crossed by the pipeline reflect a reasonable estimate for where the workers are likely to re-locate and the level of current population that would be affected.

Populated Areas

Impacts on high-population areas and other populated areas that may occur from construction and operation of the Project were assessed by:

- Overlaying the Applicant's proposed project and the CN Alternatives on a map of high consequence areas that includes highly populated areas and other populated areas;
- Recording the total miles of populated areas crossed by the Applicant's proposed project and the CN Alternatives, and the total area of populated areas that would fall within 1,250 feet of the construction work area;
- Identifying all populated areas within the ROI; and
- Assessing the nature, extent, duration, and magnitude of impacts on populated areas and any measures to minimize potential impacts.

The ROI for the review of populated areas consists of the area within 1,250 feet of the construction footprint for the Applicant's proposed project and the CN Alternatives. For this analysis, "populated areas," as defined by the U.S. Census Bureau, consist of incorporated areas or legal entities and census-designated places, which are statistical entities.

Data for populated areas within 1,250 feet of the routes were derived from the U.S. Census Bureau's Master Address File / Topologically Integrated Geographic Encoding and Referencing Database (U.S. Census Bureau 2015). Impacts on these areas were quantified in terms of the number of populated areas crossed, the extent of the pipeline crossing in these populated areas (i.e., miles crossed by the pipeline centerline), and the populated area (acreage) within 1,250 feet of construction. These metrics are intended to capture the number of communities most affected and the degree to which each community would be affected. The miles of an area crossed by the pipeline centerline quantifies the relative extent of impact, but does not reflect impacts on locations adjacent to the pipeline. Using a 1,250-foot buffer accounts for areas that may be affected by noise, dust, vibration, and increased traffic from construction (typical construction noise would most likely be within acceptable levels at a distance of 1,250 feet, as discussed in Section 6.2.2).

No single one of the data sources considered above provides a complete indication of all relevant impacts to population, but together the different metrics provide a reasonably comprehensive indication of the potential impacts. For example, while total population can aid in identifying the number of potentially affected people, an understanding of population density is needed in order to understand the potential stress that could be felt as the result of an influx of temporary workers.

Furthermore, the quantitative information from these data sources should be coupled with an understanding of the qualitative descriptions of impacts that are contained in the text in this section. Tables in this section provide miles, for example, of the Applicant's pipeline route and alternatives that would cross within populated areas and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to population centers is contained in the text of this section.

5.3.3.2 Existing Conditions

Populated areas and population density within those areas for the counties crossed by the Applicant's proposed project and CN Alternatives in Minnesota are shown in Figure 5.3.3-1.

5.3.3.2.1 Applicant's Preferred Route

The Applicant's proposed project would cross 14 counties in three states (Figure 5.3.3-1). The population density of all of the potentially affected counties is below the statewide average in all three states, which would indicate that the counties are primarily rural with few large population centers. Of these counties, the county with the highest population density is Crow Wing County in Minnesota, with 64 people per square mile (U.S. Census Bureau 2015). The population density of Minnesota as a whole is 69 people per square mile. The county with the lowest population density is Kittson County, also in Minnesota. Crow Wing County has the highest total population of all the counties, with 63,428 people; and Red Lake County in Minnesota has the lowest, with 4,055 people. The total population for the counties that would be crossed is 301,084 people. County population estimates for 2010 and 2015, the percentage population change between those years, and the population density for all counties crossed by the Applicant's proposed project are presented in Appendix N.

Table 5.3.3-1 lists the populated areas that occur along the Applicant's proposed project. For each populated area, the table also gives its population, the length of the route centerline that passes through the populated area, and the total acreage of populated areas that would be located within 1,250 feet of the construction work area. For the Applicant's proposed project, the total number of people in the populated areas that would be crossed is 92,017 people, the total miles of populated areas crossed would be approximately 10 miles, and the total acreage of populated areas within 1,250 feet would be approximately 3,314 acres.

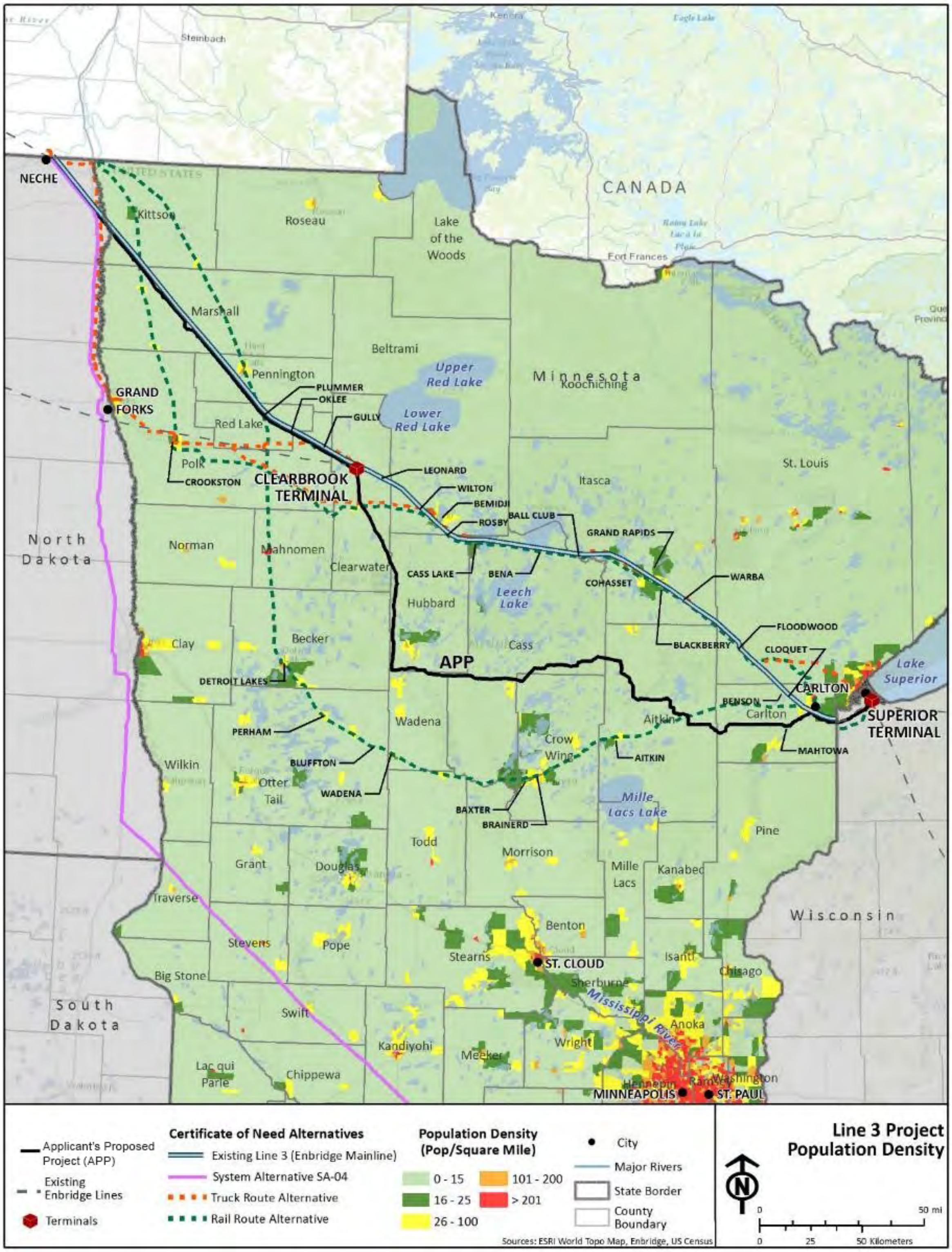

Figure 5.3.3-1. Population Density in the Counties Crossed by the Applicant's Proposed Project and the Certificate of Need Alternatives in Minnesota

Table 5.3.3-1. Populated Areas near the Applicant's Proposed Project

Populated Area	Population[a]	Miles of Populated Area Crossed by Pipeline Centerline	Populated Areas within 1,250 Feet of Construction Work Area (acres)
North Dakota			
None	None	None	None
Subtotal	***0.0***	***0.0***	***0***
Minnesota			
Gonvick	282	0.0	0
Gully	66	0.0	12
Oklee	435	0.8	215
Plummer	292	2.0	606
Trail	46	0.7	217
Clearbrook	518	0.0	70
Mahtowa	370	2.9	792
Mule Lake	--	0.0	3
Outing	--	0.0	41
Waukenabo	316	0.0	2
Carlton	862	0.0	84
Chub Lake	--	0.0	6
Wrenshall	399	0.1	79
Duluth	86,265	1.0	256
Subtotal	***89,851***	***6.5***	***2,383***
Wisconsin			
Superior	2,166	2.7	930
Subtotal	***2,166***	***2.7***	***930***
TOTAL	**92,017**	**9.9**	**3,313**

[a] Source: U.S. Census Bureau 2010.

"--" = these areas are not census-designated areas; therefore, population information is not available.

5.3.3.2.2 Continued Use of Existing Line 3

The existing Line 3 pipeline lies within the Enbridge Mainline corridor that follows a similar route to the Applicant's proposed project, except where the routes diverge between Clearbrook and Carlton in Minnesota (Figure 5.3.3-1).

Table 5.3.3-2 presents the number of people within the populated areas near the existing Line 3, the miles of populated areas crossed by the pipeline centerline, and the total acreage of populated areas located within 1,250 feet of the pipeline right-of-way.

Table 5.3.3-2. Populated Areas near the Existing Line 3 Pipeline

Populated Area	Population[a]	Miles of Populated Areas Crossed by Pipeline Centerline	Populated Areas within 1,250 Feet of Construction Work Area (acres)
North Dakota			
None	None	None	None
Subtotal	***0.0***	***0.0***	***0.0***
Minnesota			
Gonvick	282	0.0	0
Gully	66	0.0	12
Oklee	435	0.8	215
Plummer	292	2.0	606
Trail	46	0.7	217
Ball Club	342	1.8	492
Bemidji	13,431	4.7	1,749
Bena	116	0.8	250
Bagley	1,392	0.9	304
Blackberry	--	1.6	402
Cass Lake	770	1.6	566
Chub Lake	--	0.0	2
Cloquet	12,124	0.1	41
Cohasset	2,698	3.4	1,126
Coleraine	1,970	3.3	1,051
Deer River	930	0.0	9
Floodwood	528	0.4	173
Grand Rapids	10,869	4.6	1,509
Grant Creek	--	0.0	18
La Prairie	665	0.0	17
Leonard	41	0.2	54

Table 5.3.3-2. Populated Areas near the Existing Line 3 Pipeline

Populated Area	Population[a]	Miles of Populated Areas Crossed by Pipeline Centerline	Populated Areas within 1,250 Feet of Construction Work Area (acres)
Midge Lake	--	0.0	15
Pinewood	--	0.0	39
Portage Lake	--	0.0	18
Rosby	--	0.6	155
Warba	181	1.0	344
Wilton	204	1.6	561
Zemple	93	1.1	311
Chub Lake	--	0.0	6
Wrenshall	399	0.1	79
Duluth	86,265	1.0	256
Subtotal	***134,139***	***32.3***	***10,596***
Wisconsin			
Superior	2,166	2.7	930
Subtotal	***2,166***	***2.7***	***930***
TOTAL	**136,305**	**35.0**	**11,526**

[a] Source: U.S. Census Bureau 2010.

"--" = these areas are not census-designated areas; therefore, population information is not available.

The total number of people in the populated areas near the existing Line 3 pipeline is 136,305 people, the total miles of populated areas crossed is approximately 35 miles, and the total acreage of populated areas within 1,250 feet is approximately 11,526 acres.

5.3.3.2.3 System Alternative SA-04

The route for SA-04 would cross 35 counties in four states (Figure 5.3.3-2). The total population of the counties that would be crossed by SA-04 is 1,887,320 people. The population in the counties along SA-04 ranges from a low of 3,401 people in Traverse County, Minnesota, to a high of 677,560 people in Will County, Illinois. The population densities are typically higher in counties along SA-04 compared to the counties along the Applicant's proposed project. The overall population density for counties along SA-04 is 73 people per square mile. County population estimates for 2010 and 2015, the percentage population change between those years, and the population density for all counties crossed by SA-04 are presented in Appendix N.

Table 5.3.3-3 presents the population of populated areas near SA-04, the miles of populated areas that would be crossed by the pipeline centerline, and the total acreage of populated areas that would be located within 1,250 feet of the construction footprint.

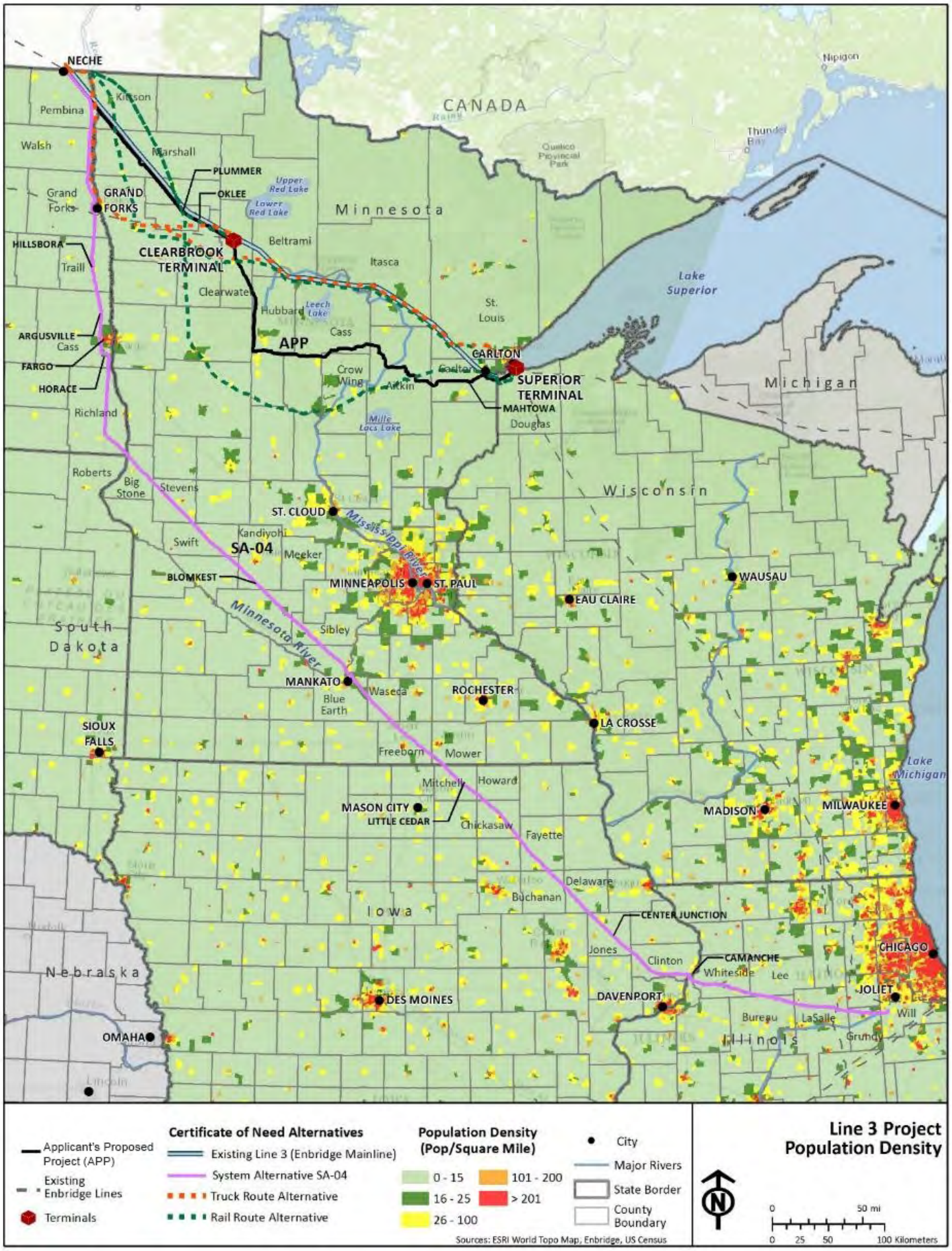

Figure 5.3.3-2. Population Density in the Counties Crossed by System Alternative SA-04

Table 5.3.3-3. Populated Areas near System Alternative SA-04

Populated Area	Population[a]	Miles of Populated Areas Crossed by Pipeline Centerline	Populated Areas within 1,250 Feet of Construction Work Area (acres)
North Dakota			
Argusville	475	2.0	643
Drayton	824	0.0	104
Fargo	105,549	1.1	323
Gardner	74	0.8	234
Grand Forks	52,838	1.0	338
Grandin	173	0.0	28
Hillsboro	1,603	0.7	184
Horace	2,430	3.6	940
Manvel	360	0.0	43
West Fargo	25,830	0.0	256
Subtotal	***190,156***	***9.2***	***3,093***
South Dakota			
White Rock	3	0.0	0
Subtotal	***3***	***0.0***	***0***
Minnesota			
Benson	3,240	0.0	7
Blomkest	157	0.1	61
Eagle Lake	2,422	1.0	73
Hector	1,151	0.0	14
Lyle	551	0.0	49
Mankato	39,309	0.0	341
Subtotal	***46,830***	***1.2***	***546***
Iowa			
Aurora	185	0.0	1
Camanche	4,448	3.5	898
Center Junction	111	0.1	58
Little Cedar	60	0.4	129
Subtotal	***4,804***	***4.0***	***1,086***
Illinois			
Morris	13,636	0.2	64
Mendota	7,372	0.0	0

Table 5.3.3-3. Populated Areas near System Alternative SA-04

Populated Area	Population[a]	Miles of Populated Areas Crossed by Pipeline Centerline	Populated Areas within 1,250 Feet of Construction Work Area (acres)
Channahon	12,560	3.6	1,151
Subtotal	***33,568***	***3.8***	***1,215***
TOTAL	**275,361**	**18.2**	**5,939**

[a] Source: U.S. Census Bureau 2010.

The total population of the populated areas within 1,250 feet of SA-04 is 275,361 people, the total miles of populated areas crossed would be approximately 18 miles, and the total acreage of populated areas within 1,250 feet of the construction footprint would be 5,939 acres.

5.3.3.2.4 Transportation by Rail

The rail alternative includes construction of a new offloading facility in Clearbrook, Minnesota, an offloading facility in Superior, Wisconsin, and upgrades and expansion of existing rail infrastructure. The likely routes for transportation by rail and counties crossed are shown in Figure 5.3.3-1. During operations, unit trains traveling between near Gretna and Clearbrook or Superior would transit through some populated areas and require closure of at-grade crossings during train passage. The increased number of train passages would increase the amount of time each day that rail crossings would be obstructed and movement of vehicular traffic blocked.

Table 5.3.3-4 lists populated areas and the size of the local population located near potential construction sites for rail loading, rail offloading, and rail improvement sites.

Table 5.3.3-4. Populated Areas near Potential Construction Sites for Transportation by Rail

Populated Area	Population[a]	Construction Type
Thief River Falls, Minnesota	8,573	Rail line improvement
Plummer, Minnesota	292	Rail line improvement
Oklee, Minnesota	435	Rail line improvement
Trail, Minnesota	46	Rail line improvement
Gully, Minnesota	66	Rail line improvement/new rail line
Gonvick, Minnesota	282	New rail line
Clearbrook, Minnesota	518	Loading facility/new rail line
Superior, Wisconsin	2,166	Offloading facility/new rail line
TOTAL	**12,378**	

[a] U.S. Census Bureau 2010.

Tables 5.3.3-5 through 5.3.3-7 list the population centers and the size of the local population through which likely rail routes to Clearbrook and Superior would pass. Depending on their proximity to the rail line, portions of these populations could experience increases in noise and dust from passing trains. Increased rail traffic also would extend the amount of time each day that local at-grade crossings would be blocked by passing trains and local traffic movements would be obstructed. Table 5.3.3-8 shows the number of rural and urban at-grade crossings along each potential route. For at-grade crossings, the Federal Railroad Administration's designation of a "population center" is different from the designation of a "populated area" by the U.S. Census Bureau (see table notes). Annual crossing incidents also are shown in Table 5.3.3-8.

Table 5.3.3-5. Populated Areas near the Northern Rail Route

Populated Area	Population[a]	Miles of Populated Areas Crossed by Route Centerline	Populated Areas within 1,250 Feet of Route (acres)
Minnesota			
Ball Club	342	1.2	418
Bemidji	13,431	4.7	1,911
Bena	116	0.3	239
Blackberry	--	0.0	542
Brookston	141	1.1	2238
Carlton	862	1.3	361
Cass Lake	770	1.2	487
Cloquet	12,124	7.3	2,179
Cohasset	2,698	5.0	1,523
Coleraine	1,970	1.6	508
Crookston	7,891	2.9	968
Deer River	930	0.9	324
Donaldson	42	1.5	374
Duluth	86,265	1.2	381
Ebro	64	0.4	237
Erksine	503	0.9	255
Floodwood	528	0.8	238
Fosston	1,527	0.7	365
Grand Rapids	10,869	3.9	1,149
Hallock	104	2.9	582
Humboldt	45	0.4	68
Kennedy	193	0.8	241
La Prairie	665	1.3	382
Lengby	86	0.5	132

Table 5.3.3-5. Populated Areas near the Northern Rail Route

Populated Area	Population[a]	Miles of Populated Areas Crossed by Route Centerline	Populated Areas within 1,250 Feet of Route (acres)
McIntosh	625	1.1	287
Mentor	153	1.5	453
Midge Lake	--	0.0	34
Portage Lake	--	0.0	2
Rosby	--	0.0	211
Scanlon	991	1.1	296
Shevlin	176	1.2	338
Solway	96	1.0	307
Stephen	658	0.8	224
Thomson	159	0.0	3
Warba	181	2.1	601
Warren	1,563	1.6	469
Wilton	204	2.2	641
Wrenshall	399	0.8	223
Zemple	93	0.0	51
Subtotal	***147,464***	***56.2***	***20,242***
Wisconsin			
Argyle	436	1.0	310
Bagley	210	1.8	518
Superior	2,166	2.2	619
Subtotal	***2,812***	***5.0***	***1,447***
TOTAL	**150,276**	**61.2**	**21,689**

[a] Source: U.S. Census Bureau 2010.

"--" = these areas are not census-designated areas; therefore, population information is not available.

Table 5.3.3-6. Populated Areas near the Southern Rail Route

Populated Area	Population[a]	Miles of Populated Areas Crossed by Route Centerline	Populated Areas within 1,250 Feet of Route (acres)
Minnesota			
Aitkin	2,165	0.8	475
Aldrich	48	0.8	202
Baxter	7,610	5.1	1,553
Bejou	89	0.7	150
Bluffton	207	1.5	455
Brainerd	13,590	2.8	928
Brooks	141	1.5	406
Callaway	234	0.8	205
Carlton	862	1.1	330
Cloquet	12,124	0.0	316
Cromwell	234	2.0	614
Deerwood	532	1.8	516
Detroit Lakes	52,334	2.7	994
Erskine	503	0.0	82
Fond Du Lac	--	0.0	172
Frazee	1,350	1.1	424
Halma	61	1.2	309
Karlstad	760	1.7	439
Lake Bronson	229	0.8	231
Lancaster	340	0.9	356
Mahnomen	1,214	1.3	330
McGregor	391	1.2	359
Motley	671	1.2	335
New York Mills	1,199	1.0	291
Newfolden	368	0.9	277
Ogema	184	1.3	355
Perham	2,985	1.7	562
Pillager	469	0.8	175
Plummer	292	1.7	505
Staples	2,981	1.3	441
Strandquist	69	0.5	116
Tamarack	94	1.6	490

Table 5.3.3-6. Populated Areas near the Southern Rail Route

Populated Area	Population[a]	Miles of Populated Areas Crossed by Route Centerline	Populated Areas within 1,250 Feet of Route (acres)
Thief River Falls	8,573	1.8	679
Thomson	159	0.0	3
Verndale	602	1.1	342
Wadena	4,088	2.2	679
Waubun	400	0.5	163
Winger	220	0.8	217
Wrenshall	399	0.8	223
Wright	127	0.0	461
Duluth	86,265	1.2	381
Subtotal	***205,036***	***50.20***	***16,080***
Wisconsin			
Superior	2,166	2.2	619
Subtotal	***2,166***	***2.2***	***619***
TOTAL	**207,202**	**52**	**16,699**

[a] Source: U.S. Census Bureau 2010.

"--" = these areas are not census-designated areas; therefore, population information is not available.

Table 5.3.3-7. Populated Areas near the Clearbrook Rail Route

Populated Area	Population[a]	Miles of Populated Areas Crossed by Route Centerline	Populated Areas within 1,250 Feet of Route (acres)
Minnesota			
Clearbrook	518	0.7	232
Gonvick	282	1.1	372
Gully	66	0.5	138
Halma	61	1.2	309
Karlstad	760	1.7	439
Lake Bronson	229	0.8	231
Lancaster	340	0.9	356
Newfolden	234	0.9	277
Oklee	435	0.8	251
Plummer	292	1.7	505
Strandquist	69	0.5	116
Thief River Falls	8,573	1.8	679
Trail	46	1.3	357
TOTAL	**11,905**	**13.9**	**4,260**

[a] Source: U.S. Census Bureau 2010.

Table 5.3.3-8. At-Grade Crossings along Potential Rail Routes

Route	Route Length (miles)	Population Centers along the Route[a]	Population Center At-Grade Crossings[b]	Rural At-Grade Crossings[b]	Average Annual Crossing Incidents[c]
Northern route	354.8	11	198	291	1.6
Southern route	381.7	10	261	303	3.2
Clearbrook route	129.3	1	11	238	0.6

[a] Concentrations of more than 1,500 people. Source: Minnesota State Demographic Center City 2016.

[b] Source: Federal Railroad Administration, Office of Safety 2017

[c] Average of January 2012 through December-2016. Source: Federal Railroad Administration, Office of Safety 2016

5.3.3.2.5 Transportation by Truck

The truck alternative would include constructing a new offloading facility in Clearbrook, Minnesota, expanding an offloading facility in Superior, Wisconsin, and constructing new local access roads to these facilities. The likely routes for transportation by truck to each destination and the counties that would be crossed are shown in Figure 5.3.3-1. During operations, increased use of freeways and state highways would occur between near Gretna and Clearbrook or Superior. Increased use of local roads also would occur in the vicinity of the Clearbrook and Superior terminals.

Table 5.3.3-9 lists the populated areas and their populations that are located near potential construction sites for the truck alternative. Two populated areas were identified, one in Minnesota and one in Wisconsin—each with populations below 2,200 people. Tables 5.3.3-10 and 5.3.3-11 list the populations and the populated areas through which likely truck routes to Clearbrook and Superior would pass.

Table 5.3.3-9. Populated Areas near Potential Construction Sites for Transportation by Truck

Populated Area	Population[a]	Construction Type
Clearbrook, Minnesota	518	Loading facility/new truck route
Superior, Wisconsin	2,166	Loading facility/new truck route
TOTAL	**4,076**	

[a] Source: U.S. Census Bureau 2010.

Table 5.3.3-10. Populated Areas near the Clearbrook Truck Route

Populated Area	Population[a]	Miles of Populated Areas Crossed by Route Centerline	Populated Areas within 1,250 Feet of Route (acres)
North Dakota			
Drayton	824	0.0	129
Grand Forks	52,838	4.0	1,127
Manvel	360	<0.1	15
Neche	371	0.7	104
Pembina	592	0.0	86
Subtotal	***54,985***	***4.7***	***1,462***
Minnesota			
Clearbrook	518	0.26	144
Crookston	7,891	2.1	551
East Grand Forks	8,601	0.0	106
Fisher	435	0.0	59
Gonvick	282	1.2	3586
Gully	66	0.0	39
Trail	46	1.1	315
Subtotal	***17,839***	***4.7***	***1,567***
TOTAL	**72,824**	**9.4**	**3,029**

[a] Source: U.S. Census Bureau 2010.

Table 5.3.3-11. Populated Areas near the Superior Truck Route

Populated Area	Population[a]	Miles of Populated Areas Crossed by Route Centerline	Populated Areas within 1,250 Feet of Route (acres)
North Dakota			
Drayton	824	0.0	129
Grand Forks	52,838	4.0	1,127
Manvel	360	0.0	15
Neche	371	0.7	104
Pembina	592	0.0	86
Subtotal	***54,985***	***4.7***	***1,461***
Minnesota			
Bagley	1,392	2.0	5912
Ball Club	342	1.1	414
Bemidji	13,431	6.7	2333
Bena	116	0.7	240
Blackberry	--	2.4	536
Cass Lake	770	3.0	784
Cohasset	2,698	4.9	1,493
Coleraine	1,970	1.7	534
Crookston	7,891	2.1	551
Deer River	930	0.8	290
East Grand Forks	8,601	0.0	106
Erskine	503	0.8	245
Fisher	435	0.0	59
Floodwood	528	0.8	210
Fosston	1,527	0.9	405
Grace Lake	--	0.0	109
Grand Rapids	10,869	3.9	1,157
Hermantown	9,414	3.2	980
La Prairie	665	1.3	419
McIntosh	625	1.1	294
Mentor	153	1.7	449
Midge Lake	--	1.5	317
Rosby	--	0.6	212
Shevlin	176	1.3	342

Table 5.3.3-11. Populated Areas near the Superior Truck Route

Populated Area	Population[a]	Miles of Populated Areas Crossed by Route Centerline	Populated Areas within 1,250 Feet of Route (acres)
Solway	96	1.0	307
Warba	181	2.3	585
Wilton	204	2.2	555
Duluth	86,265	8.7	2,634.0
Subtotal	***149,782***	***57***	***22,472***
Wisconsin			
Superior	2166	2.7	930
Subtotal	***2,166***	***2.7***	***930***
TOTAL	**206,933**	**64.4**	**24,863**

[a] Source: U.S. Census Bureau 2010.

"--" = these areas are not census-designated areas; therefore, population information is not available.

The Minnesota Department of Transportation reports road usage in two ways; annual average daily traffic (AADT) and heavy commercial annual average daily traffic (HCAADT). AADT is the total number of vehicles (in both directions) using a segment of the highway network on a daily basis while HCAADT is that portion of AADT that are trucks and other commercial vehicles. AADT and HCAADT along the routes from near Gretna to either Clearbrook or Superior are shown on Table 5.3.3-12. One-way traffic was assumed to be one-half of the values shown in Table 5.3.3-12.

Table 5.3.3-12. Existing Daily Traffic Levels – Truck Routes

Route	Annual Average Daily Traffic (AADT) (Vehicles per day-2010 to 2013)	Heavy Commercial Annual Average Daily Traffic (HCAADT) (Vehicles per day-2012)
Clearbrook – Highway 2	3,050	359
Superior – Highway 2	6,677	598

Source: Minnesota Department of Transportation 2017

5.3.3.3 Impact Assessment

An influx of workers to the area during the estimated 12-month construction period may create excess demand for housing; traffic congestion; or strain on government services such as police, fire, hospitals, and schools during this time period. Construction of pipelines or other facilities can cause disruptions to populated areas from noise, dust, and vibrations from construction and operations equipment; disruptions to traffic and services such as water and gas; and displacement of residences and structures. Areas with greater populations and amenities (e.g., hotels and restaurants) may be able to absorb an influx of temporary workers more readily than areas with lower populations and fewer amenities. Conversely, the more populated the area, the more people would be affected by construction (i.e., greater density of roads, residents, and businesses). Construction of facilities to support transportation by rail are truck could cause similar disruptions to local populations.

Additional rail and truck traffic also could cause congestion or temporary obstruction of local roadways during some portion of each day. The effects of increased rail traffic were assessed in relation to increased gate down-time and blockage of at-grade rail crossings in rural and urban settings. The effects of increased truck traffic were assessed in relation to increased traffic density at various traffic speeds, as traffic speeds would vary between rural and urban settings.

5.3.3.3.1 Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

Non-Local Workforce

Enbridge estimates that each construction spread would require about 600 workers, resulting in a total maximum workforce of 4,200 workers across seven different construction spreads between Neche, North Dakota, and Superior, Wisconsin. While it is expected that Enbridge would use some local workers – as referenced in the direct testimony of Barry Simonson (lines 505-513) current labor agreements in Minnesota require that at least 50% of workers would be expected to be employed from local union halls - it was assumed as a conservative estimate in order to test a worst-case scenario for population that all workers would be non-local and would need to re-locate to the area during construction. Additionally, some workers could be accompanied by their families. However, given the transitory nature of pipeline construction and estimated project duration it is unlikely that all workers would re-locate with their families. According to the U.S. Census Bureau (2014), the average number of persons per household in the United States is about 3. If each of the non-local workers brought their families, the total increase in population across the entire route could be 12,600 people (worst-case scenario). This represents an increase to the current population of about 4 percent within all counties that would be crossed by the Applicant's proposed project.

In the event that two construction spreads occurred adjacent to each other during construction, a maximum of 1,200 workers could be present in a county at a given time. In the largest county crossed by the Applicant's proposed project (Crow Wing County, Minnesota), it would represent a 2-percent increase in population. In the smallest county crossed by the route (Red Lake County, Minnesota), it would represent 30 percent of the county's total population. Pembina County in North Dakota (17 percent) and Kittson County (27 percent), Marshall County (13 percent), and Clearwater County (14 percent) in Minnesota all would experience increases over 10 percent of their current population. Added population would create more traffic on roadways, as workers may need to commute from surrounding counties under the worst-case scenario. This could result in congestion on the roads and within the service industry area (e.g., restaurants and gas stations).The added population also could increase demand for emergency services, as discussed in Section 6.2.5. However, this increased need is expected to be temporary and minor.

As discussed in Section 6.2.4, the total housing available is expected to be adequate.

Overall, impacts related to the non-local workforce are expected to be minor and temporary, but could be major and temporary at times under some worst-case scenarios, such as when two spreads are located within the same county and/or if a high number of workers are accompanied by their families. Population increases of more than 10 percent would be considered a major impact; as previously noted, increases of this magnitude are anticipated to occur in Red Lake County (MN), Pembina County (ND), Kittson County (MN), Marshall County (MN) and Clearwater County (MN).

Populated Areas

Overall, only 15 populated areas would be crossed by the Applicant's proposed project, and all but two areas that would be crossed have populations under 1,000. The populated areas identified within 1,250 feet of the construction work area are more likely to be affected by pipeline construction because of the higher density of people, structures, and infrastructure.

As described in Section 6.2.2, calculations show that typical construction noise attenuates to levels below the daytime noise standards at 1,250 feet from the noise source. Applicant-proposed measures to limit noise during construction include limiting construction to daylight hours, maintaining equipment in good working order, limiting transportation to areas of active construction, and using manufacturer-supplied silencers when available. Detailed noise and vibration analyses are provided in Section 6.2.2, and additional mitigation is identified there to further reduce noise or vibration impacts.

During construction, increased dust can be harmful or bothersome to people located near work areas. Construction-related dust is discussed in Section 5.2.7. Applicant-proposed measures to minimize dust include wetting construction areas and roadways.

The potential for displaced structures is increased when a pipeline is routed through populated areas. Structures in the permanent right-of-way would need to be removed or re-located during construction. Section 6.2.4 further discusses the displacement of residences. Enbridge has reached agreements with landowners for all structures identified within the permanent right-of-way for the Applicant's proposed project.

Populated areas have a higher density of roads and driveways than more rural areas, and generally more traffic and more people could be affected by traffic congestion associated with movement of construction workers and equipment or road closures. To minimize traffic impacts, Enbridge has proposed to cross all paved roads using the bore technique or HDD. These methods would prevent road closures by tunneling underneath the road surface. Impacts on roads are further discussed in Section 6.2.5.

Interruptions to utility services would be more likely in areas of dense population because of the amount of infrastructure, with potential effects on more people. Applicant-proposed measures to minimize the potential for service interruptions from construction include consulting with all utility companies prior to construction and using the One-Call system prior to excavation, to ensure that all adjacent pipelines and underground utilities are properly marked prior to construction. Utilities are further discussed in Section 6.2.5.

For areas with small populations that would be crossed, impacts on populated areas during construction are anticipated to be temporary and minor with implementation of the Applicant-proposed measures described above. For areas with larger populations that would be crossed —Duluth, Minnesota and Superior, Wisconsin—impacts on populated areas during construction are also anticipated to be temporary and minor, but could be major in localized areas, based on construction specifications.

Operations Impacts

Non-Local Workforce

Enbridge estimates that operation of the pipeline would require few workers along the pipeline route. Therefore, there would be minimal influx of non-local workers, and populations of local communities would experience no impact.

Populated Areas

During operations, populated areas may be affected through restrictions placed on land within the permanent right-of-way, such as prohibition of structures. This could prevent further development (both residential and commercial) within an easement; populated areas with more miles crossed by the pipeline centerline would have more land with this restriction. For the Applicant's proposed project, approximately 10 miles of populated areas would be crossed. While the restrictions would apply to the permanent right-of-way, existence of the permanent right-of-way would not restrict access across the easement or use of the easement. Typically, the pipeline would be buried at least 48 inches underground, and standard operations would not constitute a safety concern. Potential impacts associated with an accidental release of crude oil and associated emergency response procedures are discussed in Chapter 10.

Standard maintenance of the permanent right-of-way would include periodic mowing to prevent woody vegetation from interfering with inspection of the right-of-way or encroaching on the pipeline itself. In populated areas, mowing activity may be noticed by more people, but it would be infrequent and transitory.

Overall, operational impacts on populated areas would be negligible but permanent.

5.3.3.3.2 Continued Use of Existing Line 3

Construction Impacts

No construction impacts on populated areas would result from continued use of the existing Line 3 pipeline because it is already built.

Operations Impacts

Non-Local Workforce

No change in the local workforce is anticipated under continued operation of the existing Line 3 for normal operations. For pipeline maintenance, Enbridge estimates that about 267 pipeline integrity digs would be required per year. While the level of effort required for integrity digs and subsequent maintenance or repair would vary, the work is not expected to require additional personnel beyond the current workforce. Therefore, there would be no influx of non-local workers, and populations of local communities would not be affected.

Populated Areas

Integrity digs including pipeline excavation and repair have the potential to affect populations from noise, dust, and vibrations from maintenance and operations equipment. However, integrity digs are typically small, short timeframe construction projects. With implementation of Enbridge's existing BMPs to minimize noise, vibration, and dust, impacts would be temporary, minor, and localized.

5.3.3.3.3 System Alternative SA-04

Construction Impacts

Non-Local Workforce

Based on Enbridge's estimate that seven spreads would be needed to construct the 380-mile Applicant's proposed project, 14 to 15 spreads likely would be needed to construct the 795-mile long SA-04 route. This could result in a maximum of 9,000 workers relocating to the Project area. Given the transitory nature of pipeline construction, it is unlikely that all workers would re-locate with their families. However, if each of those workers was accompanied by their family members, a total influx of 27,000 people could re-locate to the Project area, which would represent a 1.4-percent increase to the total population of counties crossed by SA-04.

In counties where two construction spreads were located next to each other, non-local workers could total 1,200 people. In the smallest county crossed by the Applicant's proposed project (Traverse County, Minnesota), this would represent 35 percent of the county's total population. Pembina (17 percent), Walsh (11 percent), and Trail (15 percent) counties in North Dakota; Stevens (12 percent) and Swift (13 percent) counties in Minnesota; and Howard (13 percent) and Mitchell (11 percent) counties in Iowa would experience increases over 10 percent of their current population.

Added population would create more traffic on roadways and emergency services, as discussed in Section 6.2.5. Temporary housing in the counties with the highest population increases may become unavailable, requiring some workers to commute from surrounding counties under a worst-case scenario. However, the total housing available in the counties crossed by SA-04 is expected to be adequate. As with the Applicant's proposed project, overall impacts associated with non-local workers are expected to be minor and temporary in most areas crossed by SA-04. In some counties where an influx of workers would increase the local population by more than 10 percent, impacts could be major but temporary for the length of time it takes for one construction spread to be completed.

Populated Areas

The 24 populated areas identified within 1,250 feet of the construction work area are more likely to be affected by pipeline construction because of the higher density of people, structures, and infrastructure. The types of impacts felt in these areas would be similar to those described for the Applicant's proposed project, including noise, dust, increases in traffic, and potential disruption of local utilities. Impacts on populated areas would be greater for SA-04 than for the Applicant's proposed project because of the increased population and number of populated areas affected along SA-04. However, with implementation of measures similar to the Applicant-proposed measures summarized in Section 5.3.3.1, impacts during construction would likely be temporary and minor.

Operations Impacts

Non-Local Workforce

Operation of the pipeline would require few workers along the pipeline route; therefore, a minimal influx of non-local workers would not affect the populations of local communities.

Populated Areas

During operations, populated areas may be affected by restrictions placed on land within the permanent right-of-way. The exact location and amount of land that would be converted to industrial/developed land for pump stations and valve sites is unknown but likely would be a larger amount than required for the Applicant's proposed project given the overall greater length of the SA-04 pipeline. Based on the length of SA-04 relative to the length of the Applicant's proposed project, disruptions to populated areas from restrictions placed on land within the permanent right-of-way likely would be greater. Standard maintenance of the permanent right-of-way would include periodic mowing to prevent woody vegetation from interfering with inspection of the right-of-way or encroaching on the pipeline itself. In populated areas, mowing activity may be noticed by more people, but it would be infrequent and transitory. Overall, operations impacts on populated areas would be negligible but permanent.

5.3.3.3.4 Transportation by Rail

Construction Impacts

Non-Local Workforce

The number of workers required to construct rail facilities is expected to be small (less than 100 construction jobs). Even in the event that each of the workers holding these jobs were non-local, the impacts resulting from an influx of 100 people to these areas would be negligible and temporary.

Populated Areas

Populated areas located near construction for new or improved rail lines and rail facilities would experience similar construction impacts on those described for the Applicant's proposed project, including increased noise and dust from construction work. However, unlike pipeline construction, construction of the rail facilities would be more localized; would occur adjacent to existing industrial facilities; and would last for a longer period of time in one location, rather than moving linearly. People and businesses near construction sites may experience relatively greater impacts because of the higher population, but overall construction impacts would be temporary and minor.

Operations Impacts

Non-Local Workforce

During operation, transporting crude oil by rail is not likely to result in a substantial increase in workers re-locating to the area, either temporarily or permanently. It is likely that the majority of rail facility operators would be hired from the local workforce. If additional rail facility operators were required, the number of non-local workers re-locating to the area would not likely measurably increase local populations in the ROI. Therefore, operations impacts related to changes in local workforces would be negligible and permanent.

Populated Areas

Impacts on populated areas during operation of the rail alternative include noise from trains and train horns in areas along rail tracks, and delays at road crossings when barriers are lowered to allow trains to pass. It is noted that these are existing impacts for populations located along active rail lines, but these impacts would be new to areas with inactive rail lines and with rail crossings that are currently inactive but would need to be re-instated as a result of the increased volume of oil. The rail alternative includes approximately 10 unit trains traveling along three possible rail routes. Therefore, a populated area along one of those routes could experience an increase of between 3 and 10 unit trains per day (each unit train comprises approximately 110 tank cars). In total, 10 populated areas along the Northern rail route, 11 populated areas along the Southern rail route, and 1 populated area along the Clearbrook rail route would be within 1,250 feet of the rail line (see Tables 5.3.3-5 to 5.3.3-7). For these areas, an increase in noise and rail traffic could result in a permanent and minor to major impact, depending on the actual number of trains that would pass by each day.

An increase in 3 to 10 unit trains per day would increase the average daily gate down-time and obstruction of local traffic at rail crossings. The passing time for a unit train and the maximum gate closure time per day are shown in Table 5.3.3-13. Gate down-time is a function of train speeds, which vary by both regulation and rail system operational requirements (waiting on passing tracks, dispatch within various segments of each route and train crew work schedules). As Table 5.3.3-13 shows, that gate down-time ranges from 2.3 minutes at 50 mph typical in rural areas to 3.0 minutes at 35 mph, which may be typical in populated areas. These time intervals represent a potential increase of 23 to 30 minutes of additional blockage per day, but as a series of discrete events. In rural areas with little roadway traffic, the increase in blockage of at-grade crossings would be a minor permanent impact. In populated areas and in areas near the Clearbrook and Superior terminals, train speeds would be reduced, in some cases to speeds less than 35 mph, with a corresponding increase in blockage of at-grade crossings. In these areas, minor to major, permanent impacts on local traffic movement could occur. Table 5.3.3-8 shows that few population centers are located along potential rail routes; therefore, the number of high population areas potentially affected by major permanent impacts may be limited.

Table 5.3.3-13. At-Grade Crossing – Gated Down-Time by Train Speed

Train Speed[a]	Gate Down-Time[b]	Daily Access Limitation[c]	Speed Limit Description[a]
50 mph	2.3 minutes	23 minutes per day	Rural – all trains with 20 or more crude oil tank cars
40 mph	2.7 minutes	27 minutes per day	Crude oil trains with DOT-111 tank cars moving through High Threat Urban Areas
35 mph	3.0 minutes	30 minutes per day	Urban limited speed – shale crude oil trains through municipalities with populations of 100 thousand people or more

[a] Location speeds for trains based on their size and the populations traversed were established by the Federal Rail Administration/PHMSA Final Rule May 2015: Docket No. PHMSA-2012-0082 (HM-251).

[b] The gate down-time assumes a 110-unit train with 4 locomotives and 2 buffer cars equals 7,800-foot train length. Also assumed there would be a 30 second delay from when the gates descend until the train approaches the crossing

[c] The daily access limitation is the cumulative increase over a single day for all 10 trains.

5.3.3.3.5 Transportation by Truck

Construction Impacts

Non-Local Workforce

Similar to the rail alternative, the number of workers required for construction of truck facilities and roads is expected to be small and substantially lower than those needed for the Applicant's proposed project and SA-04. Because a measurable increase in population is unlikely in construction areas, impacts are expected to be negligible and temporary.

Populated Areas

Construction impacts at the truck offloading facilities would be similar to construction impacts for the rail alternative and would be associated with typical construction activities such as noise, dust, and traffic. Unlike pipeline construction, construction of the truck facilities would be more localized; would occur adjacent to existing industrial facilities; and would last for a longer period of time in one location, rather than moving linearly. With implementation of standard measures for dust suppression and noise reduction during construction, impacts on populated areas in the immediate vicinity of the construction sites would be temporary and minor.

Operations Impacts

Non-Local Workforce

During operation, transporting crude oil by truck is not likely to result in a substantial number of workers re-locating to a specific area, temporarily or permanently; however, a workforce of approximately 4,000 truck drivers would be required in the general region. If additional truck drivers and fleet maintenance personnel were required, the number of non-local workers re-locating to the area still would not be likely to measurably increase local populations in the ROI. Therefore, impacts related to changes in local workforces would be negligible and permanent.

Populated Areas

Additional trucks on regional highways and local roads associated with the truck alternative could significantly increase traffic density and generate potential traffic congestion along routes between the loading facility at Gretna and the offloading facilities at Clearbrook and Superior. As described in Section 4.2.6, to transport the proposed 760,000 bpd of oil carried by the Line 3 pipeline would require that approximately 4,000 tanker trucks per day be loaded and dispatched from Gretna. On average, approximately 1,920 trucks would travel each day from Gretna to the Clearbrook terminal and unload, and 2,080 loaded trucks would travel each day from Gretna to the Superior terminal.

Table 5.3.3-12 shows that AADT along the major highway route is 3,050 AADT to Clearbrook and 4,671 to Superior for traffic in both directions. The addition of 4,000 tanker truck trips per day in both directions (approximately 8,000 truck trips) would more than double daily traffic. Table 5.3.3-12 shows that the HCAADT is 359 vehicles to Clearbrook and 598 to Superior. The addition of tanker truck traffic to these routes could represent a three- to five-fold increase in heavy commercial traffic.

Changes in potential traffic density along truck routes as an indicator of increased congestion were assessed by estimating the average spacing between trucks and the additional trucks per mile at various speeds (Table 5.3.3-14).

At typical freeway speeds (65 mph), traffic density would increase by approximately 5 vehicles per mile on routes used jointly by trucks going to Clearbrook or to Superior, and approximately 3 trucks per mile for routes used by trucks traveling solely to one destination or the other. During inclement winter weather, freeway speeds likely would be reduced, thus increasing the traffic density. It also should be noted that, although the evaluation is based on average spacing between trucks, spacing is more likely to be random due to variation in the dispatch rate, truck speed, traffic over specific route segments, and weather conditions.

Table 5.3.3-14. Average Truck Spacing on Clearbrook and Superior Routes

Average Speed	Clearbrook Route[a] (1,920 trucks per day)		Superior Route[b] (2,080 trucks per day)		Joint Route (4,000 trucks per day)	
	Average Trucks/Mile[c]	Average Spacing (Feet)[d]	Average Trucks/Mile[c]	Average Spacing (Feet)[d]	Average Trucks/Mile[c]	Average Spacing (Feet)[d]
65 mph	2.5	2,112	2.7	1,956	5.3	996
45 mph	3.3	1,600	3.9	1,354	7.4	714
20 mph	8.1	652	8.8	600	16.7	317

[a] Assumes one round trip per day to Clearbrook (179 miles each way)

[b] Assumes one round trip every 2 days to Superior (360 miles each way)

[c] Assuming trucks would be dispatched over a 12 hour period each day, calculated the number of trucks dispatched per hour and divided by the average speed to determine the average trucks per mile.

[d] Average spacing calculated by taking the average speed and dividing by the number of trucks dispatched per hour.

The increase in AADT and HCAADT along major truck routes and the increase in future traffic density indicate that the potential for congestion along portions of the route may result in minor permanent impacts and major temporary impacts on traffic movement, thus affecting the mobility of residents along truck routes.

Traffic density on state and county highways at lower speeds (45 mph) would increase between approximately 3 to 4 trucks per mile of traffic per day to accommodate the same number of trucks per day. Along State Highway 92 in particular, the addition of truck traffic to the Clearbrook terminal would cause a significant increase in AADT. It is likely that congestion on this truck route segment would result in major permanent impacts on the mobility of the local population without mitigation.

Traffic in urban areas on access roads off the freeway network near the Clearbrook or Superior terminals would typically operate at lower speeds (in the range of 20 mph). In these areas, the increase in traffic density could average from approximately 8 to 9 trucks per mile. A typical tractor-tailor combination may be approximately 65 feet long. This means that crude oil trucks would use approximately 585 lineal feet or 10 percent of the available roadway (a single lane). This assumes, however, that the trucks maintain average spacing. At lower speeds and maneuvering in stop-and-go traffic, density increases significantly, likely resulting in major local traffic impacts in the areas of the Clearbrook and Superior terminal accompanied by a reduction in local population access and safety. Such impacts would be major and permanent.

5.3.3.3.6 Existing Line 3 Supplemented by Rail

Impacts associated with continued use of the existing Line 3 pipeline supplemented by rail would be similar to the impacts described for each individual component of this alternative (see Sections 5.3.3.2 and 5.3.3.4). Impacts associated with construction of additional rail facilities would be similar to those described for the rail alternative, and the number of non-local workers from outside the local population is not expected to affect the overall population. Under this alternative, the volume of rail traffic would not increase as much as it would for transportation by rail alone. The lower rail traffic cause less noise-related impacts and fewer traffic delays at railroad crossings during operations, resulting in minor, permanent impacts on populated areas along the rail routes. The number of integrity digs along the existing line would remain the same, resulting in localized minor temporary impacts on populated areas.

5.3.3.3.7 Existing Line 3 Supplemented by Truck

Impacts associated with continued use of the existing Line 3 pipeline supplemented by truck transportation would be similar to the impacts described for each individual component of the alternative (see Sections 5.3.3.2 and 5.3.3.5). Construction impacts associated with truck offloading facilities would be similar to those described for the truck alternative. No impact is expected from the number of non-local workers from outside the local population. Although the volume of truck traffic would be reduced, the additional number of trucks required for the truck alternative would increase traffic along the major routes between loading and offloading facilities. This would create a minor to major permanent impact on populations that travel along similar routes. This combined alternative therefore would result in minor to major, permanent impacts from traffic during operations.

5.3.3.4 Summary and Mitigation

5.3.3.4.1 Summary

Table 5.3.3-15 summarizes the impacts on populated areas for the Applicant's proposed project and each of the CN Alternatives. The potential change in the local workforce during construction of pipelines or offloading facilities and rail upgrades for rail and truck transportation would be temporary and would generally cause negligible impacts on housing availability or public services, with potentially temporary major impacts in counties with expected population increases of greater than 10 percent. Permanent impacts on the local workforce during operations would be negligible and have negligible impacts on local housing availability or demand for public services.

Disruption to local populations during construction would be temporary and minor for the Applicant's proposed project and all of the CN Alternatives. The Applicant's proposed project and SA-04 would require extended construction operations that would expose a larger population to construction activities than continued operation of existing Line 3 (no construction) or the rail and truck alternatives, which would require limited construction.

During operations, the Applicant's proposed project, SA-04, and continued use of the existing Line 3 would result in negligible to minor, permanent population disruption impacts. The rail and truck alternatives and the alternatives that combine rail and truck with continued operation of the existing Line 3 could result in permanent minor to major impacts on population mobility—especially in more populated areas, where rail obstruction of at-grade crossings would be increased, and where road traffic congestion could occur from the significant increase in tanker trucks transiting to the Clearbrook and Superior terminals.

When comparing the Applicant's proposed project and the CN Alternatives, continued use of the existing Line 3 would have the least impact on local populations because it would require no changes. However, it would not provide the same capacity for crude oil transfer as the Applicant's proposed project or the other CN Alternatives. Of the remaining options, the Applicant's proposed project would cause minor workforce and population disruption impacts as would system alternative SA-04. Because it is approximately one-half the length of SA-04, those impacts would be reduced for the Applicant's proposed project. The rail, truck, and combined rail/truck with continued use of the existing Line 3 may cause minor to potentially major disruption impacts on local populations from reduced mobility.

5.3.3.4.2 Mitigation

Beyond the Applicant-proposed measures described for the Applicant's proposed project, mitigation measures to address potential major impacts of traffic congestion for the rail and truck alternatives could include:

- Freeways – Construct additional freeway lanes, off ramps and other traffic flow features in congested areas to reduce traffic density.
- Highways – Upgrade (widening) or add lanes to existing state and county highways to increase traffic flow and reduce traffic density. Construction of additional lane capacity or dedicated truck-only lanes on State Highway 92 near Clearbrook may be required.
- Populated areas – Construct dedicated access roads to the terminal facilities.

However, it should be noted that these mitigation measures are infrastructure upgrades that could also result in similar or different impacts of unknown magnitude and duration to local populations.

Table 5.3.3-15. Summary of Potential Impacts on Population for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project [c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Changes in Population from Non-Local Workforce							
Percentage increase in local population across all counties	Temporary/minor impacts • 4.2 percent increase Temporary/major impacts *(in counties where population increase would be greater than 10 percent)*	No impact	Temporary/minor impacts • 1.4 percent increase Temporary/major impacts *(in counties where population increase would be greater than 10 percent)*	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts	Temporary/ negligible impacts
Populated Areas							
Number of populated areas crossed or within 1,250 feet of construction work area	Temporary/minor impacts • 15 populated areas	No impact • 32 populated areas	Temporary/minor impacts • 24 populated areas	Temporary/minor impacts • Northern route – 42 populated areas • Southern route – 42 populated areas • Clearbrook route – 13 populated area	Temporary/minor impacts • Clearbrook route – 12 populated areas • Superior route – 33 populated areas	Temporary/minor impacts • Northern route – 42 populated areas • Southern route – 42 populated areas • Clearbrook route – 13 populated areas	Temporary/minor impacts • Clearbrook route – 12 populated areas • Superior route – 33 populated areas

Table 5.3.3-15. Summary of Potential Impacts on Population for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project [c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Total population of populated areas crossed	Temporary/minor impacts • 92,017	No impact • 136,305	Temporary/minor impacts • 275,361	Temporary/minor impacts • Southern route – 207,202 • Northern route – 150,276 • Clearbrook route – 11,905	Temporary/minor impacts • Clearbrook route – 72,824 • Superior route – 206,933	Temporary/minor impacts • Southern route – 207,329 • Northern route – 150,276 • Clearbrook route – 11,905	Temporary/minor impacts • Clearbrook route – 72,824 • Superior route – 206,933
Total area of populated areas crossed or within 1,250 feet of construction work area (acres)	Temporary/minor impacts • 3,313 acres	No impact • 11,526 acres	Temporary/minor impacts • 5,939 acres	Temporary/minor impacts • Southern route – 16,699 acres • Northern route – 21,689 acres • Clearbrook route – 4,260 acres	Temporary/minor impacts • Clearbrook route – 3,029 acres • Superior route – 24,863 acres	Temporary/minor impacts • Southern route – 17,159 acres • Northern route – 19,669 acres • Clearbrook route – 4,260 acres	Temporary/minor impacts • Clearbrook route – 3,029 acres • Superior route – 24,863 acres

Table 5.3.3-15. Summary of Potential Impacts on Population for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project [c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Operations Impacts							
Changes in Population from Non-Local Workforce							
Increase in local population across all counties	No to negligible impact	No impact	No to negligible impact	No to negligible impact	No to negligible impact	No to negligible impact	No to negligible impact
Populated Areas							
Miles of populated areas crossed by pipeline centerline; effects on local populations	Temporary/minor impacts • 9.9 miles	Temporary/minor impacts • 35 miles	Temporary/minor impacts • 18.2 miles	Temporary/minor impacts • Southern route – 52 miles • Northern route – 61.2 miles • Clearbrook route - 13.9 miles	Temporary/minor impacts • Clearbrook route – 9.4 miles • Superior route – 64.4 miles	Temporary/minor impacts • Southern route – 52 miles • Northern route – 61 miles • Clearbrook route – 13.9 miles	Temporary/minor impacts • Clearbrook route– 9.4 miles • Superior route – 64.4 miles
Operations impacts on traffic in populated areas	No to negligible impacts	No to negligible impacts	No to negligible impacts	Permanent/minor impacts in rural areas Permanent/minor to major impacts in urban areas	Permanent/minor to major impacts in rural areas Permanent/minor to major impacts in urban areas	Permanent/minor impacts in rural areas Permanent/minor to major impacts in urban areas	Permanent/minor to major impacts in rural areas Permanent/minor major impacts in urban areas

Table 5.3.3-15. Summary of Potential Impacts on Population for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project [c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Transportation by Rail[f]	Transportation by Truck[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]

[a] No single dataset in this summary table provides a complete indication of all relevant impacts to population. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, while total population can aid in identifying the number of potentially affected people, an understanding of population density and percentage change in local population is needed in order to understand the potential stress that could be felt as the result of an influx of temporary workers. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-498 through 5-507. The table above, for example, describes miles of populated areas within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to populated areas is contained in the text of this section.

[c] The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-498 to 5-501. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on page 5-501. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-501 to 5-503. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-503 to 5-505. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-505 to 5-506. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

5.3.3.5 References

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5.3.4 Employment, Income, and Tax Revenues

Employment and income statistics provide insight into local economic conditions. Changes in employment and income influence the level of tax revenues received by local and state governments, making tax revenues another important indicator of how well an economy is doing. Following are the issues addressed in this section related to employment, income, and tax revenue associated with construction and operation of the Applicant's proposed project and CN Alternatives:

- Construction-related employment, payroll spending, and expenditures on materials, supplies and equipment;
- Operations-related employment and payroll spending;
- Income tax revenue from workers during construction and operation; and
- Property taxes paid by the Applicant during operation.

This section first describes the regulatory context and methods used in the assessment of impacts, followed by a description of relevant economic conditions within the counties along the pipeline routes and where the rail and truck terminals would be sited; these counties could experience changes in employment, income, and tax revenue as a result of construction and operation of the Project. Section 5.3.4.3 addresses the potential impacts on employment, income, and tax revenue from construction and operation of the Applicant's proposed project and CN Alternatives (system alternative SA-04, continued use of the existing Line 3, transportation by rail, transportation by truck, continued use of the existing Line 3 pipeline supplemented by rail, and continued use of the existing Line 3 supplemented by truck). A summary and comparison of the impacts are presented in Section 5.3.4.4.

5.3.4.1 Regulatory Context and Methodology

5.3.4.1.1 Regulatory Context

Minnesota Administrative Rules Part 7853.0130 lists "the effect of the proposed facility upon the natural and socioeconomic environments compared to the effects of reasonable alternatives" as one of several criteria to be considered for determining whether to grant a CN. Impacts on employment, income, and tax revenues are part of the socioeconomic environment the Commission considers in their decision about whether there are more reasonable and prudent alternatives to the proposed Project (Part 7853.0130 B) and whether the benefits outweigh the consequences of granting a CN for the proposed Project (Part 7853.0130 C).

North Dakota, Iowa, Illinois, and Wisconsin do not have state-specific environmental review processes. Impacts associated with any project would be assessed through the individual state's permit application process. More specifically, these states have not established regulations that require assessment of socioeconomic impacts associated with proposed pipeline or transportation projects.

5.3.4.1.2 Methodology

The assessment for this EIS addressed the impacts on employment, income, and tax revenues from construction and operation of the Applicant's proposed project and CN Alternatives. This assessment consisted of the following:

- Describing the existing economic conditions in the counties affected by the Applicant's proposed project and CN Alternatives using county-level employment, income, and tax revenues (where available); and
- Determining potential impacts on the economic baseline by using employment numbers and construction related expenditures provided by the Applicant to provide a qualitative discussion of the relative magnitude (i.e., negligible, minor, or major) of Project-related changes to county-level employment and income levels, and to quantitatively estimate the potential increase in income tax revenue by county.

The ROI for this analysis consists of the counties crossed by the Applicant's proposed project and CN Alternatives. County-level data provide a reasonable base for defining a local economy and determining economic impacts in each of the counties affected by the Applicant's proposed project and CN Alternatives.

The data obtained to describe the existing economic conditions in the ROI counties included county-level employment, income, and tax revenues (where available). Potential direct and indirect impacts on the economic baselines in the ROI were determined using employment numbers and construction-related expenditures provided by the Applicant and estimates from other sources for other CN applications. This information was used to develop a qualitative analysis of the relative magnitude and expected changes to county-level employment and income levels, and to estimate the potential increase in income tax revenue by county.

The employment and income statistics used to describe the economic baseline, or existing conditions, are based on median household income from the U.S. Census Bureau and per capita income, total labor force numbers, and employment rates from the U.S. Bureau of Labor Statistics. Median household income is commonly used to describe a household's economic status, or to track economic trends, whereas per capita household income is often used to measure the standard of living within a geographic area. Labor force numbers represent the total number of people (15 years and older) who are currently employed or unemployed but looking for work, while the unemployment rate represents the percentage of the labor force that is currently unemployed. All data are from the most recent survey years available when this EIS was prepared, unless otherwise noted.

Existing conditions for tax revenues were based on available data from the Office of the Auditor for each state in the ROI. These revenues included total government revenue and the portion of revenue from property taxes. Construction of a pipeline would generate tax revenues in the form of property taxes paid by the Applicant for the life of the Project. Rail and truck offloading terminals would also generate property taxes. Property tax revenue would be based on the appraised value of the pipeline easement or the rail or truck offloading terminals and state and local tax rates. Enbridge has appealed the amount of property taxes it paid between 2012 and 2016, alleging that the Minnesota Department of Revenue overvalued the value of the pipeline property, resulting in overpayment of taxes to counties and Minnesota. The appeal has not been settled at the time this document was prepared. For pipelines, this revenue would be additive to the amount that the existing landowner currently pays and is additional revenue to the local and state governments. For the purposes of this analysis, changes in property tax revenues from construction of the Applicant's proposed project and CN Alternatives (where applicable) are discussed in terms of relative magnitude and are assumed to be incurred only during operation.

While most states (including those crossed by the Applicant's proposed project and CN Alternative pipeline routes) do not have local or county-level income taxes, county governments receive income tax appropriations from the state. Individual states determine the amount each county receives. For the pipelines in this analysis, existing income tax figures are reported at the state level. Output from a national Impact Model for Planning (IMPLAN) model (an economic input-output model) and the number of miles of pipeline per county were used to allocate the potential change in state income taxes from the alternatives and allocated to each county in the ROI (see Appendix R).

The total amount of estimated labor income to each state was generated using the IMPLAN output and each state's share of the total pipeline (in miles). Income tax revenue was derived using each state's respective income tax rate. This figure then was allocated to each county in the ROI based on the number of miles of pipeline in each county for the Applicant's proposed project and SA-04. For the rail and truck transport alternatives, assumptions related to construction expenditures provided in Chapter 4 were used as inputs into IMPLAN. Per-county estimates were not provided for the rail and truck alternatives because it is not known how each state would distribute the income generated by the terminal facilities. Per-county estimates were also not provided for the existing Line 3 since it is already in place, and information about the current level of income taxes generated by the pipeline were not readily available.

No single one of the data sources referenced above provides a complete indication of all relevant impacts to employment, income, and tax revenues, but together the estimates provided give a reasonably comprehensive indication of the potential impacts. For example, while estimates of total employment and income provide an indication of a subset of the socioeconomic effects of the projects, other datapoints, like estimated tax revenues can provide an understanding the potential revenue that might be generated at a broader level within a particular county.

Furthermore, the quantitative information from these datasources should be coupled with an understanding of the qualitative descriptions of impacts that are contained in the text in this section. Tables in this section provide estimated impacts, for example, related to tax revenues and numbers of jobs created by the Applicant's pipeline route and alternatives and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to is contained in the text of this section.

5.3.4.2 Existing Conditions

5.3.4.2.1 Applicant's Proposed Project

Employment and Income

The Applicant's proposed project would extend across 14 counties in three states. Summary statistics on employment and income for the counties that would be crossed by the route are listed in Table 5.3.4-1. The per capita income ranges from a low of $32,836 to a high of $52,326 (all in Minnesota), and the median household income ranges from a low of $38,706 to a high of $53,492 (also in Minnesota). Throughout the ROI, the median household income is below the median household income in each state, and only two counties (Kittson County in Minnesota and Douglas County in Wisconsin) are above their respective state averages for per capita personal income.

Crow Wing County in Minnesota has the highest share of the total labor force in the ROI at 21 percent, followed by Douglas County in Wisconsin at 15 percent, and Carlton County in Minnesota at 11 percent. Based on the labor force and the unemployment rates for each county, more than 6,800 individuals are estimated to be unemployed in the region. Unemployment rates are highest in Kittson and Clearwater counties in Minnesota, at approximately 7 percent each.

Table 5.3.4-1. Employment and Income Conditions in Counties Crossed by the Applicant's Proposed Project

State/County	Per Capita Personal Income 2014[a] ($2015)	Median Household Income 2010–2014[b] ($2015)	Labor Force (August 2015)[a]	Unemployment Rate (August 2015)[a]
North Dakota				
Pembina	$50,665	$51,673	3,649	3.1%
Minnesota				
Kittson	$52,326	$48,950	2,543	7.0%
Marshall	$47,271	$53,373	5,574	4.9%
Pennington	$48,980	$47,436	8,933	3.4%
Red Lake	$45,722	$47,253	2,259	3.9%
Polk	$42,157	$51,085	16,795	3.8%
Clearwater	$36,512	$45,158	4,493	6.7%
Hubbard	$36,338	$46,466	9,847	4.5%
Wadena	$32,836	$38,706	6,236	4.6%
Cass	$42,349	$45,620	14,690	5.1%
Crow Wing	$37,863	$49,244	32,402	3.9%
Aitkin	$36,363	$42,085	6,757	4.4%
Carlton	$36,801	$53,492	17,328	4.2%
Subtotal/Average	***Average = $41,293***	***Average = $47,406***	***Total = 127,857***	***Average = 4.7%***
Wisconsin				
Douglas	$38,603	$44,946	23,101	4.5%
TOTAL/AVERAGE	**Average = $41,770**	**Average = $47,535**	**Total = 154,607**	**Average 4.6%**

[a] Source: U.S. Bureau of Economic Analysis 2015.

[b] Source: U.S. Census Bureau 2014.

Tax Revenues

Table 5.3.4-2 list the existing conditions for total government revenue and the portion of revenue from property taxes for all of the counties that would be crossed by the Applicant's proposed project. For many of these counties, property taxes are an important source of income. In Minnesota, Pennington and Red Lake counties have the highest share of their total revenue from property taxes (86 and 74 percent, respectively). While the states crossed by the Applicant's proposed project do not have local and county-level income taxes, county governments receive income tax appropriations from the state.

Individual states determine the amount each county receives. In the 2015 tax year, taxable income in Minnesota generated $11 billion in income tax revenue. North Dakota generated $722 million in income tax revenue, and Wisconsin generated $8 billion (U.S. Census Bureau 2015).

Table 5.3.4-2. Government Revenue in Counties Crossed by the Applicant's Proposed Project

State/County	Portion of Applicant's Proposed Project through the County	Government Revenue ($2015 thousands)	County Property Tax Revenue ($2015 thousands)[a]	Share of Government Revenue from Property Taxes
North Dakota				
Pembina	3%	$4,498	$2,310	51%
Minnesota				
Kittson	4%	$12,209	$3,346	27%
Marshall	10%	$17,237	$5,463	32%
Pennington	5%	$8,289	$7,153	86%
Red Lake	4%	$2,977	$2,198	74%
Polk	4%	$55,276	$20,562	37%
Clearwater	11%	$12,209	$3,346	27%
Hubbard	12%	$18,828	$6,142	33%
Wadena	2%	$31,732	$12,200	38%
Cass	12%	$21,289	$7,675	36%
Crow Wing	1%	$50,103	$20,332	41%
Aitkin	14%	$71,060	$35,583	50%
Carlton	11%	$35,408	$11,457	32%
Subtotal	***90%***	***$336,617***	***$135,457***	***40%***
Wisconsin				
Douglas	7%	$55,803	$16,397	30%
TOTAL	**100%**	**$396,918**	**$154,164**	**39%**

[a] Sources: Minnesota – Minnesota Office of the State Auditor 2015, North Dakota – North Dakota Office of the State Auditor, Pembina County 2013; Wisconsin – Douglas County Wisconsin 2016; adjusted to $2015 based on the consumer price index where necessary;

5.3.4.2.2 Continued Use of Existing Line 3 Pipeline

Employment and Income

Table 5.3.4-3 provides the employment and income statistics for the counties located along the pipeline corridor for the existing Line 3 pipeline The per capita income ranges from a low of $35,078 to a high of $52,326 (all in Minnesota), and the median household income ranges from a low of $43,990 to a high of $53,492 (also in Minnesota). The median household income is below the median household income in each state in the ROI, and only two counties (Kittson County in Minnesota and Douglas County in Wisconsin) are above their respective state averages for per capita personal income.

Table 5.3.4-3. Employment and Income Conditions in Counties Crossed by the Existing Line 3 Pipeline

State/County	Per Capital Personal Income 2014[a] ($2015)	Median Household Income 2010–2014[b] ($2015)	Labor Force (August 2015)[a]	Unemployment Rate (August 2015)[a]
North Dakota				
Pembina	$50,665	$51,673	3,649	3.1%
Minnesota				
Kittson	$52,326	$48,950	2,543	7.0%
Marshall	$47,271	$53,373	5,574	4.9%
Pennington	$48,980	$47,436	8,933	3.4%
Red Lake	$45,722	$47,253	2,259	3.9%
Polk	$42,157	$51,085	16,795	3.8%
Clearwater	$36,512	$45,158	4,493	6.7%
Beltrami	$35,078	$43,990	23,451	4.1%
Hubbard	$36,338	$46,466	9,847	4.5%
Cass	$42,349	$45,620	14,690	5.1%
Itasca	$36,367	$47,122	22,967	5.8%
Aitkin	$36,363	$42,085	6,757	4.4%
St. Louis	$39,861	$47,138	8,569	3.4%
Carlton	$36,801	$53,492	17,328	4.2%
Subtotal/Average	***Average = $41,240***	***Average = $47,628***	***Total = 144,206***	***Average = 4.7%***
Wisconsin				
Douglas	$38,603	$44,946	23,101	4.5%
TOTAL/AVERAGE	***Average = $41,693***	***Average = $47,719***	***Total = 170,956***	***Average = 4.6%***

[a] Source: U.S. Bureau of Economic Analysis 2015.

[b] Source: U.S. Census Bureau 2014.

Tax Revenues

Table 5.3.4-4 summarizes the existing conditions for total government revenue and the portion of revenue from property taxes for all of the counties along the existing Line 3 pipeline corridor. While the states crossed by the Line 3 pipeline do not have local and county-level income taxes, county governments receive income tax appropriations from the state. Individual states determine the amount distributed to each county. In the 2015 tax year, taxable income in Minnesota generated $11 billion in income tax revenue. North Dakota generated $722 million in income tax revenue, and Wisconsin generated $8 billion (U.S. Census Bureau 2015).

Table 5.3.4-4. Existing Government Revenue in Counties Crossed by the Existing Line 3 Pipeline

State/County	Portion of Pipeline through the County	Government Revenue ($2015 thousands)	County Property Tax Revenue ($2015 thousands)[a]	Share of Government Revenue from Property Taxes
North Dakota				
Pembina	8%	$4,498	$2,310	51%
Minnesota				
Kittson	5%	$12,209	$3,346	27%
Marshall	11%	$17,237	$5,463	32%
Pennington	6%	$8,289	$7,153	86%
Red Lake	4%	$2,977	$2,198	74%
Polk	4%	$55,276	$20,562	37%
Clearwater	6%	$18,828	$6,142	27%
Beltrami	7%	$72,476	$26,651	37%
Hubbard	2%	$18,828	$6,142	33%
Cass	10%	$21,289	$7,675	36%
Itasca	15%	$94,707	$28,855	30%
Aitkin	<1%	$71,060	$35,583	50%
St. Louis	8%	$278,021	$111,234	40%
Carlton	7%	$35,408	$11,457	32%
Subtotal	***86%***	***$706,605***	***$272,461***	***39%***
Wisconsin				
Douglas	7%	$55,803	$16,397	30%
TOTAL	**100%**	**$766,906**	**$291,168**	**38%**

[a] Sources: Minnesota – Minnesota Office of the State Auditor 2015, North Dakota – North Dakota Office of the State Auditor, Pembina County 2013; Wisconsin – Douglas County Wisconsin 2016; adjusted to $2015 based on the consumer price index where necessary

5.3.4.2.3 System Alternative SA-04

Employment and Income

System alternative SA-04 would cross 35 counties in 4 states. Table 5.3.4-5 provides the employment and income statistics for the counties that would be crossed by SA-04. The median household income ranges from a low of $46,074 in Chickasaw County in Iowa to a high of $76,101 in Will County, Illinois. In North Dakota, median household incomes in Cass, Richland, and Trail counties are above the state average, while only Le Sueur County in Minnesota is above the state average. In Iowa, all counties with the exception of Chickasaw are above the state average for median household income; in Illinois, Grundy and Will counties are above the state average.

Table 5.3.4-5. Employment and Income Conditions in Counties Crossed by System Alternative SA-04

State/County	Per Capita Personal Income 2014[a] ($2015)	Median Household Income 2010–2014[b] ($2015)	Labor Force (August 2015)[a]	Unemployment Rate (August 2015)[a]
North Dakota				
Cass	$53,552	$53,055	95,774	1.8%
Grand Forks	$46,129	$47,105	37,764	1.8%
Pembina	$50,665	$51,673	3,649	3.1%
Richland	$45,487	$56,462	8,767	2.0%
Traill	$51,420	$53,704	4,542	2.2%
Walsh	$46,728	$49,838	5,616	2.8%
Subtotal/Average	***Average = $48,997***	***Average = $51,973***	***Total = 156,112***	***Average 2.3%***
Minnesota				
Blue Earth	$43,168	$51,037	40,002	2.5%
Chippewa	$44,722	$51,583	7,065	3.3%
Freeborn	$41,371	$45,622	16,512	3.1%
Kandiyohi	$49,060	$52,104	24,435	2.7%
Le Sueur	$44,197	$60,367	15,739	3.2%
Mower	$42,364	$47,679	20,691	2.5%
Nicollet	$44,646	$60,033	20,662	2.2%
Renville	$51,844	$52,061	9,179	3.2%
Sibley	$43,865	$56,383	8,876	3.1%
Stevens	$52,226	$51,241	5,981	2.0%
Swift	$53,874	$49,810	5,474	6.6%
Traverse	$55,225	$48,807	1,929	2.4%
Waseca	$46,847	$53,893	10,073	3.2%
Subtotal/Average	***Average = $47,185***	***Average = $52,355***	***Total = 186,618***	***Average = 3.1%***
Iowa				
Bremer	$44,610	$61,691	14,080	2.9%
Buchanan	$42,757	$56,459	11,169	2.4%
Chickasaw	$50,531	$46,074	6,535	3.6%
Clinton	$40,161	$49,907	24,525	4.4%
Delaware	$44,894	$54,865	10,797	2.6%
Fayette	$40,294	$45,496	10,871	3.4%
Howard	$45,956	$47,355	5,356	3.1%
Jones	$40,524	$54,327	10,834	3.3%

Table 5.3.4-5. Employment and Income Conditions in Counties Crossed by System Alternative SA-04

State/County	Per Capita Personal Income 2014[a] ($2015)	Median Household Income 2010–2014[b] ($2015)	Labor Force (August 2015)[a]	Unemployment Rate (August 2015)[a]
Mitchell	$47,161	$47,381	5,447	2.1%
Subtotal/Average	***Average = $44,099***	***Average = $51,506***	***Total = 99,614***	***Average 3.1%***
Illinois				
Bureau	$38,446	$49,979	16,999	7.6%
LaSalle	$39,582	N/A	58,052	8.0%
Lee	$37,895	$52,065	18,012	5.9%
Rock Island	$40,332	$48,282	71,527	7.1%
Grundy	$47,930	$65,887	25,400	6.8%
Will	$46,823	$76,101	355,617	6.0%
Whiteside	$39,483	$53,482	28,574	6.3%
Subtotal/Average	***Average = $41,499***	***Average = $57,633***	***Total = 574,181***	***Average = 6.8%***
TOTAL/AVERAGE	**Average = $45,445**	**Average = $53,367**	**Total = 1,016,525**	**Average = 3.8%**

[a] Source: U.S. Bureau of Economic Analysis 2015.

[b] Source: U.S. Census Bureau 2014.

Tax Revenues

Table 5.3.4-6 summarizes the existing conditions for total government revenue and the portion of revenue from property taxes for all of the counties that would be crossed by SA-04. While the majority of states do not have local and county-level income taxes, county governments receive income tax appropriations from the state. Individual states determine the amount distributed to each county. In the 2015 tax year, taxable income in North Dakota generated $722 million in income taxes, while Minnesota generated $11 billion, Iowa generated $3.9 billion, and Illinois generated $19.9 billion (U.S. Census Bureau 2015).

Table 5.3.4-6. Government Revenue in Counties Crossed by System Alternative SA-04

State/County	Portion of Pipeline through County	Government Revenue ($2015 thousands)[a]	County Property Tax Revenue ($2015 thousands)[a]	Share of Government Revenue from Property Taxes
North Dakota				
Cass	6%	$92,833	$35,718	39%
Grand Forks	5%	$41,977	$22,024	53%
Pembina	5%	$4,498	$2,310	51%
Richland	7%	$17,123	$8,057	47%
Traill	4%	$10,668	$3,817	36%
Subtotal	***27%***	***$167,099***	***$71,926***	***43%***
Minnesota				
Walsh	3%	$13,704	$5,212	38%
Blue Earth	2%	$77,593	$29,775	38%
Chippewa	1%	$18,655	$8,781	47%
Freeborn	4%	$44,800	$19,900	44%
Kandiyohi	2%	$73,422	$30,087	41%
Le Sueur	0%	$31,769	$15,500	49%
Mower	1%	$45,039	$18,100	40%
Nicollet	2%	$34,250	$17,604	51%
Renville	3%	$10,307	$6,344	62%
Sibley	3%	$29,015	$11,944	41%
Stevens	4%	$14,234	$6,718	47%
Swift	3%	$20,594	$9,155	45%
Traverse	3%	$12,044	$4,528	38%
Waseca	2%	$23,542	$12,825	55%
Subtotal	***33%***	***$448,968***	***$196,473***	***44%***
Iowa				
Bremer	0.2%	$21,842	$7,435	34%
Buchanan	2%	$16,425	$6,948	42%
Chickasaw	4%	$13,380	$5,112	38%
Clinton	5%	$30,602	$17,421	57%
Delaware	3%	$16,017	$8,224	51%
Fayette	3%	$17,021	$7,242	43%
Howard	1%	$13,639	$4,715	35%
Jones	4%	$18,954	$7,294	38%

Table 5.3.4-6. Government Revenue in Counties Crossed by System Alternative SA-04

State/County	Portion of Pipeline through County	Government Revenue ($2015 thousands)[a]	County Property Tax Revenue ($2015 thousands)[a]	Share of Government Revenue from Property Taxes
Mitchell	3%	$16,402	$6,216	38%
Subtotal	***25.2%***	***$164,282***	***$70,607***	***43%***
Illinois				
Bureau	2%	$14,917	$5,306	36%
LaSalle	6%	$58,534	$23,701	40%
Lee	1%	$19,011	$7,173	38%
Grundy	1%	$28,144	$13,437	48%
Will	1%	$182,751	$65,615	36%
Rock Island	1%	$77,001	$25,836	34%
Whiteside	4%	$29,935	$9,210	31%
Subtotal	***16%***	***$410,293***	***$150,278***	***37%***
TOTAL	**100%**	**$1,190,642**	**$489,284**	**41%**

[a] Source: North Dakota – North Dakota Office of the State Auditor, Pembina County North Dakota 2013; Minnesota - Minnesota Office of the State Auditor 2015; Iowa –State of Iowa Auditor of State; Illinois – County Comptroller; adjusted to $2015 based on the consumer price index where necessary.

5.3.4.2.4 Transportation by Rail

Employment and Income

Table 5.3.4-7 provides the employment and income statistics for the counties in which the rail offloading facilities and development of new or expanded rail lines would be sited.

Table 5.3.4-7. Employment and Income Conditions in Counties for Development of Rail Facilities

County, State	Per Capita Personal Income 2014[a] ($2015)	Median Household Income 2010–2014[b] ($2015)	Labor Force (August 2015)[a]	Unemployment Rate (August 2015)[a]
Clearwater, Minnesota	$36,512	$45,158	4,493	6.7%
Douglas, Wisconsin	$38,603	$44,946	23,101	4.5%
TOTAL/AVERAGE	**AVERAGE = $37,558**	**AVERAGE = $45,052**	**TOTAL = 27,594**	**AVERAGE = 5.6%**

[a] Source: U.S. Bureau of Economic Analysis 2015.

[b] Source: U.S. Census Bureau 2014.

Tax Revenues

Table 5.3.4-8 summarizes the existing conditions for total government revenue and the portion of revenue from property taxes by county for all counties in the locations of rail facilities. Property taxes are an important source of income in these counties. Douglas County has the highest total government revenue while Clearwater has the highest share of its revenue from property taxes (33 percent). County governments receive income tax appropriations from states and individual states determine the amount distributed to each county. In the 2015 tax year, taxable income in Minnesota generated $11 billion, and Wisconsin generated $8billion (U.S. Census Bureau 2015).

Table 5.3.4-8. Government Revenue in Counties for Development of Rail Facilities

State/County	Government Revenue ($2015 thousands)	County Property Tax Revenue ($2015 thousands)[a]	Share of Government Revenue from Property Taxes
Clearwater, Minnesota	$18,828	$6,142	33%
Douglas, Wisconsin	$55,803	$16,397	30%
TOTAL	**$74,631**	**$22,539**	**30%**

[a] Sources: Minnesota – Minnesota Office of the State Auditor 2015, adjusted to $2015 based on the consumer price index where necessary; Wisconsin – Douglas County Wisconsin 2016.

5.3.4.2.5 Transportation by Truck

Employment and Income

Table 5.3.4-9 provides the employment and income statistics for the counties where construction or upgrades would occur for development of truck offloading facilities and access roads.

Table 5.3.4-9. Employment and Income Conditions in Counties for Development of Truck Facilities

County, State	Per Capita Personal Income 2014[a] ($2015)	Median Household Income 2010–2014[b] ($2015)	Labor Force (August 2015)[a]	Unemployment Rate (August 2015)[a]
Clearwater, Minnesota	$36,512	$45,158	4,493	6.7%
Douglas, Wisconsin	$38,603	$44,946	23,101	4.5%
TOTAL/AVERAGE	**Average = $37,558**	**Average = $45,052**	**Total = 27,594**	**Average = 5.6%**

[a] Source: U. S. Bureau of Economic Analysis 2015.

[b] Source: U.S. Census Bureau 2014.

Tax Revenues

Table 5.3.4-10 summarizes the existing conditions for total government revenue and the portion of revenue from property taxes by county for all of the counties in which truck offloading and related facilities would be sited. Property taxes are an important source of income in these counties. Douglas County has the highest total government revenue while Clearwater has the highest share of its revenue from property taxes (33 percent). While the majority of states (including those where the facilities would be constructed) do not have local and county-level income taxes, county governments receive income tax appropriations from the state. Individual states determine the amount distributed to each county. In the 2015 tax year, taxable income in Minnesota generated $11 billion, and Wisconsin generated $8 billion (U.S. Census Bureau 2015).

Table 5.3.4-10. Government Revenue in Counties for Development of Truck Facilities

State/County	Government Revenue ($2015 thousands)	County Property Tax Revenue ($2015 thousands)[a]	Share of Government Revenue from Property Taxes
Clearwater, Minnesota	$18,828	$6,142	33%
Douglas, Wisconsin	$55,803	$16,397	30%
TOTAL	**$74,631**	**$22,539**	**30%**

[a] Sources: Minnesota – Minnesota Office of the State Auditor 2015, adjusted to $2015 based on the consumer price index where necessary; Wisconsin – Douglas County Wisconsin 2016.

5.3.4.3 Impact Assessment

Construction and operation of the Applicant’s proposed project and most of the CN Alternatives (except for aspects of the existing Line 3 pipeline alternative since that pipeline is in place and operating) are anticipated to have positive effects on employment, income, and tax revenue. Direct impacts on employment would be driven by the large number of construction personnel. Although it is not expected that all workers would live in the counties where construction would occur, some would be expected to temporarily re-locate to these counties during construction or spend money locally which could result in temporary county-level income changes in supporting industries. Furthermore, , it is expected that Enbridge would use some local workers – as referenced in the direct testimony of Barry Simonson (lines 505-513) current labor agreements in Minnesota require that at least 50% of workers would be expected to be employed from local union halls. As construction jobs are typically permanent in nature and spatially temporary in the sense that workers move from project to project, permanent jobs may result from said construction (this is also dependent on an unquantifiable backlog of other construction project demand). Tax revenues would increase due to the increase in labor income (i.e., taxable income), sales tax on the purchase of goods locally, and property taxes. Construction would also have a temporary indirect influence on economic conditions due to employment and income for service industries supporting construction activities (e.g., the hotel industry, fueling services, and the food service industry).

5.3.4.3.1 Applicant's Proposed Project (from Neche to Superior)

Construction Impacts

Employment and Income

Construction of the Applicant's proposed project is expected to require up to a maximum of 4,200 workers across 7 different construction spreads over a 12-month period. As noted above, it is expected that Enbridge would use some local workers – as referenced in the direct testimony of Barry Simonson (lines 505-513) current labor agreements in Minnesota require that at least 50% of workers would be expected to be employed from local union halls. As construction jobs are typically permanent in nature and spatially temporary in the sense that workers move from project to project, permanent jobs may result from said construction (this is also dependent on an unquantifiable backlog of other construction project demand). Based on this assumption, it is likely that direct construction-related employment would have a minor positive impact on county-level unemployment and per capita and/or median household income levels.

Furthermore, it is likely that some of the non-technical work could be accomplished by local labor (e.g., clearing and trenching); hiring of local labor for those positions would have a temporary (over the duration of construction and post-construction restoration activities) and negligible to minor impact on county-level unemployment or per capita and/or median household income levels, depending on the nature of work activities.

Construction workers who re-locate to the Project area would spend a portion of their income on local goods and services such as food, gas, and lodging. These expenditures would increase revenues to those secondary or supporting industries (i.e., industries that indirectly support the construction industry) for the duration of the construction period in the area of the construction spread. This would result in a temporary, negligible to minor positive impact on the secondary industries. If businesses in the secondary industries hire additional staff to accommodate increased business, there would be a temporary, positive negligible to minor indirect impact on employment and unemployment within each county along the route.

In addition to direct Project-related employment and payroll spending, a large portion of the construction-related expenses would be for construction materials, supplies, equipment, parts, and other goods and services such as fuel, hardware, and parts. The Applicant estimated the material costs for construction of its proposed project in Minnesota to be $438.9 million. According to the IMPLAN model results, the top 10 industries (as defined in the model) that would be positively affected by construction-related spending are construction services for new, non-residential structures; food services and drinking places; real estate businesses;, wholesale trade business (businesses engaged in wholesaling merchandise such as agriculture and mining); architectural and engineering services; offices of health practitioners; private hospitals; employment services; and financial services (see Appendix R). These expenditures during construction would result in temporary and negligible to minor indirect, positive impacts on those industries, particularly within the counties along the route. The magnitude of the impact on the industries would depend on the size of the industries and the portion of the expenditures that would be spent locally in each county crossed by the route.

If businesses in these industries hire local additional staff to accommodate increased business, there would be a temporary, positive negligible to minor indirect impact on employment, unemployment, and per capita income at the county level along the route.

If the Applicant employs some local residents during construction, there would be a direct effect on employment, unemployment, and per capita income at the county level along the route and the temporary, positive impact would likely be greater.

Tax Revenues

Construction of the Applicant's proposed project would generate state and local taxes from a variety of sources. State and county tax revenues would increase due to increased employment payrolls directly associated with construction (i.e., the wages paid to construction workers). In other words, regardless of where a construction worker lives, a portion of their wages would be subject to Minnesota state income taxes since the construction occurs in Minnesota over an extended period of time; nonresident employees in Wisconsin and North Dakota may also be subject to tax withholding. In addition, if the industries indirectly affected by construction hire additional staff to accommodate the increased business as described above, the wages paid to those workers would also increase state and county tax revenues. As noted, it was assumed that property taxes would not begin to accrue until the operations phase of the Project; therefore, construction of the pipeline would not affect property taxes at the county level.

As previously discussed, income taxes are generated at the state level and reapportioned to county governments as determined by the state. Table 5.3.4-11 presents the estimated increase in the state income tax that would be appropriated to each county in the ROI based on the portion of total length of the pipeline through each county. Based on these estimates, Aitkin County would receive the highest increase in income tax revenue at $15 million. Specifically, the State of Minnesota would receive approximately $98 million in income tax receipts, which is less than 1 percent of the amount that Minnesota currently receives in income tax revenue. This positive impact on income tax revenues would be temporary and minor to major (i.e., depending on the allocation to each individual county) and likely would be limited to the duration of the construction timeframe.

Table 5.3.4-11. Estimated Income Tax Generated from Construction-Related Income for the Applicant's Proposed Project

State/County	Miles of Pipeline through County	Estimated Income Tax Generated from Direct and Indirect Construction-Related Income[a] ($2016 millions)
North Dakota		
Pembina	27.6	$2.4
Minnesota		
Kittson	15.4	$4.5
Marshall	36.3	$10.7
Pennington	19.7	$5.8
Red Lake	15.7	$4.6
Polk	14.0	$4.1
Clearwater	42.2	$12.4
Hubbard	44.6	$13.1
Wadena	7.1	$2.1

Table 5.3.4-11. Estimated Income Tax Generated from Construction-Related Income for the Applicant's Proposed Project

State/County	Miles of Pipeline through County	Estimated Income Tax Generated from Direct and Indirect Construction-Related Income[a] ($2016 millions)
Cass	47.4	$12.0
Crow Wing	4.8	$1.4
Aitkin	51.6	$15.2
Carlton	41.0	$12.1
Subtotal	***339.8***	***$98.0***
Wisconsin		
Douglas	13.2	$3.5
TOTAL	**380.5**	**$103.9**

[a] The estimates represent a conservative upper bound on the actual values. The underlying data are based on results from an IMPLAN model that uses national data, rather than data at the state level. The national data inflate the results at a more localized level, compared to a state-level model (see Appendix R).

Operations Impacts

Employment and Income

The Applicant stated that the existing operations staff would be able to operate the Project and that few additional employees would be hired to assist the staff. As a result, operation of the pipeline would have no measureable impact on local employment, per capita household income, median household income, or unemployment in the ROI.

Tax Revenues

Since there would be few additional staff members hired for operation of the Project, there would be very little change in income tax or sales tax revenues due to increased spending by permanent operational staff. Therefore, the impact on income tax and sales tax revenues would be permanent, but at most negligible.

Property tax revenues would be the largest source of ongoing revenue to the counties along the route. Local and state governments would continue to collect annual property taxes from the Applicant based on the assessed value of the pipeline easements for the life of the Project. This would result in permanent, minor to major positive impacts on property tax revenues for the counties along the route.

5.3.4.3.2 Continued Use of Existing Line 3

Construction Impacts

There would be no construction impacts on employment, income, or tax revenue from the continued use of the existing Line 3 pipeline because it is already built.

Operation Impacts

Continued use of existing Line 3, including continuation of ongoing integrity maintenance, would not be expected to alter current employment, income, or tax revenue. Any integrity digs and subsequent maintenance or repairs would likely be completed by the existing workforce or local contractors and no new land or easements would need to be purchased. Therefore, no impacts on employment, income, or tax revenue would be expected associated with continued operations.

5.3.4.3.3 System Alternative SA-04

Construction Impacts

Employment and Income

For the purposes of the analysis, it was assumed that system alternative SA-04 would be constructed and operated in the same manner as the Applicant's proposed project. Based on the Applicant's estimate that 7 spreads would be needed to construct the Applicant's 380-mile-long proposed project, it was estimated that 14 to 15 spreads would be needed to construct the 795-mile-long system alternative SA-04. If all of the workers were hired from outside the Project area, a conservatively high estimate of 9,000 workers would temporarily re-locate to the Project area. Based on the assumptions that the additional workers would not be local, as described above, direct construction-related employment would not affect county-level unemployment or per capita and/or median household income levels. If some local labor was utilized for construction, minor positive impacts on county-level unemployment and per capita and/or median household income levels would be anticipated. As construction jobs are typically permanent in nature and spatially temporary in the sense that workers move from project to project, permanent jobs may result from said construction (this is also dependent on an unquantifiable backlog of other construction project demand). It is likely that some of the non-technical work could be accomplished by local labor (e.g., clearing and trenching); hiring of local residents for those positions would have a temporary and negligible to minor impact on county-level unemployment or per capita and/or median household income levels.

Construction workers who re-locate to the Project area would spend a portion of their income on local goods and services such as food, gas, and lodging. Construction of SA-04 would be expected to have the largest increase of local spending on goods and services of all alternatives due to the 9,000 workers (i.e., 4,200 more workers than for the Applicant's proposed project). These expenditures would increase revenues to those secondary or supporting industries (i.e., industries that indirectly support the construction industry) for the duration of the construction period in the area of the construction spread. This would result in a temporary, minor positive impact on the secondary industries. If businesses in the secondary industries hire additional staff to accommodate increased business, there would be a temporary, positive but negligible indirect impact on employment, and unemployment, and within each county along the route.

A large portion of the construction-related expenses would be for construction materials, supplies, equipment, parts, and other goods and services such as fuel, hardware, and parts. While the Applicant has not estimated the material costs for construction for SA-04, it is expected these would be higher than the Applicant's proposed project due to anticipated length and scope of the Project. According to the IMPLAN model results, the top 10 industries (as defined in the model) that would be positively affected by construction-related spending are construction services for new, non-residential structures; food services and drinking places; real estate businesses; wholesale trade business (i.e., businesses engaged in wholesaling merchandise such as agriculture and mining;, architectural and engineering services; offices of health practitioners; private hospitals; employment services; and financial services (see Appendix R). These expenditures during construction would result in temporary and negligible to minor indirect, positive impacts on those industries, particularly within the counties along the route. The magnitude of the impact on the industries would depend on the size of the industries and the portion of the expenditures that would be spent locally in each county crossed by the route.

If businesses in these industries hire local additional staff to accommodate increased business, there would be a temporary, positive negligible to minor indirect impact on employment, unemployment, and per capita income at the county level along the route.

Tax Revenues

Impacts on tax revenues from construction of SA-04 would be similar to those discussed for the Applicant's proposed project. At the state and local level, property taxes paid by the Applicant would be the primary source of tax revenue. State and county tax revenues would increase due to increased employment payrolls directly associated with construction (i.e., the wages paid to construction workers). This increase in income tax revenues would be higher for SA-04 compared to the Applicant's proposed project as a result of the greater number of workers projected to be required for construction. If the industries indirectly affected by construction hire additional staff to accommodate the increased business as described above, the wages paid to those workers would also increase state and county tax revenues. As stated earlier, it was assumed that property taxes would not begin to accrue until the operations phase of the Project; therefore, construction of the pipeline would not affect property taxes at the county level.

As previously discussed, income taxes are generated at the state level and reapportioned to county governments. Individual states determine the amount allocated to each county. Table 5.3.4-12 presents the estimated increase in state income tax for each state that would be crossed by SA-04. This amount was then allocated to each county that would be crossed by SA-04 based on the portion of pipeline through each county. Based on the IMPLAN output and total miles per county, it is estimated that Minnesota would receive the highest share of income tax revenue at approximately $75 million, followed by Iowa at approximately $63 million (see Appendix R). These figures represent less than a 1-percent change to the current overall level of income tax in each state (approximately $9 billion in Minnesota and $4 billion in Iowa). As a result, the impact would be positive, but temporary and minor to major (i.e., depending on the allocation in each individual county).

Table 5.3.4-12. Estimated Income Tax Generated from Construction-Related Income for System Alternative SA-04

State/County	Miles of Pipeline through County	Estimated Income Tax Generated from Direct and Indirect Construction-Related Income[a] ($2016 millions)
North Dakota		
Cass	46.3	$4.0
Grand Forks	39.5	$3.4
Pembina	37.4	$3.2
Richland	54.6	$4.7
Traill	31.0	$2.7
Walsh	24.6	$2.1
Subtotal	***233.5***	***$20.1***

Table 5.3.4-12. Estimated Income Tax Generated from Construction-Related Income for System Alternative SA-04

State/County	Miles of Pipeline through County	Estimated Income Tax Generated from Direct and Indirect Construction-Related Income[a] ($2016 millions)
Minnesota		
Blue Earth	18.2	$5.4
Chippewa	8.3	$2.5
Freeborn	29.7	$8.8
Kandiyohi	19.2	$5.7
Le Sueur	1.9	$0.6
Mower	8.5	$2.5
Nicollet	20.0	$6.0
Renville	23.1	$6.9
Sibley	22.2	$6.6
Stevens	31.6	$9.4
Swift	27.4	$8.2
Traverse	21.3	$6.3
Waseca	19.6	$5.8
Subtotal	***251.0***	***$74.7***
Iowa		
Bremer	1.6	$0.5
Buchanan	12.9	$4.3
Chickasaw	29.1	$9.7
Clinton	38.3	$12.8
Delaware	20.4	$6.8
Fayette	23.1	$7.7
Howard	5.4	$1.8
Jones	32.1	$10.7
Mitchell	24.9	$8.3
Subtotal	***187.9***	***$62.6***
Illinois		
Bureau	17.9	$3.2
LaSalle	31.8	$4.3
Lee	8.9	$1.6
Grundy	20.0	$3.6
Will	4.8	$0.9

Table 5.3.4-12. Estimated Income Tax Generated from Construction-Related Income for System Alternative SA-04

State/County	Miles of Pipeline through County	Estimated Income Tax Generated from Direct and Indirect Construction-Related Income[a] ($2016 millions)
Rock Island	4.9	$0.9
Whiteside	34.7	$6.2
Subtotal	***123***	***$20.7***
TOTAL	**795.4**	**$178.1**

[a] The estimates represent a conservative upper bound on the actual values. The underlying data are based on results from an IMPLAN model that uses national data, rather than data at the state level. The national data inflate the results at a more localized level, compared to a state-level model (see Appendix R).

Operations Impacts

Employment and Income

For the purposes of the analysis, it was assumed that SA-04 would be operated in the same manner as the Applicant's proposed project. Based on Enbridge's estimate that very few permanent workers would be needed for operation of the proposed project, it is expected that SA-04 would similarly require few operational staff. Based on the small number of permanent jobs, it is likely that operation of the pipeline would result in no to negligible impact on the per capita household income, median household income, or unemployment rates in the ROI.

Tax Revenues

Since there is likely to be a small number of permanent operational staff, it is also likely that operation of the pipeline would result in a permanent, negligible impact on tax revenues associated with payroll spending (i.e., income taxes) in the ROI.

Property tax revenues are likely to be the largest source of ongoing revenue to the counties in the ROI. Local and state governments would continue to collect annual property taxes from the Applicant for the life of the Project based on the assessed value of the pipeline easements for SA-04. Therefore, it is likely that positive impacts on property taxes from operation would be permanent and minor to major, depending on share of each county's property tax base.

5.3.4.3.4 Transportation by Rail

In the United States, this alternative would require construction and operation of a new rail offloading facility near the existing Enbridge terminals in Clearbrook, Minnesota. As described in Chapter 4, the rail alternative would also require upgrades to existing rail facilities near Clearbrook, in Clearwater County. The alternative would also require expansion of the existing facility at the Enbridge terminal in Superior, and up to 0.5 mile of new rail spur in Douglas County, Wisconsin.

Construction Impacts

<u>Employment and Income</u>

Construction of the offloading facility and associated facilities for the rail alternative is estimated to generate from 50 to 100 construction positions over the duration of construction activities, based on similar types of rail-related construction projects. As construction jobs are typically permanent in nature and temporary in the sense that workers move from project to project, an equal or lower number of permanent jobs may result from said construction (this is also dependent on an unquantifiable backlog of other construction project demand). It also was assumed, based on the information in Chapter 4 that it would cost between $85 and $125 million to construct the terminal facilities.

For this analysis, it was assumed that the construction workforce would not be hired locally. Based on this assumption, it is likely that direct construction-related employment would not affect county-level unemployment or per capita and/or median household income levels. However, it is likely that some of the non-technical work could be accomplished by local residents (e.g., clearing and grading); hiring of local residents for those or other positions would have a temporary and negligible impact on county-level unemployment or per capita and/or median household income levels.

Construction workers who re-locate to the ROI (Clearwater and Douglas counties) would spend a portion of their income on local goods and services such as food, gas, and lodging. These expenditures would increase revenues to those secondary or supporting industries (i.e., industries that indirectly support the construction industry) for the duration of the construction period in the counties. This would result in a temporary, negligible to minor positive impact on the secondary industries. If businesses in the secondary industries hire additional staff to accommodate increased business, there would be a temporary, positive negligible to minor indirect impact on employment and unemployment within Clearwater and Douglas counties.

In addition to direct Project-related employment and payroll spending, a large portion of the construction-related expenses would be for construction materials, supplies, equipment, parts, and other goods and services such as fuel and hardware. These expenditures during construction would result in temporary and negligible to minor indirect, positive impacts on industries receiving the expenditures. The actual magnitude of the impact on the industries would depend on the size of the industries and the portion of the expenditures that would be spent in each county.

<u>Tax Revenues</u>

Income tax revenues generated from these activities would be determined at the state level, i.e, in Minnesota and Wisconsin, and allocated at the county level as determined by the state. Based on the IMPLAN output, it is likely that construction of the terminals and related facilities would generate approximately $2.5 million for Minnesota, and $2.2 million for Wisconsin, substantially lower than expected tax revenues generated by the Applicant's proposed project and SA-04 (see Appendix R). This positive impact on income tax revenues to the counties would be temporary and minor.

It was assumed that property taxes would not begin to accrue until the operations phase of the Project; therefore, construction of the pipeline would not affect property taxes at the county level.

Operations Impacts

<u>Employment and Income</u>

It is possible that the increased volume of rail traffic could lead to the addition of several hundred permanent jobs, such as railroad operators, technicians during operations, and general laborers to facilitate offloading of tank cars. However, it is unknown how many of the workers hired for operation would be housed within the ROI. At the county level, it is unlikely that the increase in permanent jobs would affect per capita income, mean household income levels, or unemployment rates; the increase would be small relative to the overall income and labor force in the county, resulting in permanent negligible impacts.

Tax Revenues

Depending on the number of local jobs, there could be a direct, permanent, minor impact on income taxes from the increase in direct permanent employment at the facilities. There would also be a permanent, minor indirect impact on income taxes from spending in industries in the ROI that support the rail industry.

Property tax revenues would be based on the increase in value of the new and expanded facilities. These new taxes are expected to result in a permanent, minor impact on tax revenues for the two counties.

5.3.4.3.5 Transportation by Truck

In the United States, this alternative would require construction of offloading and related facilities at and near the Enbridge terminals at Clearbrook and Superior. At both sites, small sections of additional roadways would be required for access. In Clearwater County, it may be also necessary to construct a new roadway and upgrade area highways (although these potential auxiliary needs are not specifically included in the analysis of this alternative). In Douglas County it would be necessary construct an alternate truck route to the Superior terminal.

Construction Impacts

Employment and Income

Construction of the offloading facility and associated facilities for the truck alternative is estimated to generate from 30 to 50 construction positions over the duration of Project construction activities, based on similar types of construction projects. As construction jobs are typically permanent in nature and temporary in the sense that workers move from project to project, an equal or lower number of permanent jobs may result from said construction (this is also dependent on an unquantifiable backlog of other construction project demand). For this analysis, it was assumed that the construction workforce would not be hired locally. Based on this assumption, it is likely that direct construction-related employment would not affect county-level unemployment or per capita and/or median household income levels. However, it is likely that some of the non-technical work could be accomplished by local residents (e.g., clearing and grading); hiring of local residents for those or other positions would have a temporary and negligible impact on county-level unemployment or per capita and/or median household income levels.

Construction workers who re-locate to the ROI (Clearwater and Douglas counties) would spend a portion of their income on local goods and services such as food, gas, and lodging. These expenditures would increase revenues to those secondary or supporting industries (i.e., industries that indirectly support the construction industry) for the duration of the construction period in the counties. This would result in a temporary, negligible to minor positive impact on the secondary industries. If businesses in the secondary industries hire additional staff to accommodate increased business, there would be a temporary, positive but negligible indirect impact on employment, and unemployment, and within each county along the route.

In addition to direct Project-related employment and payroll spending, a large portion of the construction-related expenses would be for construction materials, supplies, equipment, parts, and other goods and services such as fuel and hardware. These expenditures during construction would result in temporary and negligible to minor indirect, positive impacts on industries receiving the expenditures. The magnitude of the impact on the industries would depend on the size of the industries and the portion of the expenditures that would be spent in each county.

Tax Revenues

Income tax revenues generated from these activities would be determined at the state level (i.e., in Minnesota and Wisconsin) and allocated at the county level as determined by the state. Based on the IMPLAN output, it is likely that construction of the terminal facilities would generate approximately $2.5 million for Minnesota, and $2.2 million for Wisconsin, substantially lower than expected tax revenues generated by the Applicant's proposed project and SA-04 (see Appendix R). This positive impact on income tax revenues to the counties would be temporary and minor.

It was assumed that property taxes would not begin to accrue until the operations phase of the Project; therefore, construction of the pipeline would have no impact on property taxes at the county level.

Operations Impacts

Employment and Income

Transport of oil via tanker trucks would require up to 4,000 trucks per day. If local workers were hired to operate and maintain the facilities or work directly for the truck line, a positive, permanent impact would result from an increase in labor income and employment in the surrounding county. However, it is likely that at least some truck drivers hired to transport the oil would come from outside of the ROI and therefore would have permanent negligible impact on per capita income, median household income, and unemployment rates at the county level.

Tax Revenues

Depending on the number of local jobs generated, there could be a direct permanent minor impact on income taxes from the increase in direct permanent employment at the facilities, as well as a permanent indirect minor impact on income taxes from spending in industries that support the truck industry. Each of the 4,000 trucks would need to refuel at gas stations along the truck routes. This could result in a permanent negligible to minor increase in tax revenue generated from the state gas tax, depending on where and how often the trucks need to refuel.

Property tax revenues would be based on the increase in value of the new and expanded facilities. These new taxes are expected to result in a permanent, minor impact on tax revenues for the two counties.

5.3.4.3.6 Existing Line 3 Supplemented by Rail

Construction Impacts

As previously indicated, no impacts on employment, income, or tax revenue would be expected associated with continued use of the existing Line 3. With respect to supplemental rail transport, it was assumed that the same upgrades of rail facilities described above for transportation by rail would be required at the Clearbrook and Superior terminals; therefore, the construction impacts would be the same as described for the rail alternative.

Operations Impacts

Continued use of existing Line 3, including continuation of ongoing integrity maintenance, would not be expected to alter current employment, income, or tax revenue. Therefore, no impacts on employment, income, or tax revenue would be expected associated with continued operations.

Overall, fewer trains would be used to transport crude oil than under the Transportation-by-Rail alternative which would reduce the number of new permanent jobs compared to the rail alternative. Therefore, it is unlikely that the additional permanent jobs would have more than a negligible effect on per capita income, mean household income levels, or unemployment rates at the county level, as the increase would be small relative to the overall income and labor force in the county.

Impacts on tax revenues would be the same as described for the rail alternative, with a potentially smaller permanent, minor impact on income taxes from the direct impact of employment related to operation of the facilities and the indirect impact of spending in industries that support the rail industry. Property taxes would likely be similar to those of the rail transport alternative, although it is possible that the offloading facilities would be smaller than for the rail transport alternative, which would result in a lower property value for the facilities.

5.3.4.3.7 Existing Line 3 Supplemented by Truck

Construction Impacts

As previously indicated, no impacts on employment, income, or tax revenue would be expected associated with continued use of existing Line 3. With respect to supplemental truck transport, it was assumed that the same upgrades of transport facilities described above for transportation by truck would be required at the Clearbrook and Superior terminals; therefore, the construction impacts would be the same as described for the truck alternative.

Operations Impacts

Continued use of existing Line 3, including continuation of ongoing integrity maintenance, would not be expected to alter current employment, income, or tax revenue. Therefore, no impacts on employment, income, or tax revenue would be expected associated with continued operations.

Overall, fewer trucks would be used to transport crude oil than under the Transportation-by-Truck alternative, which would reduce the number of trucks per day compared to the truck alternative and is likely to add fewer permanent jobs. Therefore, it is unlikely that the additional permanent jobs would have more than a negligible effect on per capita income, mean household income levels, or unemployment rates at the county level, as the increase would be small relative to the overall income and labor force in the county.

Impacts on tax revenues would be the same as described for the truck alternative, with a smaller permanent, minor impact on income taxes from the direct impact of employment related to operation of the facilities and the indirect impact of spending in industries that support the rail industry. Property taxes would likely be similar to those of the truck transport alternative, although it is possible that the offloading facilities would be smaller than for the truck transport alternative, which would result in a lower property value for the facilities.

5.3.4.4 Summary and Mitigation

5.3.4.4.1 Summary

The potential impacts on employment, income, and tax revenue from construction and operation of the Applicant's proposed project and CN Alternatives were assessed. This evaluation considered construction-related employment, payroll spending, and expenditures on materials, supplies and equipment; operation-related employment and payroll spending; income tax revenue from workers during construction and operation; and property taxes paid by the Applicant during operation. The ROI for this analysis consists of the counties where construction would occur for the Applicant's proposed project and CN Alternatives, as well as those counties crossed by Line 3. Table 5.3.4-13 provides a summary list of the potential impacts of construction and operation of the alternatives, including the anticipated duration and magnitude of the impacts.

Construction Impacts

The construction workforce needed for new pipeline construction (SA-04 and the Applicant's proposed project) would be much greater than for the rail or truck alternatives. Because the Line 3 pipeline is in place and operating, there would not be any construction-related changes in employment or income for that alternative. The construction workforce for any of the alternatives would not have a direct effect on employment and income at the county level, based on the assumption that the workforce would not be local. If the Applicant employs some local residents during construction, there would be a greater influence on employment, unemployment, and per capita income at the county level that could result in a temporary, positive negligible to minor impact.

During construction, there could be an increase in hiring in secondary industries (i.e., the industries that support the construction industry). The impact of that increase in employment for each alternative, except the alternative of continued use of Line 3, would have temporary, negligible to minor impacts on employment and income at the county level; positive impacts resulting from construction of the Applicant's proposed project or SA-04 would likely be of greater magnitude due to their substantially greater construction workforces as compared to those of the other CN alternatives.

Construction-related tax revenues would be largely due to income taxes paid at the state level and apportioned to the counties crossed by the pipeline, as well as sales and use taxes on construction-related goods and services. Tax revenues generated during construction are likely to be temporary and minor to major for all alternatives except continued use of Line 3. Construction-related tax revenues would likely be highest for the Applicant's proposed project and SA-04 alternatives.

The increase in tax revenues during construction is likely to be the greatest for construction of any of the new pipeline alternatives (Applicant's proposed project and SA-04) due to the size of the workforce and the amount of time required to complete construction activities. Of these two alternatives, SA-04 would be expected to have the largest positive effects on employment, income, and tax revenue since it would require the largest construction workforce.

Operations Impacts

Operation of the pipelines would require a small number of new hires at most since a new pipeline system would be operated primarily by the existing operations staff for the Enbridge Mainline. Therefore, operation would not result in a measureable effect on county-level income and employment levels. In addition, the small number of permanent staff required to operate a new pipeline would not be large enough to have more than a negligible positive effect on tax revenues at the county-level. Continued operation of the Line 3 pipeline would not require additional staff. Property taxes for the pipelines would be substantial and would result in a permanent, minor to major impact on county-level tax revenues (depending on respective property tax base of each county). The impact on property taxes would likely be greater for SA-04 due to its greater length, and more evenly distributed among four states, whereas the majority of property taxes generated by the Applicant's proposed project would be in Minnesota.

Operation of the rail offloading facility and the truck offloading facility would not require a substantial number of workers. Although the increased volume of rail traffic could lead to the addition of several hundred permanent jobs, it is likely that many of the workers hired to operate the trains would not be housed within the ROI but spread across the general region. Similarly, transport of oil via tanker trucks would require a substantial number of truck drivers, but it is likely that many of the truck drivers hired to transport the oil would come from outside of the ROI. Therefore, operation of the rail and truck transport alternatives would have a permanent negligible impact on per capita income, median household income, and unemployment rates at the county level.

Depending on the number of local jobs for the rail and truck alternatives, there could be a direct permanent negligible impact on income taxes from the increase in direct permanent employment at the rail and truck offloading facilities, as well as a permanent indirect minor impact on income, sales, and use taxes from spending in industries that support the truck industry. This indirect impact would likely be greater for the truck transport alternative due to refueling needs along the truck routes.

Property tax revenues would be based on the increase in value of the new and expanded offloading facilities. These new taxes are expected to result in a permanent, minor impact on tax revenues for the two counties. The total property taxes generated by the rail and truck alternatives would likely be substantially less than those of the pipeline alternatives.

The impacts of operating the combined alternatives of continued use of the Line 3 and rail transport or continued use of the Line 3 and truck transport would be essentially the same as those for the rail and truck alternatives. However, with the use of the Line 3 pipeline, there would be fewer jobs for train and truck operations due to decreased volume

5.3.4.4.2 Mitigation

The only potentially major impacts of the Applicant's proposed project or CN Alternatives on employment, income, and tax revenue would be associated with increases in tax revenue during construction for the pipeline alternatives, and permanent increases in property tax revenue for the new pipeline alternatives. It is anticipated that SA-04 would result in generating more property tax than the Applicant's proposed project since the SA-04 pipeline would be over twice as long. According to Enbridge, engagement with and promotion of potential tribal businesses and individuals through work on Enbridge-related projects will occur. Based on information received from Enbridge, Enbridge supported the Heavy Equipment Operators (Local 49) in a tribal focused training in June 2017.No mitigation measures have been identified to address impacts on employment, income, or tax revenues.

Table 5.3.4-13. Summary of Potential Impacts on Employment, Income, and Tax Revenue for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Employment, unemployment, per capita income, median household income	Temporary and permanent/ negligible to minor impacts • 4,200 workers (*combination of local labor utilized per Enbridge commitments, non-local labor)* • Increase in income/jobs in secondary industries that support construction	No impact	Temporary and permanent/ negligible to minor impacts • 9,000 workers *(expected combination of local and non-local workers assumed non-local)* • Increase in income/jobs in secondary industries that support construction	Temporary/ negligible impacts • 50 to 100 workers *(all workers assumed non-local)* • Increase in income/jobs in secondary industries that support construction	Temporary/ negligible impacts • 30 to 50 workers *(all workers assumed non-local)* • Increase in income/jobs in secondary industries that support construction	Temporary/ negligible impacts • 50 to 100 workers *(all workers assumed non-local)* • Increase in income/jobs in secondary industries that support construction	Temporary/ negligible impacts • 30 to 50 workers *(all workers assumed non-local)* • Increase in income/jobs in secondary industries that support construction
Property tax revenue during construction	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Income tax revenue during construction	Temporary/minor to major impacts • $104 million	No impact	Temporary/minor to major impacts • $178 million	Temporary/minor impacts • $5 million	Temporary/minor impacts • $5 million	Temporary/minor impacts • $5 million	Temporary/minor impacts • $5 million
Operations Impacts							
Employment, unemployment, per capita income, median household income	No impact	No impact	No impact	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts	Permanent/ negligible impacts

Table 5.3.4-13. Summary of Potential Impacts on Employment, Income, and Tax Revenue for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Property tax revenue during operations	Permanent/minor to major impacts	No impact	Permanent/minor to major impacts	Permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts
Income tax revenue during operations	Permanent/ negligible impacts	No impact	Permanent/ negligible impacts	Permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts	Permanent/ negligible to minor impacts

a No single dataset in this summary table provides a complete indication of all relevant impacts to employment, income, and tax revenue. However, together the estimates provide a reasonably comprehensive indication of the potential impacts. For example, while estimates of total employment and income provide an indication of a subset of the socioeconomic effects of the projects, other data points, like the estimated magnitude of property tax revenues can provide an understanding the potential revenue that might be generated at a broader level within a particular county. The appropriate weight to place on any given impact is the subject to debate, even among technical experts, so the weight that the user places on one type of impact or another may legitimately vary based on individual preferences and values.

b Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-592 through 5-604. The table above, for example, describes temporary increases in local workforce and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to is contained in the text of this section.

c The Applicant's proposed project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-593 to 5-595. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

d Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on pages 5-595 to 5-596. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

e SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-596 to 5-599. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

f The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-599 to 5-601. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

g The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-601 to 5-602. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

5.3.4.5 References

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5.4 CULTURAL RESOURCES

Cultural resources include the locations of human activity, occupation, or usage that contain materials, structures, or landscapes that were used, built, or modified by people. They also include the institutions that form and maintain communities and link them to their surroundings. Cultural resources consist of archaeological resources (e.g., sites and isolated finds), historic resources (e.g., objects, buildings, structures, or districts), and sacred places (including traditional cultural properties and landscapes). Cultural resources also include tribal, usufructuary rights resources both within reservation boundaries and ceded lands by treaty (e.g., traditional hunting and fishing areas) and treaty areas, which are discussed in detail in Chapter 9. For the purposes of this discussion, these resources are referred to collectively as cultural resources.

The discussion of existing conditions and the evaluation of potential impacts on cultural resources, addressed in this section, are limited to archaeological and historic resources that are recorded as part of resource investigations (e.g., Phase I and Phase II archaeological surveys) and that are recorded in databases maintained by individual state historic preservation offices (SHPOs). Special attention also is made to historic properties (i.e., those listed or eligible for listing on the National Register of Historic Places [NRHP]). In this manner, cultural resources important to American Indian tribes may not be captured in their entirety. Additional discussion of resources important to American Indian tribes, as well as the confluence of cultural and natural resources are discussed in Chapter 9.

This section first describes the existing conditions for the cultural resources within an area along the Applicant's proposed project and each of the CN Alternatives where these resources could be affected by construction and operation of the Project. Potential impacts on cultural resources are discussed and compared for the Applicant's proposed project and the CN Alternatives (continued use of the existing Line 3, SA-04, transportation by rail, transportation by truck, and Line 3 supplemented by rail or truck). None of the impacts or mitigation measures described in this chapter reflect how American Indians describe impacts on the landscape and tribal resources within reservation boundaries and ceded lands (see Chapter 9). Potential impacts on cultural resources from an accidental release of crude oil are discussed in Chapter 10.

5.4.1 Regulatory Context and Methodology

The regulatory context and data availability varies across the states that would be collectively crossed by the Applicant's proposed project and the CN Alternatives (Minnesota, North Dakota, Iowa, Illinois, and Wisconsin).

5.4.1.1 Regulatory Context

5.4.1.1.1 North Dakota

North Dakota Century Code

The North Dakota Century Code (NDCC) outlines the policies of the state of North Dakota regarding cultural resources. The State Historical Society of North Dakota (SHSND) is the agency responsible for protecting historic properties and cultural resources within North Dakota. The Historic Preservation Division is within the SHSND. Through the director, this division is responsible for preservation and interpretation of antiquities on the state level.

NDCC 55-03 outlines the permitting process for cultural resources investigations. A permit to investigate, excavate, or otherwise record cultural resources on state land and to excavate cultural resources on private land is required under NDCC 55-03-01.1. NDCC 55-10 outlines the preservation of historic sites and antiquities, which are within the public's interest (see NDCC 55-10-01). It also established the North Dakota State Historic Sites Registry.

NDCC 23-06-27 protects unmarked human burial sites, human remains, and burial goods located on state lands and makes it a felony to knowingly disturb, or fail to report disturbance to, such locations without authority of law.

North Dakota Administrative Code

The North Dakota Administrative Code (NDAC) outlines the criteria for listing cultural resources in the State Historic Sites Registry (NDAC 40-02-01). However, the SHSND uses the NRHP to record and maintain lists of resources worthy of preservation (see Section 5.4.1.1.6 for a discussion of the NRHP). The NDAC outlines the process for obtaining a permit to conduct archaeological investigations (NDAC 40-02-02). Prehistoric and historic human burial sites, human remains, and burial goods are protected under NDAC 40-02-03.

5.4.1.1.2 Minnesota

Minnesota Field Archaeology Act of 1963

The Minnesota Field Archaeology Act of 1963 (Minn. Stat. 138.31-42) allows the State of Minnesota to reserve the exclusive right of field archaeology on state sites in order to protect and preserve archaeological sites on state lands. It prohibits unlicensed field archaeology on state sites and discourages unlicensed field archaeology on privately owned lands. Based on the Field Archaeology Act, it is a gross misdemeanor for a person to willfully conduct unlicensed archaeology on state sites; willfully deface, injure, destroy, displace, or remove any object or data belonging to the State; or willfully interfere with evidence or work on any state site or other site for which a license has been issued. Persons having knowledge of the location of archaeological sites are encouraged to communicate such information to the State Archaeologist.

The Field Archaeology Act also outlines the duties of the Minnesota's Office of the State Archaeologist (OSA), which include consultation with the Minnesota Indian Affairs Council (MIAC). The MIAC shares legal responsibility for monitoring and enforcing laws that protect Indian human remains and associated burial items. The MIAC reviews archaeological license applications to conduct fieldwork to determine if a burial or cemetery are within the project area. The authority for the MIAC is contained in Minnesota Statute 138.31.

Under the Field Archaeology Act, the Minnesota OSA shares some duties with the Minnesota Historical Society (MHS), but the Minnesota OSA is not affiliated with the MHS or the State Historic Preservation Officer (SHPO). The Minnesota OSA and the MHS/SHPO operate independently, but cooperatively with regard to their shared duties.

Minnesota DNR, MNDOT, and all other state agencies whose activities may affect cultural resources are required to cooperate with MHS and the State Archaeologist to carry out the provisions of the Field Archaeology Act. Under the Field Archaeology Act, state agencies (i.e., the agency controlling the public lands or waters) must supply MHS and the State Archaeologist with a development plan for review and comment when known or suspected sites (i.e., when significant archaeological sites exist, or are predicted to exist) on public lands or waters under their jurisdiction may be affected by implementation of the plan. The Minnesota Environmental Quality Board submits copies of Environmental Assessment Worksheets to the MHS/SHPO for comment on potential effects of privately funded developments, such as the proposed Project, on cultural resources in Minnesota (Minnesota SHPO 2005). As part of the worksheet, consideration is made for historic designations (state or national registers), known artifact areas, and architectural features.

Minnesota Historic Sites Act

The Minnesota Historic Sites Act (Minn. Stat. 138.661-669) established the Minnesota Historic Sites Network. The sites are significant state resources that MHS is preserving, developing, interpreting, and maintaining for public use, benefit, and access.

The Minnesota Historic Sites Act also created the State Register of Historic Places (SRHP), which is an inventory of outstanding properties possessing historical, architectural, archaeological, and aesthetic values that are of paramount importance in the development of the state. These historic properties represent and reflect elements of the state's cultural, social, economic, religious, political, architectural, and aesthetic heritage. These properties are separate from the Minnesota Historic Sites Network and are not operated by MHS for historical interpretive or public use and access purposes.

Historic properties are selected for inclusion in the SRHP based on any of the following criteria:

1. The quality of significance in American history, architecture, archaeology, engineering, and culture that is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association;
2. Association with events that have made a significant contribution to the broad patterns of our history;
3. Association with the lives of persons significant in our past;
4. Embodiment of 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
5. The yielding or likelihood of yielding information pertinent in prehistory or history.

The Minnesota Historic Sites Act outlines the responsibility of the State in protecting the physical features and historic character of properties designated in the Minnesota Historic Sites Network, SRHP, or in the NRHP. Before carrying out any undertaking that would affect designated or listed properties, or funding or licensing an undertaking by other parties, the state department or agency must consult with the MHS to determine appropriate treatments and to seek ways to avoid and mitigate any adverse effects on designated or listed properties.

Minnesota Private Cemeteries Act

The Minnesota Private Cemeteries Act (Minn. Stat. 307.08) sets forth the equal treatment and respect for human dignity of all human burials, human remains, and human burial grounds without reference to their ethnic origins, cultural backgrounds, or religious affiliations. This applies to all human burials, human remains, or human burial grounds found on or in all public or private lands or waters in Minnesota. This also includes all remains found outside of recorded cemeteries or unplatted graves or burials found within recorded cemeteries and in contexts that indicate antiquity greater than 50 years. If such burials are not Indian or their ethnic identity cannot be ascertained, as determined by the State Archaeologist, they shall be dealt with in accordance with provisions established by the State Archaeologist and other appropriate authority.

Minnesota State Historic Preservation Office

The Minnesota SHPO is a department of MHS. While the SHPO's principal responsibilities are defined in the National Historic Preservation Act (NHPA) Section 110, the SHPO also has historic preservation duties under Minnesota state law. The SHPO acts for MHS in the review of state agency projects that may affect state archaeological sites including projects.

The SHPO is responsible for maintaining an inventory of historic properties; identifying and nominating properties to the NRHP; implementing a statewide historic preservation plan; administering a federal grants program; assisting federal, state, and local governments with historic preservation duties; and working with state and federal agencies to ensure that historic properties (i.e., those eligible for listing or listed on the SRHP or the NRHP) are considered by planning and development.

As defined in 36 CFR 800, the SHPO plays a central role in the Section 106 process and "advises and assists federal agencies in carrying out their 106 responsibilities." The SHPO ensures that agencies make "a reasonable and good faith effort" to consider the effects of their undertakings on historic properties. "Historic properties" for the purposes of Section 106 are defined as sites, districts, buildings, structures, or objects that are included in or are eligible for listing in the NRHP.

Minnesota archaeological laws do not set standards for site significance and do not discuss integrity, but the SHPO evaluates affected sites using NRHP criteria and suggests treatments of significant state sites that are consistent with Section 106.

Minnesota Governor's Executive Order 13-10

The Minnesota Governor's Executive Order 13-10 directs state government agencies to implement new tribal consultation policies aimed at improving relationships and collaboration with Minnesota's 11 tribal governments. It provides for consultation, coordination, and cooperation between the State and the 11 Indian tribes.

5.4.1.1.3 Iowa

Iowa Administrative Code, Chapter 263B

Iowa Administrative Code (Iowa AC) Chapter 263B requires the University's Board of Regents to appoint a State Archaeologist, who is a faculty member of the Department of Anthropology at the University of Iowa. Established in 1959 and implemented under Chapter 685 (see below), the Office of the State Archaeologist (Iowa OSA) conducts archaeological research and public programs around the state, preserves ancient burial sites (150 years old or older), and examines and reinters ancient human remains (University of Iowa 2016a). The Iowa OSA also maintains the state archaeological repository, and manages data on all recorded archaeological sites in Iowa (University of Iowa 2016a).

Iowa Administrative Code, Chapter 303

Chapter 303 outlines the administrative responsibility of state agencies in agreement with the Department of Cultural Affairs under Chapter 28E for historical sites. Chapter 303.4 established a State Historical Society Board of Trustees. The State Historical Society preserves and provides access to Iowa's historical resources through a variety of statewide programs, exhibitions, and projects while serving as an advocate for Iowa's past and connector to the future (Iowa Department of Cultural Affairs 2016).

Iowa Administrative Code, Chapter 685

The Iowa OSA's responsibilities are implemented under Iowa AC 685, Chapter 1. As part of their responsibility, the Iowa OSA has developed procedural guidelines for treatment of burial places (Iowa AC 685, Ch. 11), confidentiality of archaeological site records (Iowa AC 685, Ch. 14; see also Iowa AC Ch. 22.7 [21]), the curation of archaeological specimens and associated records (Iowa AC 685, Ch. 7), and submittal of site records (Iowa AC 685, Ch. 12).

Iowa Administrative Code, Chapter 716.5

The intentional disturbance of burials is a violation of Iowa state law. Under Chapter 716.5, such disturbance is prosecutable as an aggravated misdemeanor.

Iowa State Historic Preservation Office

The Iowa SHPO is within the State Historical Society of Iowa. The Iowa SHPO identifies, preserves, and protects Iowa's historic and prehistoric resources. It administers state and federal historic preservation programs, and maintains a survey and inventory collection of historic properties in Iowa. The SHPO also issues guidelines for archaeological investigations in Iowa.

5.4.1.1.4 Illinois

Historic Preservation Act (20 ILCS 3410)

The Historic Preservation Act (20 Illinois Compiled Statutes [ILCS] 3410) created the Illinois Historic Sites Advisory Council, which reviews nominations to the NRHP.

Historic Preservation Agency Act (20 ILCS 3405)

The Historic Preservation Agency Act created the Illinois Historic Preservation Agency (IHPA). The IHPA protects historic, architectural, and archaeological sites as part of the public planning process within Illinois. The IHPA carries out their duties in accordance with Section 106 of the NHPA and the Illinois State Agency Historic Resource Preservation Act.

Illinois State Agency Historic Resource Preservation Act (20 ILCS 3420)

The Illinois State Agency Historic Resources Preservation Act of 1990 (20 ILCS 3420) outlines procedures for the identification and protection of cultural resources that may be affected by projects that are funded by, licensed by, or permitted by state agencies. The Act was amended in 1991 to limit archaeological surveys for state agency permit and license reviews to projects in high-probability zones across the state and to locations of previously recorded sites. These zones are corridors extending up to 500 feet beyond both edges of the major river drainages in the state. Based on previous surveys and excavations, these areas are known as having the highest probabilities for containing archaeological sites, especially burial mounds. SA-04 would be located across major river drainages in Illinois.

Archaeological and Paleontological Resources Protection Act (20 ILCS 3435)

The Archaeological and Paleontological Resources Protection Act (20 ILCS 3435) was passed to ensure that cultural resources on state or local public lands are protected. Formal permits are required to conduct archaeology on public lands.

The IHPA is responsible for the protection of archaeological and paleontological resources. The act also provides strict penalties for vandalism and theft of archaeological and paleontological resources.

The Illinois State Museum and the IHPA maintain a statewide file of known archaeological and paleontological sites.

Human Skeletal Remains Protection Act

The Human Skeletal Remains Protection Act (20 ILCS 3440) protects marked or unmarked human burials without reference to ethnic origins, cultural backgrounds, or religious affiliations. This law states that all human graves in unregistered cemeteries that are older than 100 years are protected by the State of Illinois. It is illegal to intentionally disturb these burials or burial markers, including Indian mounds. In the case of accidental discovery of human remains, whoever makes the discovery is required by state law to notify the county coroner immediately so that the coroner can determine whether the remains are part of a crime scene.

Illinois State Archaeologist

The Illinois State Archaeologist was established under Public Act 098-0346, to provide current information on the results of archaeological-related research and scientific inquiries to the public at large, communities, scientists, industry, and government agencies (University of Illinois 2016). The duties of the State Archaeologist include preservation, data collection and management, education, and research (University of Illinois 2016).

5.4.1.1.5 Wisconsin

Wisconsin Historical Society and State Historic Preservation Officer (Wisc. Stat. 44.01-02, 44.31-32)

The Wisconsin Historical Society (WHS) is designated as an official agency and trustee of the state and is charged with the preservation and care of Wisconsin's heritage and cultural resources under Wisconsin State Legislature Statutes (Wisc. Stat.) Chapter 44.01-02. The WHS is authorized with carrying out a historic preservation program for the "preservation or rehabilitation of historic properties." Wisc. Stat. Chapter 44.32, Subchapter II states that the director of the WHS or his or her designee shall serve as the SHPO whose duty among others includes identifying and nominating properties of historic significance.

Wisconsin State Historic Preservation Program and Archaeology Program (Wisc. Stat. 44.48(2))

Wisc. Stat. Chapter 44.48(2) authorizes the WHS to establish and administer a state archaeology program, in order to carry out specified archaeological surveys, studies, excavations or other activities in designated regions of the state.

Wisconsin State Register of Historic Places (Wisc. Stat. 44.36-41)

The Wisconsin SRHP was established under Wisc. Stat. 44.36 to provide an inventory of districts, sites, buildings, structures and objects which are significant in national, state or local history, architecture, archaeology, engineering and culture.

Under Wisc. Stat. 44.41, each state agency that owns a listed property must develop a long-term plan for the management, preservation, and improvement of the property that to the greatest extent possible result in the preservation of the property.

Field Archaeology (Wisc. Stat. 44.47)

The Field Archaeology section of Wisc. Stat. 44.47 asserts that the State of Wisconsin reserves the exclusive right of field archaeology on state sites, and establishes regulations for field archaeology on sites owned by political subdivisions, in order to protect and preserve archaeological and scientific information, matter and objects. Further, it states that it is a declaration of legislative intent that persons practicing field archaeology on private owned land are encouraged to pursue their field archaeology in accordance with this Wisc. Stat. 44.47, and that the looting of all archaeological remains be strongly discouraged.

Burial Sites Preservation (Wisc. Stat. 157.70)

Chapter 157.70, Subchapter III of the Wisc. Stat. protects both catalogued and uncatalogued burial sites from disturbance, and outlines procedures necessary if any activity is thought to be disturb the burial site. The director of the WHS must be immediately notified if a person knows or has reasonable grounds to believe that a burial site or the cataloged land contiguous to a cataloged burial site is being disturbed or may be disturbed. Wisc. Stat. 157.70(10) details penalties to be imposed on any individual who fails to report the disturbance of a burial, intentionally disturbs a burial site, or allows for disturbance of a burial site to transpire without the authorization of the director of the WHS.

Wisconsin State Archaeologist (Wisc. Stat. 44.47)

The Wisconsin State Archaeologist was established under Wisc. Stat. 44.47 to sponsor, engage in, and direct fundamental research of Wisconsin archaeology, and encourage and coordinate archaeological research and investigation undertaken within the state. In addition to administering the state archaeology program, the State Archaeologist also approves permits for field archaeological research, cooperates with other state agencies which have authority in areas where archaeological site are located, encourages the preservation of archaeological sites located on privately owned property, and protects objects of archaeological significance discovered by field archaeology at state sites or discovered during the course of any public construction or demolition work on state sites.

5.4.1.1.6 Federal Regulations

National Historic Preservation Act, as amended

The NHPA of 1966 (54 U.S.C. 300101 et seq.) as amended, requires federal agencies to identify and manage historic properties that are under their jurisdiction, and encourages the preservation of historic properties through consultation and cooperation with state and local governments, Indian tribes, and private individuals. The NHPA outlines the role of the federal government has in preserving historic properties, considering the effects of its actions, advancing the purposes of the Act, and avoiding activities that would be contrary to its purpose. The NHPA also outlines the roles of the Advisory Council on Historic Preservation, SHPOs, and Tribal Historic Preservation Officers (THPOs).

Section 106 of the NHPA (54 U.S.C. 306108, and its implementing regulations under 36 CFR Part 800) requires that any federal or federally assisted project, any project requiring federal licensing or permitting, or any project on federal lands consider the effect of the undertaking on historic properties listed in or eligible for listing in the NRHP. Under the NHPA, federal agencies must evaluate effects on historic properties that are eligible for or listed in the NRHP before a project is approved. Under Section 106, agencies are required to consult American Indian tribes at all stages of project development, particularly if an undertaking may affect a historic property with religious or cultural significance to a tribe, even if the undertaking is outside reservation boundaries.

National Register of Historic Places

The NRHP (54 U.S.C. Ch. 3021), created under the NHPA of 1966, is the federal list of historic, archaeological, and cultural resources. Resources listed in the NRHP include districts, sites, buildings, structures, and objects that are significant in American history, prehistory, architecture, archaeology, engineering, and culture. The NRHP is maintained and expanded by the NPS on behalf of the Secretary of the Interior.

In North Dakota, the SHPO at the SHSND administers the NRHP program. To guide the determination of eligibility of properties for inclusion in the NRHP, the NPS developed the NRHP Criteria for Evaluation (36 CFR 60.4). These criteria are standards by which properties are evaluated for listing in the NRHP. The criteria consider the level of significance in American history, architecture, archaeology, and culture and are applied to districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association. To be listed in the NRHP or to be considered eligible for listing in the NRHP, a district, site, building, structure, or object must meet one of the following criteria:

- Criterion A: Are associated with events that have made a significant contribution to the broad patterns of our history; or
- Criterion B: Are associated with the lives of persons significant in our past; or
- Criterion C: 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 make lack individual distinction; or
- Criterion D: Has yielded, or may be likely to yield, information important in prehistory or history.

Archaeological sites are primarily assessed under Criterion D. Buildings and other resources that are less than 50 years old do not meet the NRHP criteria unless they are of exceptional importance under Criterion Consideration G, as described in the NPS Bulletin No. 22, “How to Evaluate and Nominate Potential National Register Properties That Have Achieved Significance Within the Last 50 Years.”

Amendments to NHPA specify that properties of religious and cultural significance (including traditional cultural properties [TCPs]) may be determined to be eligible for inclusion on the NRHP.

In addition to these types of resources, TCPs also are present. A TCP is defined in the National Register Bulletin 38 as a property that is “eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining the continuing cultural identity of the community.” Per the bulletin, “‘Traditional’ in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice” (Parker and King 1998).

5.4.1.1.7 Tribal Policies and Ordinances

American Indian tribes also have adopted policies and/or ordinances governing cultural resources, including archaeological and historic resources. These policies often define what cultural resources are and how they will be protected for future generations (see Chapter 9).

As an example of these policies, the Mille Lacs Band of Ojibwe define archaeological resources as remains of past human life or activities, which are of archaeological or historical interest. These resources must be at least fifty years in age. This definition is part of their Cultural Resources Code (1072-MLB-23), which was enacted prior to the establishment of the THPO (see Appendix P). In addition, the Fond du Lac Band of Lake Superior Chippewa have adopted Ordinance #03/14, which established a cultural resources preservation zone to help protect and preserve cultural sensitive areas. In addition to these policies and/or ordinances, the THPOs have assumed Section 106 responsibilities for archaeological sites and TCPs, as well as other duties; however, the SHPO has retained Section 106 responsibility for buildings, structures, and landscapes within these reservations. Agencies and contractors need to consult both the THPOs and the SHPO about federal undertakings within these reservations. Among the THPOs in MN are the Bois Forte Band of Chippewa Indians, the Fond du Lac Band of Lake Superior Chippewas, the Grand Portage Band of Lake Superior Chippewa, the Leech Lake Band of Ojibwe, Lower Sioux Indian Community, Mille Lacs Band of Ojibwe Indians, Prairie Island Indian Community, Upper Sioux Community, and the White Earth Band of Minnesota Chippewa.

5.4.1.2 Methodology

The ROI for this impact analysis encompasses the areas along the Applicant’s proposed project and the CN Alternatives where cultural resources could be directly or indirectly disturbed during Project-related construction or operations. The ROI for the Applicant’s proposed project, includes the construction work area, permanent right-of-way, ATWS, access roads, and aboveground facilities, including 0.5 mile on either side of the pipeline centerline for archaeological resources, and 1 mile on either side of the pipeline centerline for historic resources. The ROI for SA-04 and the existing Line 3 also included 0.5 mile on either side of the pipeline centerline for archaeological resources and 1 mile on either side of the pipeline centerline for historic resources. For the impacts analysis, an assumed construction work area and permanent right-of-way was used that is similar to that for the Applicant’s proposed project. The ROI for the transportation by rail and the transportation by truck alternatives includes archaeological resources and historic resources that are within 0.5 mile of the offloading facility locations at the Clearbrook and Superior terminals. While the exact location of these rail or truck offloading facilities is not known, it was assumed they would be located adjacent to the terminals and associated with existing rail and truck infrastructure.

For Minnesota, existing data were obtained from MHS for archaeological and historic resources within the ROI. Cultural resource data from the MHS includes information on the following: properties that are listed in the NRHP or SRHP; resources that have been determined eligible for listing in the NRHP through previous federal or state review; and resources that have been identified through reconnaissance surveys, but which have not been evaluated for NRHP eligibility or are not recommended for listing. . Archaeological and historic data were also obtained from the North Dakota and Wisconsin SHPOs for the Applicant's proposed project and the CN Alternatives that would extend into those states. For SA-04, archaeological and historic data were also obtained from the respective SHPOs for Iowa (Iowa Archaeological Site File and I-Sites) and Illinois (Illinois Inventory of Archaeological Sites [IAS] and the Historic Architectural and Archaeology Resources Geographic Information System [HARGIS]). Sensitive locational information, however, is not provided within the context of this EIS. This type of information, however, was considered in evaluating the potential impacts to cultural resources. For the CN alternatives, data reviewed includes only that provided as part of the SHPO databases, whereas for the Applicant's proposed project, information is available for surveys conducted within Minnesota and from the SHPO databases.

Cemetery data also was reviewed based on available GIS data. Available cemetery data included information for Illinois, Iowa, Minnesota, North Dakota, and Wisconsin. This data is not intended to represent a full list and may exclude small, family owned cemeteries or those without names. Cemetery information is included in the discussion of historic resources and is treated as a historic resource within the impacts discussion, unless noted as an archaeological resource within a SHPO database.

The data collected included site number, site/property type, site location, date of recordation, historic context, and associated reports. Site leads, which are resources that are located on historic maps (e.g., rural schools), but have not been recently surveyed and have not been officially recorded, are not included in these analyses. The types of cultural resources were input into a GIS and overlaid with the Applicant's proposed project and CN Alternatives where available. Potential impacts on cultural resources for the Applicant's proposed project and CN Alternatives were considered where construction or operation of the alternatives could cause disturbance, loss, or modification of the resource.

National Register data was reviewed using data from the National Park Service (2014). This data provides information on those properties listed within the NRHP as of April 28, 2014. The file reviewed consists of properties listed within the Midwest.

Additionally, surveys for archaeological resources were completed for the Applicant's proposed project in Minnesota, the information from these surveys is included in this analysis. Additionally, the Applicant did not conduct any surveys for cultural resources for any CN Alternative. DOC-EERA's consultation with SHPO is ongoing, and the results of the consultation concerning determinations of eligibility, potential Project effects, and any necessary treatment for impacts are not available.

Information concerning sacred places or resources with importance to American Indian tribes is not available through SHPO databases, but may be available through consultation with affected American Indian tribes with geographic and/or traditional interests in Minnesota, North Dakota, Iowa, Illinois, and Wisconsin. Where information is known on resources of this type or TCPs, information is provided within this chapter. Details on ongoing tribal consultation and coordination can be found in Chapter 9 and Appendix P. **In its December 14, 2017, order finding the Line 3 Project EIS inadequate, the**

Commission specified that the traditional cultural properties survey must be completed before the start of any construction pursuant to any permit granted in the Line 3 Project proceeding.[21]

As noted in previous sections, no one dataset for cultural resources provides a complete indication of all relevant impacts to them. However, taken together these datasets provide a reasonably comprehensive indication of the potential impacts. For instance, the number of resources alone does not account for the size or significance of a particular site or structure. However, data from the National Register dataset (and where available, survey information) in combination can aid the reader in understanding the number of resources along the route already known to be significant and how they may be impacted by the proposed route or the alternatives. Known resources also hint as to the types of resources that may be present.

Furthermore, the quantitative information from the analysis of these datasets should be coupled with an understanding of the qualitative descriptions of impacts that are contained in the text in this section. The summary table at the end of the cultural resources section provides counts of resources and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to these resources is contained within the text of this section.

5.4.2 Existing Conditions

This section describes the existing conditions for archaeological and historic resources in the ROI for the Applicant's proposed project and the CN Alternatives. Additional information on American Indian tribes and associated resources and histories is provided in Chapter 9.

5.4.2.1 Minnesota

Eleven federally recognized Indian tribes are located in Minnesota. The Ojibwe/Chippewa tribes in Minnesota are the Bois Forte (Nett Lake), Fond du Lac, Grand Portage, Leech Lake, Mille Lacs, Red Lake, and White Earth. The Dakota Communities (Sioux) in the state are the Lower Sioux, Prairie Island, Shakopee-Mdewakanton, and Upper Sioux.

Nine of the federally recognized American Indian tribes in Minnesota have a THPO. These include the following: Bois Forte Band of Chippewa Indians, Fond du Lack Band of Lake Superior Chippewa, Grand Portage Band of Lake Superior Chippewa, Leech Lake Band of Ojibwe, Lower Sioux Indian Community, Mille Lacs Band of Ojibwe Indians, Prairie Island Indian Community, Upper Sioux Community, and White Earth Band of Minnesota Chippewa.

North Dakota

The Applicant's proposed project and the CN Alternatives would cross through the Northern Red River Study Unit of North Dakota. Additionally, SA-04 crosses through the Southern Red River Study Unit and the Sheyenne River Study Unit.

Five federally recognized American Indian tribes are in North Dakota: the Three Affiliated Tribes of the Fort Berthold Reservation (the Mandan, Hidatsa and Arikara Nation), the Spirit Lake Nation, the Standing

[21] **Minnesota Public Utilities Commission (December 14, 2017) Order Finding Environmental Impact Statement Inadequate, e-dockets No. 201712-138168-01**

Rock Sioux Tribe, the Turtle Mountain Band of Chippewa Indians, and the Sisseton-Wahpeton Oyate of the Lake Traverse Reservation. Four of the tribes in North Dakota have THPOs: the Three Affiliated Tribes of the Fort Berthold Reservation, the Spirit Lake Nation, the Standing Rock Sioux Tribe, and the Turtle Mountain Tribe of Chippewa (NATHPO 2016).

The Trenton Indian Service Area is an American Indian community located partially within North Dakota and partially in Montana (North Dakota IAC 2010). Some tribes who have traditional and ceded lands within North Dakota now live on reservations in other states. These tribes may hold interests in the area of the ROI.

5.4.2.2 Iowa

SA-04 crosses through eastern Iowa.

One federally recognized tribe is in Iowa, the Sac and Fox Tribe of the Mississippi in Iowa (National Conference of State Legislatures 2016). The Sac and Fox Tribe (also called the Meskwaki Nation of Iowa), purchased land in Iowa to establish the Meskwaki Indian Settlement on July 13, 1857. Other tribes who have traditional and ceded lands within Iowa now live on reservations in other states. These tribes may hold interests in the ROI.

No THPOs are present in the state of Iowa (NATHPO 2016).

5.4.2.3 Illinois

SA-04 extends from Iowa into northern Illinois.

No federally recognized American Indian tribes have a reservation in Illinois, and no THPOs are present in the state of Illinois (NATHPO 2016). However, American Indian tribes are present who have traditional and ceded lands within Illinois, but now live on reservations in other states. These tribes may hold interests in the ROI.

5.4.2.4 Wisconsin

The Applicant's proposed project and all of the CN Alternatives except SA-04 would cross into Wisconsin. Wisconsin is home to 11 federally recognized tribes (National Conference of State Legislatures 2016):

- Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation
- Forest County Potawatomi Community
- Ho-Chunk Nation of Wisconsin
- Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
- Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin
- Menominee Indian Tribe of Wisconsin
- Oneida Tribe of Indians of Wisconsin
- Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin

- St. Croix Chippewa Indians of Wisconsin
- Sokaogon Chippewa Community
- Stockbridge Munsee Community

Additionally, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) in Wisconsin represents 11 Ojibwe tribes in Minnesota, Wisconsin, and Michigan with off-reservation hunting, fishing, and gathering treaty rights (GLIFWC n.d.). Nine of the 11 Wisconsin tribes have formal THPO designations (the Sokaogon Chippewa Community and St Croix Band of Lake Superior Chippewa do not) (WHS 2017a).

Resources of value to these tribes may be located in the ceded territory, and hence these tribes may hold interests in the ROI.

5.4.2.5 Applicant's Proposed Project

5.4.2.5.1 Archaeological Resources

Based on data from the North Dakota SHPO provided in 2017, 16 previous studies were conducted for cultural resources within the ROI of the Applicant's proposed project in that state. Of these, 13 studies were previously conducted in areas that overlap with the construction work area and 12 that overlap with the permanent right-of-way. Based on the 2017 North Dakota SHPO data, the Applicant's proposed project in North Dakota has 15 archaeological resources (sites and/or isolates) within the ROI, four of which would be located within both the construction work area and permanent right-of-way). These resources primarily consist of chipped stone and ceramics.

For the Applicant's proposed project in Minnesota, the Applicant conducted 11 archaeological surveys (Phase I) and site evaluations (Phase II) between May 2013 and August 2016 (Table 5.4.2-1).

As part of the Applicant's surveys, over 80 archaeological resources were identified and/or re-visited (i.e., those that were previously documented). According to a 2017 summary report of the investigations, 59 of the resources are located within the Applicant's proposed project (Mueller 2017). The survey corridor for the Applicant's proposed project comprised an area of 23,874 ac (9,661 ha); a total of 23,513 ac (9,515 ha) of the corridor have been surveyed by the Applicant for archaeological resources through April 2017 (Mueller 2017).

Table 5.4.2-1. Archaeological Investigations in Minnesota Conducted by the Applicant

Survey Date	Survey Type	Reference	Archaeological Resources Identified/Re-visited[a]	Period	NRHP Status Recommendations	Counties	Miles Surveyed	Acres Surveyed
May – November 2013	Phase I	Mueller et al. April 2014	48	35 - Pre-Contact Sites 12 - Post-Contact Sites 1 Pre and Post Contact Site	35 – Not eligible 2 – Recommended as eligible 2 – Recommended for additional testing 9 - Not evaluated * 1 cemetery protected by other regulations (not included in total count)	Aitkin, Carlton, Cass, Clearwater, Crow Wing, Hubbard, Polk, and Red Lake	358	16,756
April – October 2014	Phase I and Phase II	Watson et al. 2014 Addendum	9	8 – Pre-Contact Sites 1 – Post-Contact Site	6 - Not eligible 2 - Not evaluated 1 - Recommended for additional testing	Polk, Crow Wing, Clearwater, Red Lake, Cass, Hubbard, Wadena, Aitkin, and Carlton	Unknown	3,800
May – November 2014	Phase I	Mueller and Terry March 2015	18	12 - Pre-Contact Sites 5 - Post-Contact Sites 1 Pre and Post Contact Site	17 – Not eligible 1 – Not evaluated	Kittson, Marshall, Pennington, Red Lake, Polk, and Clearwater	119	8,263
July 2014	Phase II	Mueller and Terry January 2017	1	1 – Pre and Post-Contact Site	1 – Not eligible	Hubbard	Unknown	Unknown
June – August 2015	Phase I	Mueller and Terry October 2015	2	1 - Pre-Contact Site 1 - Post-Contact Site	2 – Not eligible	Aitkin, Carlton, Cass, Clearwater, Crow Wing, Hubbard, Polk, and Red Lake	Unknown	1,617

Table 5.4.2-1. Archaeological Investigations in Minnesota Conducted by the Applicant

Survey Date	Survey Type	Reference	Archaeological Resources Identified/Re-visited[a]	Period	NRHP Status Recommendations	Counties	Miles Surveyed	Acres Surveyed
August – November 2015	Phase I	Mueller et al. 2016 Addendum	4	4 – Pre-Contact Sites	4 – Not eligible	Aitkin, Carlton, Cass, Clearwater, Crow Wing, Hubbard, Polk, and Red Lake	Unknown	1,347
June – July 2015	Phase II	Watson et al. September 2015	5	5 – Pre-Contact Sites	4 – Not eligible 1 – Recommended eligible	Polk, Clearwater, Hubbard, and Carlton	Unknown	N/A
June – August 2015	Phase I	Mueller and Terry October 2015	2	2 – Post-Contact Sites	2 –Not eligible	Kittson, Marshall, Pennington, Red Lake, Polk, and Clearwater	119	8,409
August – November 2015	Phase I	Mueller et al. February 2016 Addendum	1	1 – Post –Contact Site	1 – Not eligible	Polk	Unknown	69
June – August 2016	Phase 1	Mueller September 2016	3	3 - Post-Contact Sites	3 – Not eligible	Aitkin, Carlton, Cass, Clearwater, Crow Wing, Hubbard, Polk, and Red Lake	Unknown	781 mainline/139 access roads
June – August 2016	Phase 1	Mueller September 2016	0	Not applicable	Not applicable	Kittson, Marshall, Pennington, Red Lake, Polk, and Clearwater	Unknown	61 mainline/1 access roads

[a] Please note – the total number of sites may be overrepresented as some were subject to Phase II testing, and they, therefore, may be double-counted.

Based on a review of the site numbers noted in the reports shown in Table 5.4.2-1 and SHPO consultation letters submitted by the Applicant, 18 individual sites required additional testing to assist with recommendations for NRHP-eligibility. Among the 18, one was recommended as potentially eligible. An additional three sites were recommended as NRHP-eligible after initial investigations. Some of these sites, however, may be located in survey areas that are no longer considered part of the proposed Line 3 Project. As part of the surveys, one post-contact family cemetery plot was identified. In accordance with Minnesota Statute 307.08, this site is protected from unauthorized disturbance. The survey report indicates that the cemetery is named the Harrington Homestead Cemetery (Mueller et. al 2014). This site is proximate to the Applicant's proposed project.

Based on data obtained from MHS on November 17, 2016, 53 previously recorded archaeological resources are located within the ROI for the Applicant's proposed project in Minnesota (Table 5.4.2-2). Of these 53 archaeological resources in the ROI, nine would be located within the construction work area, four of which are in the permanent right-of-way (Table 5.4.2-1).Additionally, three archaeological sites would be located within the ATWS for the Applicant's proposed project. This data does not necessarily include all of the sites recorded by the Applicant as part of their surveys.

Based on data obtained from WHS on March 29, 2017, six previously recorded archaeological resources are located within the ROI for the Applicant's proposed project in Wisconsin (Table 5.4.2-1). Four of these Wisconsin archaeological resources are historic-era cemeteries that are located outside the construction work area. The remaining two archaeological resources, including a dam/historic earthwork site and a pre-contact lithic scatter, would be within the construction work areas. The lithic scatter would also be within the permanent right-of-way.

Based on a review of NPS data (2014) and MHS data (for MN portions only), no NRHP listed historic properties (that are archaeological in nature) are located within the construction workspaces, the permanent right-of-way, or ROI for the Applicant's proposed project.

5.4.2.5.2 Historic Resources

As stated above, 16 surveys were conducted for cultural resources within the ROI of the Applicant's proposed project. Based on data from the North Dakota SHPO provided in 2017, no historic resources are located within the ROI of the Applicant's proposed project in North Dakota.

Based on data obtained from MHS on November 17, 2016, 80 previously recorded historic resources are located within the ROI for the Applicant's proposed project. These historic resources include structures, buildings, and bridges. No historic resources would be located within the construction work area (Table 5.4.2-2).

Data obtained from WHS on March 29, 2017, found 48 previously recorded historic resources located within the historic resources ROI for the Applicant's proposed project in Wisconsin (Table 5.4.2-2). These include a farmstead, foundry, houses and outbuildings, a garage, a refinery, churches, an airport hangar, structures, and a car manufacturing plant. One historic resource was identified within the construction work area, but would be outside the permanent right-of-way.

Based on a review of NPS data (2014) and MHS data (for MN portions only), no NRHP listed historic properties (that are above-ground) are located within the construction workspaces or the permanent right-of-way for the Applicant's proposed project. However, the Itasca State Park, a NRHP listed property, is within the ROI. This resource also is referred to as the Itasca State Park CCC/WPA/Rustic Style historic resources. It contains multiple contributing resources (NPS 2014).

Thirty-seven cemeteries are located within the ROI of the Applicant's proposed project. Among these, 17 are within 0.5 mile, and 20 are within 1 mile. None are located within an American Indian reservation.

Table 5.4.2-2. Previously Recorded Archaeological and Historic Resources within the Region of Interest of the Applicant's Proposed Project

State	Number of Resources in Region of Interest (ROI)	Number of Resources in Construction Work Area	Number of Resources in Permanent Right-of-Way	Number of NRHP Listed Historic Properties within the ROI[a]
North Dakota				
Archaeological Resources	15	4	4	0
Historic Resources	0	0	0	0
Minnesota				
Archaeological Resources	53	9	4	0
Historic Resources	80	0	0	1
Wisconsin				
Archaeological Resources	6	2	1	0
Historic Resources	48	1	0	0

[a] The ROI for the Applicant's Proposed Project consists of 0.5 mile to either side of the centerline for archaeological resources and 1.0 mile to either side of the centerline for historic resources.

5.4.2.5.3 Traditional Cultural Properties

As noted in Section 5.4.1.1.6, TCPs are places of traditional religious and cultural importance. They often are associated with American Indian tribes and nations, but they can be attributed to other cultural groups. A TCP can be eligible for or listed on the NRHP. For this reason, they are considered herein.

To date, no specific studies[22] of TCPs have been completed within the ROI, and as such, no specific locations and/or details are known at this time. However, information gathered from the consultation with American Indian tribes with an interest within the ROI have indicated that TCPs are present (see Appendix P). For instance, the Ojibwe consider wild rice waters to be TCPs (Hoppe 2017).

[22] Research conducted as part of this assessment did not identify any known studies that are specific to TCPs. Therefore, the assumption that none are present within the ROI (and for those of other alternatives) does not preclude the potential for studies of this nature to exist. This assumption is carried over into the discussion in Chapter 6 of this EIS, as well.

5.4.2.6 Continued Use of Existing Line 3

5.4.2.6.1 Archaeological Resources

Based on data from the North Dakota SHPO, 16 previous studies have been conducted for cultural resources within the ROI of the existing Line 3. Of these, 13 studies were within the construction work area and 12 were within the permanent right-of-way. Based on North Dakota SHPO data, the existing Line 3 in North Dakota has 15 archaeological resources within the ROI, of which 4 would be located within both the construction work area and permanent right-of-way (Table 5.4.2-3). These resources primarily consist of chipped stone and ceramics.

Based on data obtained from MHS on November 17, 2016, 107 previously recorded archaeological resources have been identified within the ROI for the existing Line 3 pipeline in Minnesota (Table 5.4.2-3). Of these, 7 sites would be in the construction work area and 5 would be in the permanent right-of-way. Based on data obtained from WHS on March 29, 2017, six previously recorded archaeological resources are located within the ROI for the existing Line 3 pipeline in Wisconsin (Table 5.4.2-3). These include four archaeological resources that are historic-era cemeteries, a dam/historic earthwork site, and a pre-contact lithic scatter. **Based on a review of NPS data (2014), no NRHP listed historic properties (that are archaeological in nature) are located within the ROI for the existing Line 3.**

Table 5.4.2-3. Previously Recorded Archaeological and Historic Resources in the Region of Interest of Existing Line 3 Pipeline

State	Number of Sites in Region of Interest	Number of Sites in Construction Work Area	Number of Sites in Permanent Right-of-Way	Number of NRHP Listed Historic Properties within the ROI
North Dakota				
Archaeological Resources	15	4	4	0
Historic Resources	0	0	0	0
Minnesota				
Archaeological Resources	107	7	5	0
Historic Resources	166	3	1	4
Wisconsin				
Archaeological Resources	6	2	1	0
Historic Resources	48	1	0	0

Source: I-Sites 2017; IAS 2017; IHPA 2017; MHS 2016; North Dakota SHPO 2017; University of Iowa 2017; WHS 2017.

a The ROI for the existing Line 3 consists of 0.5 mile to either side of the centerline for archaeological resources and 1.0 mile to either side of the centerline for historic resources.

5.4.2.6.1 Historic Resources

Sixteen surveys have been conducted for cultural resources within the ROI of the existing Line 3 pipeline in North Dakota. Based on data from the North Dakota SHPO, no historic resources are located within the ROI of the existing Line 3 pipeline in North Dakota.

Based on data obtained from MHS on November 17, 2016, 166 previously recorded historic resources are located in the ROI, of which 3 sites would be in the construction work area and 1 would be in the permanent right-of-way (Table 5.4.2-3). Based on a review of NPS data (2014), four NRHP listed properties are within the ROI. These include the Supervisor's Office Headquarters (Ash Avenue, Cass Lake, Cass County), the Winnibigoshish Resort (U.S. Route 2, Bena, Cass County), the Itasca Lumber Company Superintendent's House (506 5th Street, Southeast, Deer River, Itasca County), and Central School (North Pokegama and 4th Street, Grand Rapids, Itasca County).

Data obtained from WHS on March 29, 2017, shows 48 previously recorded historic resources are located within the ROI for the existing Line 3 pipeline in Wisconsin. These include a farmstead, foundry, houses and outbuildings, garage, refinery, churches, airport hangar, structures, and a car manufacturing plant. Thirty-seven cemeteries are located within the ROI of the existing Line 3. Among these, 18 are within 0.5 mile, and 19 are within 1 mile. Four of these are located within the boundaries of the Leech Lake Reservation. They include the Mary Donald Cemetery, the Pine Grove Cemetery, the Saint Joseph Cemetery, and the Thompson Cemetery.

5.4.2.6.2 Traditional Cultural Properties

To date, no specific studies of TCPs have been completed within the ROI. However, information gathered from the consultation with American Indian tribes with an interest within the ROI have indicated that TCPs are present (see Appendix P). The Ojibwe consider wild rice waters to be TCPs. Among these TCPs is Deadfish Lake. Comments provided to the DOC indicate that a ditch is present that feeds directly into the lake and that is crossed by the existing Line 3 (Hoppe 2017).

5.4.2.7 System Alternative SA-04

5.4.2.7.1 Archaeological Resources

Based on the North Dakota SHPO records, a total of 156 studies have been conducted within the 1-mile ROI for historic resources of SA-04. Of these studies, 126 were conducted within the 0.5-mile ROI for archaeological resources, 51 were conducted within the construction work area, and 46 were conducted within the permanent right-of-way.

A total of 32 archaeological resources are located within the 0.5-mile ROI in North Dakota (Table 5.4.2-4). Of these, five archaeological resources would be located in the construction work area, four of which would be located in the permanent right-of-way. These 32 resources include isolated finds of chipped stone, cultural material scatters (including projectile points and chipped stone), railroads, and trails.

Based on data obtained from MHS on November 17, 2016, one previously recorded archaeological resource is located within the archaeological resources study area for SA-04 (Table 5.4.2-4) in Minnesota, and there are no previously recorded archaeological resources within the construction work area for SA-04 in Minnesota.

A search in the ROI was conducted within the Iowa Archaeological Site File by the Site Records Manager. A total of 138 studies were conducted within the ROI, of which 67 studies were in the construction work area, and 59 in the permanent right-of-way. A total of 98 archaeological resources would be located in the 0.5-mile ROI for SA-04 in Iowa (Table 5.4.2-4). These include 35 sites in the construction work area, 27 of which would be in the permanent right-of-way. These resources include prehistoric scatters, lithic scatters, lithic workshops, isolated finds, open habitations, structure/building remains, abandoned town sites, and historic scatters.

Based on data obtained from IAS on March 29, 2017, 136 previously recorded archaeological resources were identified within the ROI in Illinois, including four cemeteries. Of the 136 archaeological sites in the ROI, 9 sites would be located within the construction work area. Of the 9 archaeological sites in the construction work area, 8 sites would be within the permanent right-of-way. Two archaeological sites located within the permanent right-of-way remain unevaluated by the Illinois SHPO for listing in the NRHP, including a pre-contact village site and pre-contact campsite. The other six sites have been determined not eligible for listing in the NRHP. No cemeteries were identified within either the construction work area or the permanent right-of-way.

Based on a review of NPS data (2014) and MN data (for MN portions only), no NRHP listed historic properties (that are archaeological in nature) are located within the ROI for SA-04.

5.4.2.7.2 Historic Resources

Based on North Dakota SHPO data, a total of 359 historic resources are located within the ROI in North Dakota (Table 5.4.2-4). No historic resources are within the construction work area or the permanent right-of-way. Historic resources in North Dakota include bridges, farmsteads, barns, churches, and outbuildings. NRHP listings for the ROI in North Dakota were reviewed using NPS data (2014). Eight NRHP-listed resources are located within the ROI of SA-04. These include the following:

- Adam Fairview Bonanza Farm – 7170 82nd Street, Southeast, Wahpeton, Richland County
- Drayton United Methodist Church – North Dakota 44, Drayton, Pembina County
- First State Bank of Buxton - 423 Broadway Street, Buxton, Traill County
- Nelson's Grocery - Main and 3rd Streets, Christine, Richland County
- Amos and Lillie Plummer House - 306 West Caledonia Avenue, Hillsboro, Traill County
- O.C. Sarles House - 2nd Avenue and 3rd Street, Northeast, Hillsboro, Traill County
- Post Office – Main and 3rd Streets, Christine, Richland County
- Traill County Courthouse – U.S. 81 Hillsboro, Traill County.

For SA-04, no NRHP-listed resources are within the construction work area in North Dakota.

Based on data obtained from MHS on November 17, 2016, three previously recorded historic resources are within the ROI for SA-04 (Table 5.4.2-4) in Minnesota. A review of NRHP listings also indicates that the Alberta Teacher’s House (Main Street, Alberta, Stevens County) is located within the ROI (NPS 2014). None would be located within the construction work area or the permanent right-of-way for SA-04.

Based on I-Sites (University of Iowa 2017), a total of 208 historic studies have been previously conducted in the ROI in Iowa. 222 previously recorded historic resources are located within the ROI in Iowa (Table 5.4.2-4). The previously recorded resources include 29 cemeteries and 42 bridges. The remainder of the resources are primarily associated with farms. Of the 222 resources, 219 resources remain undetermined for NRHP eligibility (Office of the State Archaeologist 2017). Four NRHP-listed resources are within the ROI: Stoe Creek Bridge (V Avenue over Stoe Creek, Oelein, Fayette County), the

Richardson-Jakway House (Rural Route #1, Aurora, Buchanan County), the Lock and Dam No. 14 Historic District (near LeClaire, IA), and Dr. Martin H. Calkins House and Office (Washington and Main Streets, Wyoming, Jones County) (NPS 2014). No historic properties would be located within the construction work area or the permanent right-of-way in Iowa.

According to HARGIS (IHPA 2017), 77 previously recorded historic resources are located within the ROI in Illinois (Table 5.4.2-4). Four of these resources are listed in the NRHP: the Wood-Tellkamp House (201181 – 82 Main Street, LaMoille, Bureau County), the First Congregational Church of LaMoille (201032– 94 Franklin Street, LaMoille, Bureau County), the Allen School (201034– 301 Main Street, LaMoille, Bureau County), and the Dresden Island Lock and Dam Historic District (7521 North Lock Road, Morris, Grundy County) (04000164) (IHPA 2017, NPS 2014). Two additional historic resources, the Bridge over Baker Run (154875) and the Bridge over Masters Creek (153691), have been determined eligible for the NRHP (IHPA 2017).

Seventy cemeteries are located within the ROI of SA-04. Among these, 26 are within 0.5 mile, and 44 are within 1 mile. None are located within an American Indian reservation.

Table 5.4.2-4. Previously Recorded Archaeological and Historic Resources for System Alternative SA-04

Route Segment	Number of Sites in Region of Interest (ROI)	Number of Sites in Construction Work Area	Number of Sites in Permanent Right-of-Way	Number of NRHP Listed Historic Properties within the ROI
North Dakota				
Archaeological Resources	32	5	4	0
Historic Resources	359	0	0	8
Minnesota				
Archaeological Resources	1	0	0	0
Historic Resources	4	0	0	1
Iowa				
Archaeological Resources	98	35	27	0
Historic Resources	222	0	0	4
Illinois				
Archaeological Resources	136	9	8	0
Historic Resources	77	0	0	4

Source: I-Sites 2017; IAS 2017; IHPA 2017; MHS 2016; North Dakota SHPO 2017; University of Iowa 2017; WHS 2017.

[a] The ROI for SA-04 consists of 0.5 mile to either side of the centerline for archaeological resources and 1.0 mile to either side of the centerline for historic resources.

5.4.2.7.3 Traditional Cultural Properties

To date, no specific studies of TCPs have been completed within the ROI and, as such, no specific locations and/or details are known at this time. However, information gathered from the consultation with American Indian tribes with an interest within the ROI have indicated that TCPs are present (see Appendix P). For instance, the Ojibwe consider wild rice waters to be TCPs (Hoppe 2017).

5.4.2.8 Transportation by Rail

In the United States, the rail offloading facility would require between 100 and 200 acres of land that is identified as agricultural lands and wetlands near Clearbrook, Minnesota, along with reestablishment of 10 miles of existing track in Clearbrook.

The rail offloading facility near Superior, Wisconsin, would require approximately 100 acres adjacent to the existing Enbridge terminal and construction of a less-than-one-mile interconnection between existing rail lines in Superior.

5.4.2.8.1 Archaeological Resources

Four archaeological resources are within the ROI for the Clearbrook offloading facility. These include post-contact surface features, artifact scatters, and pre-contact single artifacts. Six archaeological resources within the ROI for the Superior facility and connection. Four of these are cemeteries.

Based on a review of NPS data (2014), no NRHP listed historic properties (that are archaeological in nature) are located within the ROI for the Clearbrook or Superior offloading facilities.

5.4.2.8.2 Historic Resources

Twelve historic resources are within the ROI for the Clearbrook offloading facility. 47 historic resources are within the ROI for the Superior facility, including houses, farms, outbuildings, a church, an airport, and foundries, among other buildings, structures, and objects.

Based on a review of NPS data (2014), no NRHP listed historic properties (that are above-ground) are located within the ROI for the Clearbrook or Superior offloading facilities. No cemeteries are located within the ROI of the Clearbrook or Superior offloading facilities.

5.4.2.8.3 Traditional Cultural Properties

To date, no specific studies of TCPs have been completed within the ROI, and as such, no specific locations and/or details are known at this time. However, information gathered from the consultation with American Indian tribes with an interest within the ROI have indicated that TCPs are present (see Appendix P). For instance, the Ojibwe consider wild rice waters to be TCPs (Hoppe 2017).

5.4.2.9 Transportation by Truck

In the United States, truck facilities near Clearbrook would require approximately 50 acres to construct and operate offloading facilities, and approximately five acres for road access. Truck facilities near the terminal in Superior would require approximately 50 acres to construct and operate a truck offloading facility, and an additional 34 acres to establish a truck route. Specific locations for these facilities have not been identified, but each facility would be located in a general area adjacent to the terminals where the truck facilities (or the rail offloading facilities) would be expected to be constructed, and the ROI for both archaeological and historic resources is the same for both the truck and rail alternatives. Thus, the resources within the ROI are the same as well.

5.4.2.9.1 Archaeological Resources

Four known archaeological resources are within the ROI for the Clearbrook offloading facility. Two are post-contact surface features, and two are pre-contact single artifacts. Six archaeological resources are within the ROI for the Superior facility and connection. Four of these are cemeteries.

Based on a review of NPS data (2014), no NRHP listed historic properties (that are archaeological in nature) are located within the ROI for the Clearbrook or Superior offloading facilities.

5.4.2.9.2 Historic Resources

Twelve known historic resources are within the ROI near Clearbrook, Minnesota. All of these resources are buildings or structures and include houses, a bank, a warehouse, a grain elevator, and a train station. Forty-seven historic resources are within the ROI for the Superior facility, including houses, farms, outbuildings, a church, an airport, and foundries as well as other buildings, structures, and objects.

Based on a review of NPS data (2014), no NRHP listed historic properties (that are above-ground) are located within the ROI for the Clearbrook or Superior offloading facilities. No cemeteries are located within the ROI of the Clearbrook or Superior offloading facilities.

5.4.2.9.3 Traditional Cultural Properties

To date, no specific studies of TCPs have been completed within the ROI, and as such, no specific locations and/or details are known at this time. However, information gathered from the consultation with American Indian tribes with an interest within the ROI have indicated that TCPs are present (see Appendix P). For instance, the Ojibwe consider wild rice waters to be TCPs (Hoppe 2017).

5.4.2.10 Existing Line 3 Supplemented by Rail

The existing conditions for the existing Line 3 supplemented by rail alternative are identical to those described above for continued use of the existing Line 3 pipeline and transportation by rail alternatives.

5.4.2.11 Existing Line 3 Supplemented by Truck

The existing conditions for the existing Line 3 supplemented by truck alternative are identical to those described above for continued use of the existing Line 3 pipeline and transportation by truck alternatives.

5.4.3 Impact Assessment

Impacts occur when an undertaking alters, directly or indirectly, the characteristics of a cultural resource that qualify it for inclusion in the SRHP, the State Historic Site Network, or the NRHP in a manner that diminishes the historical integrity of the property.

The Project would cause impacts on cultural resources (e.g., archaeological resources, historic resources, and TCPs) during construction and operations. Direct and/or indirect impacts are those that may affect the ability of a cultural resource to convey its significance. These types of impacts may result in changes to a resource's integrity, visibility, accessibility, and research potential. The duration of impact could range from temporary to permanent, depending on the type of impact and type of cultural resource. The magnitude of impact could range from negligible to major, depending on the type of cultural resource that would be affected and its location relative to the construction work area or permanent right-of-way.

Direct impacts are the physical disturbances of an action (e.g., construction, operation, or restoration) on a resource that occur at the same time and place as the action within the footprint of the physical disturbance. The types of direct impacts on cultural resources during construction and operation may include the following:

- Physical destruction of or damage to a cultural resource/historic property;
- Alteration of a cultural resource/historic property;
- Removal of a cultural resource/ historic property from its historic location;
- Change of the character of the cultural resource's/ historic property's use or of physical features as they relate to historical setting; and/or
- Neglect of a cultural resource/ historic property that causes its deterioration (except where such neglect and deterioration are recognized qualities of a sacred place).

The level of impact would depend on the type of archaeological resource and its eligibility for listing in the State Register of Historic Places, the State Historic Site Network, or the NRHP, as well as its significance to affected American Indian tribes (e.g., a sacred place). A resource that is eligible for listing in the NRHP generally would experience a higher magnitude of impacts than a site that is not eligible for the same register based on the site's importance to the affiliated culture or state. Single artifacts and surface sites may have a low potential to yield information important to prehistory or history as they may lack context. The level of impact also would vary depending on the location of the construction-related activity and the type of soil, bedrock, and vegetation. For example, vegetation removal may cause damage to surface sites more than deeply buried sites. Compaction may cause impacts on shallow sites and not affect deeply buried sites. If an archaeological site is directly affected, the impact would be permanent and would range in magnitude from minor to major.

Unknown archaeological resources may be located within the construction work area that could be inadvertently discovered during ground-disturbing activities. To reduce impacts on currently unknown archaeological resources, an Unanticipated Discovery Plan (Appendix O) would be implemented during construction. Impacts on inadvertently discovered archaeological resources would be similar to those described for previously recorded resources.

Contamination of archaeological resources could occur from small spills or leaks of lubricants, gasoline, oil, other fuels, coolants, transmission fluid, or other hazardous chemicals during construction activities for the Applicant's proposed project or CN Alternatives. These spills would be managed according to SPCC Plans. Direct impacts on archaeological resources due to contamination and disturbance from cleanup activities would be permanent, depending on the type and location of resource and would range in magnitude from minor to major. Direct impacts on historic resources would range from temporary to permanent and negligible to major, depending on the type and location of resource.

Indirect impacts may change the character of the property's use or physical features within the property's setting that contribute to its historic significance and integrity. Indirect impacts during construction and operations may include:

- Permanent change in viewshed of a historic resource;
- Limited or altered access to a historic resource, whereby the resource may be neglected and fall into ruin, or conversely, access to a historic resource may be facilitated, causing vandalism to increase;
- Introduction of visual, atmospheric, or audible elements that diminish integrity;
- Temporary construction-related impacts including dust, noise, vibration, and visual intrusions caused by heavy equipment.

Indirect impacts from construction activities, such as visual, auditory, and atmospheric changes, generally would be temporary. Evidence of construction would be visible during and for a short period after construction. Indirect impacts could be caused by changes to the surrounding landscape from clearing, excavation, construction equipment, and personnel. These impacts would typically be minor for cultural resources; however, some cultural resources may experience major impacts as a result of viewshed changes or inaccessibility. The changes in viewshed and accessibility would decrease over time. During revegetation, the visual impact from pipeline construction would typically be minor but may last several years or even decades (e.g., trees).

Since only the Applicant's proposed project was surveyed, the analyses for the remaining alternatives are based on the archival review of existing site data. As such, a greater number of cultural resources may be present within the ROI, construction work area, and permanent right-of-way for the alternatives. In addition, even where known resources exist, the significance of these resources may have not been evaluated.

5.4.3.1 Applicant's Proposed Project

For the Applicant's proposed project, no listed NRHP archaeological resources or historic resources are present within the construction workspaces or the permanent right-of-way (based on a review of NPS (2014) data and MHS data for the MN portions of the project). In this manner, no direct or indirect impacts would be anticipated to occur to these types of resources. However, other archaeological resources are present within the construction workspaces, permanent right-of-way, and within the ROI; direct and indirect impacts may occur to these resources. In addition, indirect impacts may occur to historic resources located within the ROI, including to one NRHP-listed property, the Itasca State Park.[23]

5.4.3.1.1 Construction Impacts

Impacts on Archaeological Resources

Fifteen known archaeological resources are within the construction work area of the Applicant's proposed project (Table 5.4.2-2). Construction-related activities such as excavation, grading, rutting, compaction, and removing vegetation would directly affect these archaeological resources. Damage to an archaeological resource could occur from clearing and grading of the pipeline alignment, construction work area, temporary workspaces, access roads, pump stations, and materials staging areas. An

[23] An ancestral burial ground was re-identified upon the construction of a nearby transportation project (to the Applicant's proposed project) at Highway 23 and 4th Street near Duluth, Minnesota. The full extent of the impact area to the burial ground has not yet been determined. While this burial ground is associated with the Fond du Lac Band, it will not be disturbed or impacted by the Applicant's proposed project or alternatives; the cemetery is over 3 miles from the closest alternative.

increased risk of erosion, vandalism, and looting of an archaeological resource may result from removal of protective vegetative cover, and compaction of archaeological resources could occur from movement of heavy machinery and transport of pipe sections, which may alter site stratigraphy and artifact morphology. In addition, impacts could be associated with Project-related spills including contamination, disturbance during cleanup activities, or encountering existing contamination (see Section 5.2.2).

Direct impacts on archaeological sites during construction would be permanent and minor to major depending on the type of resource and its eligibility for listing in the State or National Register. Some impacts would likely require mitigation that would be determined in consultation with the SHPO, affected American Indian tribes, and the public (see Section 5.4.4). Indirect impacts during construction would be temporary, localized, and negligible to minor. Temporary impacts, including vibration, changes in noise and air quality, and visual intrusions, may occur during construction.

Impacts on Historic Resources

A total of 128 known historic resources are within the ROI for the Applicant's proposed project one of which would be within the construction work area in Wisconsin (Table 5.4.2-2). Construction-related direct impacts on this known historic resource could occur and could include destruction and alteration to the resource, moving of associated historic features, as well as visual changes. These direct impacts would be permanent and minor to major.

Indirect temporary impacts may occur on the remaining 127 historic resources within the ROI, including dust, vibration, and intrusion related to construction equipment, as well as construction-related noise. These indirect impacts would be temporary and negligible to minor. Indirect visual intrusions due to vegetative clearing would be long-term and negligible to minor. Indirect impacts from the construction of aboveground facilities would be permanent and negligible to major. The viewshed contains existing pipeline rights-of-way and transmission lines, and the changes in viewshed would decrease over time from revegetation within temporary construction work areas and to a lesser degree the permanent right-of-way.

5.4.3.1.2 Operations Impacts

Impacts on Archaeological Resources

Disturbed areas would be restored and stabilized to the extent practicable after pipeline installation. Such restoration is unlikely to cause damage to cultural resources beyond what may occur during construction. Inspection, monitoring, and maintenance activities are unlikely to affect the four archaeological resources within the permanent right-of-way, because these activities would be undertaken using established access routes. The archaeological resources present within the permanent right-of-way would have been directly affected during construction, and as such, additional impacts from these activities would not be expected. Direct impacts associated with Project-related spills or encountering existing contamination could occur (see Section 5.2.2 and Chapter 10); however, no additional impacts would be expected as the archaeological resources would have already been disturbed during construction.

If operations-related activities result in direct impacts on archaeological resources that were not previously disturbed during construction (i.e., avoided) or to those resources that are adjacent to the construction work area, then the impacts would be permanent and minor to major. Some impacts would likely require mitigation that would be determined in consultation with the SHPO, affected American Indian tribes, and the public (see Section 5.4.4).

If new ground disturbance occurs during the lifespan of the Project, it would occur within the already disturbed permanent right-of-way or construction work area. As such, direct impacts on archaeological resources would have already occurred during construction, and thus, any new ground disturbance is unlikely to cause additional impacts on these resources. However, if archaeological resources had been avoided during construction, or if they are adjacent to the construction work area, then new ground disturbance may cause new impacts on these resources, which would be permanent and minor to major.

Indirect impacts during operations would be temporary, localized, and negligible to minor. Temporary impacts would include vibration, changes in noise and air quality, and visual intrusions.

Impacts on Historic Resources

Operations impacts are unlikely to directly impact historic resources, as no known historic resources are located within the permanent right-of-way. Indirect temporary impacts may occur on the historic resources within the ROI during pipeline operations. These indirect impacts would primarily consist of the presence of MLVs, pump stations, and maintenance crews and would be temporary to permanent and negligible to minor.

Indirect visual intrusions from the new pipeline would be permanent as the viewshed contains existing pipeline rights-of-way and transmission lines, and the changes in viewshed would decrease over time from revegetation of temporary construction work areas and to a lesser degree the permanent right-of-way.

5.4.3.1.3 Traditional Cultural Properties

Without specific knowledge of the particulars of a TCP, the assessment of potential impacts is difficult to accomplish. A TCP may be important for a variety of reasons, may incorporate a small or large geographic area, and may have unique qualities that make it eligible for listing on the NRHP. In this manner, impacts would vary greatly depending on the location of the TCP in relation to a project component.

5.4.3.2 Continued Use of Existing Line 3

For the continued use of existing Line 3, no listed NRHP archaeological resources are present within the ROI (based on a review of NPS (2014) data). Therefore, no direct impacts would be anticipated to occur to these types of resources. Direct impacts to other archaeological resources generally are not anticipated since the line is already in place; however, as discussed herein, some potential exists during maintenance activities. Indirect impacts may occur to both archaeological and historic resources located within the ROI.

5.4.3.2.1 Construction Impacts

No construction impacts on archaeological and historic resources would be anticipated to occur from continued use of the existing Line 3 pipeline because it is already built.

5.4.3.2.2 Operations Impacts

Impacts on Archaeological Resources

No direct impacts on the five archaeological resources within the permanent right-of-way are expected with continued use of the existing Line 3, because the Enbridge Mainline corridor has been extensively disturbed from previous pipeline construction, operations, and maintenance, and ground disturbance would not likely occur in new areas during integrity digs.

Inspection, monitoring, and maintenance activities are unlikely to affect the archaeological resources within the permanent right-of-way because these activities would be undertaken using established access routes. The archaeological resources present within the permanent right-of-way would have been directly affected during construction, and as such, additional impacts from these activities would not be expected. Direct impacts associated with Project-related spills or encountering existing contamination could occur (see Section 5.2.2 and Chapter 10); however, no additional impacts would be expected, as the archaeological resources would have already been disturbed during construction.

If operations-related activities result in direct impacts on archaeological resources that were not previously disturbed during construction (i.e., avoided) or to those resources that are adjacent to the construction work area, then the impacts would be permanent and minor to major. Some impacts would likely require mitigation that would be determined in consultation with the SHPO, affected American Indian tribes, and the public (see Section 5.4.4).

If new ground disturbance occurs during the lifespan of the Project, it would occur within the already disturbed permanent right-of-way or construction work area. As such, direct impacts on archaeological resources would have already occurred during construction, and thus, any new ground disturbance is unlikely to cause additional impacts on these resources. However, if archaeological resources are avoided during construction, or if they are adjacent to the construction work area, then new ground disturbance may cause new impacts on these resources, which would be permanent and minor to major.

Indirect impacts during operations would be temporary, localized, and negligible to minor. Temporary impacts would include vibration, changes in noise and air quality, and visual intrusions.

Impacts on Historic Resources

No direct impacts on known historic resources are expected with continued use of the existing Line 3 because the Enbridge Mainline corridor has been extensively disturbed from previous pipeline construction, operations, and maintenance, and ground disturbance would not likely occur in new areas during integrity digs. Maintenance activities may indirectly impact the single historic resource within the permanent right-of-way or the remaining 165 historic resources in the ROI (three of which are in the construction work area), comparable to those described for new pipeline construction, including dust, vibration, and intrusion related to maintenance equipment and personnel. Indirect impacts would be temporary and negligible to minor.

5.4.3.2.3 Traditional Cultural Properties

The discussion of potential impacts on TCPs would be the same as provided in Section 5.4.3.1.3.

5.4.3.3 System Alternative SA-04

For SA-04, no listed NRHP archaeological resources are present within the ROI (based on a review of NPS [2014] data). Therefore, no direct impacts would be anticipated to occur to these types of resources. However, other archaeological resources are present within the ROI; direct and indirect impacts may occur to these resources. While NRHP listed properties that are above-ground are located within the ROI, it is assumed that if this alternative were to be constructed, these types of resources would not be directly impacted; indirect impacts, however, may occur. Direct and indirect impacts, however, may occur to other historic resources located within the ROI.

5.4.3.3.1 Construction Impacts

Impacts on Archaeological Resources

A total of 49 known archaeological resources would be within the construction work area for SA-04 (Table 5.4.2-4). Construction-related impacts would be the same as described above for archaeological resources within the Applicant's proposed project. Direct impacts would be permanent and minor to major; indirect impacts would be temporary and negligible to minor. However, a greater number of archaeological resources would be affected by SA-04 than by the Applicant's proposed project. Additionally, a greater chance of encountering unknown archaeological resources is present given that surveys have not been conducted along this alternative.

Impacts on Historic Resources

No known historic resources are within the construction work area for SA-04; however, a 662 known historic resources are in the ROI (Table 5.4.2-4). No construction-related direct impacts on historic resources are expected as no known historic resources are located within the construction work area. Construction-related activities may cause indirect impacts on historic resources located in the ROI. These indirect impacts would be similar to those described for the Applicant's proposed project, resulting from pipeline construction, aboveground facilities, staging areas, and access roads. These indirect impacts would be temporary to permanent and negligible to major.

5.4.3.3.2 Operations Impacts

Impacts on Archaeological Resources

Disturbed areas would be restored and stabilized to the extent practicable after pipeline installation. Such restoration is unlikely to cause damage to the 39 known archaeological resources within the permanent right-of-way beyond what may occur during construction. Inspection, monitoring, and maintenance activities are unlikely to affect the archaeological resources within the permanent right-of-way because these activities would be undertaken using established access routes. The archaeological resources present within the permanent right-of-way would have been directly affected during construction, and as such, additional impacts from these activities would not be expected. Direct impacts associated with Project-related spills or encountering existing contamination could occur (see Section 5.2.2 and Chapter 10); however, no additional impacts would be expected as the archaeological resources would have already been disturbed during construction.

If operations-related activities result in direct impacts on archaeological resources that were not previously disturbed during construction (i.e., avoided) or to those resources that are adjacent to the construction work area, then the impacts would be permanent and minor to major. Some impacts would likely require mitigation that would be determined in consultation with the SHPO, affected Indian tribes, and the public (see Section 5.4.4).

If new ground disturbance occurs during the lifespan of the Project, it would occur within the already disturbed permanent right-of-way or construction work area. As such, direct impacts on archaeological resources would have already occurred during construction, and thus, any new ground disturbance is unlikely to cause additional impacts on these resources. However, if archaeological resources had been avoided during construction, or if they are adjacent to the construction work area, then new ground disturbance may cause new impacts on these resources, which would be permanent and minor to major.

Indirect impacts during operations would be temporary, localized, and negligible to minor. Temporary impacts would include vibration, changes in noise and air quality, and visual intrusions.

Impacts on Historic Resources

Operations are unlikely to cause direct impacts on historic resources as no known historic resources are located within the permanent right-of-way. Operations-related activities may cause indirect impacts on the 662 known historic resources located in the ROI. These indirect impacts would be similar to those described for the Applicant's proposed project including visual intrusions, viewshed changes, dust, noise and vibration caused from maintenance equipment and personnel. Indirect impacts would be temporary to permanent and negligible to minor.

5.4.3.3.3 Traditional Cultural Properties

The discussion of potential impacts on TCPs would be the same as provided in Section 5.4.3.1.3.

5.4.3.4 Transportation by Rail

For the transportation by rail alternative, no listed NRHP archaeological resources or historic resources are present within the ROI. In this manner, no direct or indirect impacts would be anticipated to occur to these types of resources. However, direct and indirect impacts may occur to other archaeological and historic resources located within the ROI, especially as the specific location of facilities has not been determined.

5.4.3.4.1 Construction Impacts

Impacts on Archaeological Resources

Four known archaeological sites are within the ROI for Clearbrook, and six known archaeological sites are within the ROI for Superior, which may be directly affected during construction of offloading facilities and associated access. Direct impacts could result from grading, vegetation removal, leak containment, and any inadvertent exposure of contaminated sediments. Construction activity may expose archaeological resources to looting and vandalism. These impacts would be permanent and may range in magnitude from minor to major, depending on the specific resource. Measures likely would be taken to avoid known important archaeological resources during construction of facilities associated with this alternative, and plans would likely be in place to address unanticipated discoveries of archaeological resources.

Indirect impacts would primarily be related to visual, auditory, and air quality changes during construction which may affect the setting or significant qualities of archaeological resources. These impacts would likely be temporary and negligible to minor.

Impacts on Historic Resources

Twelve known historic resources are within the ROI for Clearbrook, all of which are in the town. Forty-seven historic resources are within the ROI for Superior. Construction-related direct impacts could occur if resources are present within an area for ground disturbance, including destruction and alteration, and moving of associated historic features, as well as visual changes. These direct impacts, if they did occur, could be permanent and minor to major.

Indirect impacts would occur during construction of the new spur lines and loading/offloading facilities. These indirect impacts may include temporary construction-related impacts such as viewshed changes, noise, vibration, and dust, which would be negligible to minor. Long-term indirect impacts would result from vegetation removal, which could be negligible to minor. Permanent indirect impacts may include visual or auditory changes that affect the setting or significant qualities of historic resources, which would be minor to major. Construction activity also may temporarily prevent access to historic resources for a short time while construction and reclamation activities are ongoing, which would result in indirect temporary impacts that are negligible to minor.

5.4.3.4.2 Operations Impacts

Impacts on Archaeological Resources

Operation of the transportation by rail alternative includes operation of the offloading facilities and associated access adjacent to the Clearbrook and Superior terminals and use of existing rail lines. It would not involve any new ground disturbance. Therefore, direct impacts are not anticipated.

Direct impacts associated with Project-related spills or encountering existing contamination could occur (see Section 5.2.2 and Chapter 10); however, no additional impacts would be expected to archaeological resources that would have already been disturbed during construction. Regular inspection of rail cars for leaks would minimize the potential for such contamination; however, contamination could be permanent and minor to major, depending on the type of archaeological resource and soil permeability.

If operations-related activities result in direct impacts on archaeological resources that were not previously disturbed during construction (i.e., avoided) or to those resources that are adjacent to the construction work area, then the impacts would be permanent and minor to major. Some impacts would likely require mitigation that would be determined in consultation with the SHPO, affected American Indian tribes, and the public (see Section 5.4.4).

If new ground disturbance occurs during the lifespan of the Project, it would occur within the already disturbed permanent right-of-way or construction work area. As such, direct impacts on archaeological resources would have already occurred during construction, and thus, any new ground disturbance is unlikely to cause additional impacts on these resources. However, if archaeological resources had been avoided during construction, or if they are adjacent to the construction work area, then new ground disturbance may cause new impacts on these resources, which would be permanent and minor to major.

Known archaeological resources in proximity to these rail lines may be indirectly affected by dust and vibration, although these impacts are currently occurring from existing rail traffic. Operation of the transportation by rail alternative would likely result in temporary negligible to minor indirect impacts on archaeological resources.

Impacts on Historic Resources

During operation of the transportation by rail alternative, trains hauling crude oil would use existing rail lines to access offloading facilities and associated access at the Clearbrook and Superior terminals. These operations would not involve ground disturbance. As such, direct impacts on historic resources are not anticipated. However, minor spills along existing and newly constructed rail lines have the potential to directly and indirectly affect historic resources through contamination, changes in access and setting, and response activities. Regular inspection of rail cars for leaks would minimize the potential for such contamination, and impacts would likely be temporary and minor; although some contamination could be permanent and negligible to major, depending on the type of cultural resource.

Indirect impacts related to access to a historic resource or changes to its visual, auditory, and air quality setting may result from an increase in rail traffic. However, historic resources along existing lines are already subject to rail traffic, and as such, these indirect impacts would be temporary and negligible to minor.

5.4.3.4.3 Traditional Cultural Properties

The discussion of potential impacts on TCPs would be the same as provided in Section 5.4.3.1.3.

5.4.3.5 Transportation by Truck

For the transportation by truck alternative, no listed NRHP archaeological resources or historic resources are present within the ROI. In this manner, no direct or indirect impacts would be anticipated to occur to these types of resources. However, direct and indirect impacts may occur to other archaeological and historic resources located within the ROI, especially as the specific location of facilities has not been determined.

5.4.3.5.1 Construction Impacts

Impacts on Archaeological Resources

Four known archaeological sites are within the ROI for Clearbrook, and six known archaeological sites are within the ROI for Superior, which may be directly affected during construction of offloading facilities and associated access. Direct and indirect impacts could occur from construction of new offloading sites and access routes. Construction would require clearing and grading adjacent to the Clearbrook and Superior terminals. Direct impacts could result from grading, vegetation removal, leak containment, and any inadvertent exposure of contaminated sediments. Construction activity may expose archaeological resources to looting and vandalism. These impacts would be permanent, and may range in magnitude from minor to major, depending on the specific resource. Measures likely would be taken to avoid known important archaeological resources during construction of facilities associated with this alternative, and plans would likely be in place to address unanticipated discoveries of archaeological resources. In areas with existing routes, direct impacts on archaeological resources would likely be minimal if no ground disturbance was involved.

Indirect impacts would primarily be related to visual, auditory, and air quality changes during construction which may affect the setting or significant qualities of archaeological resources. These impacts would be temporary and negligible to minor. Cultural resources along existing routes are already subject to truck traffic. However, the increase in truck traffic could indirectly affect the visual, auditory, and air quality setting of, or access to, archaeological resources. These indirect impacts would be temporary and negligible to minor.

Impacts on Historic Resources

Twelve known historic resources are within the ROI for Clearbrook, all of which are in the town of Clearbrook. Forty-seven historic resources are within the ROI for Superior. Construction-related direct impacts could occur if resources are present within an area for ground disturbance, including destruction and alteration, and moving of associated historic features, as well as visual changes. These direct impacts would be permanent and minor to major.

Indirect impacts would occur during construction of the new offloading sites and access routes. These indirect impacts may include temporary construction-related impacts such as viewshed changes, noise, vibration, and dust, which would be negligible to minor. Long-term indirect impacts would result from vegetation removal, which could be negligible to minor. Permanent indirect impacts may include visual or auditory changes that affect the setting or significant qualities of historic resources, which would be minor to major. Construction activity also may temporarily prevent access to historic resources for a short time while construction and reclamation activities are ongoing, which would result in indirect temporary impacts that are negligible to minor.

5.4.3.5.2 Operations Impacts

Impacts on Archaeological Resources

Operation of the transportation by truck alternative includes use of existing roads and highways and offloading facilities and associated access adjacent to the Clearbrook and Superior terminals. Operations would not involve ground disturbance.

Direct impacts associated with Project-related spills or encountering existing contamination could occur (see Section 5.2.2 and Chapter 10); however, no additional impacts would be expected to archaeological resources that would have already been disturbed during construction. Regular inspection of trucks for leaks would minimize the potential for such contamination; however, contamination could be permanent and minor to major, depending on the type of archaeological resource and soil permeability.

If operations-related activities result in direct impacts on archaeological resources that were not previously disturbed during construction (i.e., avoided) or to those resources that are adjacent to the construction work area, then the impacts would be permanent and minor to major. Some impacts would likely require mitigation that would be determined in consultation with the SHPO, affected American Indian tribes, and the public (see Section 5.4.4).

If new ground disturbance occurs during the lifespan of the Project, it would occur within the already disturbed permanent right-of-way or construction work area. As such, direct impacts on archaeological resources would have already occurred during construction, and thus, any new ground disturbance is unlikely to cause additional impacts on these resources. However, if archaeological resources had been avoided during construction, or if they are adjacent to the construction work area, then new ground disturbance may cause new impacts on these resources, which would be permanent and minor to major.

Known archaeological resources in proximity to these roads may be indirectly affected by dust and vibration, although these impacts are currently occurring from existing traffic. Operation of the transportation by truck alternative would likely result in temporary negligible to minor indirect impacts on archaeological resources.

Impacts on Historic Resources

During operation of the transportation by truck alternative, trucks hauling crude oil would use existing roads and highways and offloading facilities and associated access at the Clearbrook and Superior terminals. Operations would not involve ground disturbance. As such, direct impacts on historic resources are not anticipated. However, minor spills have the potential to directly and indirectly affect historic resources through contamination, changes in access and setting, and response activities. These impacts would be temporary to permanent and negligible to major.

Historic resources in proximity to these roads (e.g., bridges) may be indirectly affected by dust and noise. However, these impacts are currently occurring from existing traffic, and as such, these indirect impacts would be temporary and negligible to minor.

5.4.3.5.3 Traditional Cultural Properties

The discussion of potential impacts on TCPs would be the same as provided in Section 5.4.3.1.3.

5.4.3.6 Existing Line 3 Supplemented by Rail

5.4.3.6.1 Construction Impacts

Impacts on Archaeological Resources

No construction impacts on archaeological resources would be anticipated from the continued use of the existing Line 3 pipeline, because it is already built. Impacts related to the construction of facilities and access required for the transportation by rail alternative would be the same as described above for that alternative, including damage to archaeological resources from construction activities, exposure of resources to vandalism/looting, contamination from spills of hazardous materials, and unanticipated discoveries of archaeological resources. Direct impacts would be permanent, and may range in magnitude from minor to major, depending on the specific resource. Indirect impacts would primarily be related to visual, auditory, and air quality changes during construction which may affect the setting or significant qualities of archaeological resources. Indirect impacts would be temporary and negligible to minor.

Impacts on Historic Resources

No construction impacts on historic resources would be anticipated from the continued use of the existing Line 3 pipeline, because it is already built. Impacts related to the development of facilities required for the transportation by rail alternative would be the same as described above for that alternative, including damage to historic resources from construction activities, contamination from spills of hazardous materials, and viewshed changes. Direct impacts if resources are present within an area for ground disturbance would be permanent, and may range in magnitude from minor to major, depending on the specific resource.

Indirect impacts would occur during construction of new spur lines and loading/offloading facilities and may include visual, auditory, air quality, access changes to historic resources. These indirect impacts would be temporary and negligible to minor. Permanent indirect impacts may include visual or auditory changes that affect the setting or significant qualities of historic resources, which would be minor to major.

5.4.3.6.2 Operations Impacts

Impacts on Archaeological Resources

No impacts on archaeological resources are expected with continued use of the existing Line 3 because the Enbridge Mainline corridor has been extensively disturbed from previous pipeline construction, operations, and maintenance, and ground disturbance would not likely occur in new areas during integrity digs. Direct impacts associated with Project-related spills or encountering existing contamination could occur (see Section 5.2.2 and Chapter 10); however, no additional impacts would be expected to archaeological resources that would have already been disturbed during construction. Regular inspection of rail cars for leaks would minimize the potential for such contamination; however, contamination could be permanent and minor to major, depending on the type of archaeological resource and soil permeability.

If operations-related activities result in direct impacts on archaeological resources that were not previously disturbed during construction (i.e., avoided) or to those resources that are adjacent to the construction work area, then the impacts would be permanent and minor to major. Some impacts would likely require mitigation that would be determined in consultation with the SHPO, affected Indian tribes, and the public (see Section 5.4.4).

If new ground disturbance occurs during the lifespan of the Project, it would occur within the already disturbed permanent right-of-way or construction work area. As such, direct impacts on archaeological resources would have already occurred during construction, and thus, any new ground disturbance is unlikely to cause additional impacts on these resources. However, if archaeological resources had been avoided during construction, or if they are adjacent to the construction work area, then new ground disturbance may cause new impacts on these resources, which would be permanent and minor to major.

Known archaeological resources in proximity to these rail lines may be indirectly affected by dust and vibration, although these impacts are currently occurring from existing rail cars. This alternative likely would result in temporary negligible to minor indirect impacts on archaeological resources.

Impacts on Historic Resources

No direct impacts on historic resources are expected with continued use of the existing Line 3, because the Enbridge Mainline corridor has been extensively disturbed from previous pipeline construction, operations, and maintenance, and ground disturbance would not likely occur in new areas during integrity digs. However, minor spills along existing and newly constructed rail lines have the potential to directly and indirectly affect historic resources through contamination, changes in access and setting, and response activities. Regular inspection of rail cars for leaks would minimize the potential for such contamination, and impacts would likely be temporary and minor; although some contamination could be permanent and negligible to major, depending on the type of cultural resource and soil permeability.

If maintenance activities occurred near historic resources, impacts at those locations within the permanent right-of-way would be comparable to those described for new pipeline construction, including dust, vibration, and intrusion related to construction equipment, and construction-related noise. These indirect impacts would be considered temporary and negligible to minor.

During operation of the transportation by rail alternative, trains hauling crude oil would use existing rail lines to the offloading facilities at Clearbrook and Superior. Impacts related to increases in rail traffic could include limited access to a historic resource or its visual, auditory, and air quality setting. However, historic resources along existing lines are already subject to rail traffic, resulting in permanent negligible to minor impacts.

5.4.3.6.3 Traditional Cultural Properties

The discussion of potential impacts on TCPs would be the same as provided in Section 5.4.3.1.3.

5.4.3.7 Existing Line 3 Supplemented by Truck

5.4.3.7.1 Construction Impacts

Impacts on Archaeological Resources

No construction impacts on archaeological resources would be anticipated from the continued use of the existing Line 3 pipeline because it is already built.

Direct impacts related to the construction of offloading facilities and associated access required for the transportation by truck alternative would be the same as described above for that alternative, including damage to archaeological resources from construction activities, exposure of resources to vandalism/looting, contamination from spills of hazardous materials, and unanticipated discoveries of archaeological resources. Direct impacts would be permanent, and could range in magnitude from minor to major, depending on the specific resource. Indirect impacts would primarily be related to visual, auditory, and air quality changes during construction which may affect the setting or significant qualities of archaeological resources. Indirect impacts would be temporary and negligible to minor.

Impacts on Historic Resources

No construction impacts on historic resources would be anticipated from the continued use of the existing Line 3 pipeline because it is already built. Impacts related to the development of facilities required for the transportation by truck alternative would be the same as described above for that alternative, including damage to historic resources from construction activities, contamination from spills of hazardous materials, and viewshed changes. Direct impacts if resources are present within an area for ground disturbance would be permanent, and may range in magnitude from minor to major, depending on the specific resource.

Indirect impacts would occur during construction of offloading facilities and associated access and may include visual, auditory, air quality, access changes to historic resources. These indirect impacts would be temporary and negligible to minor. Permanent indirect impacts may include visual or auditory changes that affect the setting or significant qualities of historic resources, which would be minor to major.

5.4.3.7.2 Operations Impacts

Impacts on Archaeological Resources

No impacts on archaeological resources are expected with continued use of the existing Line 3 because the Enbridge Mainline corridor has been extensively disturbed from previous pipeline construction, operations, and maintenance, and ground disturbance would not likely occur in new areas during integrity digs. Direct impacts associated with Project-related spills or encountering existing contamination could occur (see Section 5.2.2 and Chapter 10); however, no additional impacts would be expected to archaeological resources that would have already been disturbed during construction. Regular inspection of trucks for leaks would minimize the potential for such contamination; however, contamination could be permanent and minor to major, depending on the type of archaeological resource and soil permeability.

If operations-related activities result in direct impacts on archaeological resources that were not previously disturbed during construction (i.e., avoided) or to those resources that are adjacent to the construction work area, then the impacts would be permanent and minor to major. Some impacts would likely require mitigation that would be determined in consultation with the SHPO, affected American Indian tribes, and the public (see Section 5.4.4).

If new ground disturbance occurs during the lifespan of the Project, it would occur within the already disturbed permanent right-of-way or construction work area. As such, direct impacts on archaeological resources would have already occurred during construction, and thus, any new ground disturbance is unlikely to cause additional impacts on these resources. However, if archaeological resources are avoided during construction, or if they are adjacent to the construction work area, then new ground disturbance may cause new impacts on these resources, which would be permanent and minor to major.

Known archaeological resources in proximity to these roads may be indirectly affected by dust and vibration, although these impacts are currently occurring from existing traffic. This alternative likely would result in temporary negligible to minor indirect impacts on archaeological resources.

Impacts on Historic Resources

No direct impacts on historic resources are expected with continued use of the existing Line 3, because the Enbridge Mainline corridor has been extensively disturbed from previous pipeline construction, operations, and maintenance. However, minor spills have the potential to directly and indirectly affect historic resources through contamination, changes in access and setting, and response activities. Regular inspection of rail cars for leaks would minimize the potential for such contamination, and impacts would likely be temporary and minor; although some contamination could be permanent and negligible to major, depending on the type of cultural resource and soil permeability.

If maintenance activities occurred near historic resources, impacts at those locations within the existing right-of-way would be comparable to those described for new pipeline construction, including dust, vibration, and intrusion related to construction equipment, and construction-related noise. These indirect impacts would be considered temporary and negligible to minor.

Historic resources in proximity to the roads used to transport crude oil (e.g., bridges) may be indirectly affected by dust and noise. However, these impacts are currently occurring from existing traffic, and as such, these indirect impacts would be temporary and negligible to minor.

5.4.3.7.3 Traditional Cultural Properties

The discussion of potential impacts on TCPs would be the same as provided in Section 5.4.3.1.3.

5.4.4 Summary and Mitigation

5.4.4.1 Summary

Construction and operation of the Applicant's proposed project and CN Alternatives could impact archaeological and historic resources. Based on the current information, impacts on archaeological and historic resources could range from negligible to major during construction and operations (Table 5.4.4-1).

During construction, impacts on archaeological resources would be permanent and could range from minor to major for the Applicant's proposed project and each CN Alternative (except continued use of Line 3, which has already been constructed).

The types of archaeological resources across the ROI for the Applicant's proposed project and CN Alternatives are primarily comprised of individual lithic artifacts or lithic scatter. The number of archaeological resources that may be directly or indirectly affected during construction would be relatively comparable across the Applicant's proposed project and CN Alternatives (10 to 16 resources) with the exception of SA-04, which could directly impact up to 49 archaeological resources (Table 5.4.4-1). Substantially more historic resources could be directly affected within the construction footprints by the rail and truck alternatives, including those supplemented by existing Line 3, than either the Applicant's proposed project or SA-04. The historic resources in the ROI for the rail or truck alternatives around Clearbrook and Superior include houses, farms, outbuildings, and a church. Conversely, substantially greater numbers of historic resources that could be indirectly affected are within the ROI for SA-04 and the Applicant's proposed project than for the rail and truck alternatives, including those alternatives supplemented by existing Line 3 (Table 5.4.4-1).

During operations, no direct impacts on cultural resources would typically occur due to no ground disturbance beyond the previously disturbed construction footprint, so impacts on new cultural resources would not be expected unless there were extenuating circumstances (e.g., minor spills/leaks, erosion). SA-04 has substantially more archaeological resources in its operational footprint than the Applicant's proposed project or other CN Alternatives (Table 5.4.4-1). The rail and truck alternatives, including those supplemented by existing Line 3, could have more historic resources within their operational footprints than the Applicant's proposed project, existing Line 3, or SA-04. However, there could be substantially more historic resources indirectly affected during operations within the ROI for SA-04 than the Applicant's proposed project or the other CN Alternatives.

5.4.4.2 Mitigation

Avoiding known cultural resources may be possible in the construction work area by fencing around the site boundary, designating a buffer, and/or incorporating an archaeological monitor during ground-disturbing activities. Archaeological and/or tribal monitoring could be implemented in sensitive areas during construction to further minimize impacts.

Prior to construction, the need for minimization and mitigation for impacts on archaeological and historic resources would be discussed with MHS, SHPO, the OSA, affected American Indian tribes, and other parties through continuing consultation efforts. If a Certificate of Need is issued by the PUC, additional survey also may be needed to account for potential changes to the Applicant's project, as well as if a subsequent route permit is issued that accounts for areas not already investigated or surveyed. Minimization of impacts may include avoidance, site staking, and archaeological and tribal monitoring during construction. Mitigation may include data recovery excavations of significant archaeological sites, intensive recordation of historic resources, ethnographic studies, and guaranteed access, among others.

Table 5.4.4-1. Summary of Potential Impacts on Cultural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Construction Impacts							
Previously recorded archaeological resources	Direct: Permanent/minor to major impacts • 15 resources Indirect: Temporary/ negligible to minor • 15 resources	N/A (Already constructed)	Direct: Permanent/minor to major impacts • 49 resources Indirect: Temporary/ negligible to minor • 49 resources	Direct: Permanent/minor to major impacts • 10 resources Indirect: Temporary/ negligible to minor • 10 resources	Direct: Permanent/minor to major impacts • 10 resources Indirect: Temporary/ negligible to minor • 10 resources	Direct: Permanent/minor to major impacts • unknown resources Indirect: Temporary/ negligible to minor • unknown resources	Direct: Permanent/minor to major impacts • unknown resources Indirect: Temporary/ negligible to minor • unknown resources
Previously recorded historic resources	Direct: Permanent/ minor to major impacts • 1 resource Indirect: Temporary to permanent/ negligible to major impacts • 128 resources	N/A (Already constructed)	Direct: No impacts • 0 resources Indirect: Temporary to permanent/ negligible to major impacts • 662 resources	Direct: Permanent/ minor to major impacts • unknown resources Indirect: Temporary to permanent/ negligible to major impacts • 59 resources	Direct: Permanent/ minor to major impacts • unknown resources Indirect: Temporary to permanent/ negligible to major impacts • 59 resources	Direct: Temporary to permanent/ negligible to major impacts • unknown resources Indirect: Temporary to permanent/ negligible to minor impacts • unknown resources	Direct: Temporary to permanent/ negligible to major impacts • unknown resources Indirect: Temporary to permanent/ negligible to minor impacts • unknown resources

Table 5.4.4-1. Summary of Potential Impacts on Cultural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]
Operations Impacts							
Previously recorded archaeological resources	Direct: Permanent/ minor to major impacts • 9 resources Indirect: Temporary/ negligible to minor impacts • 9 resources	Direct: Permanent/ minor to major impacts • 10 resources Indirect: Temporary/ negligible to minor impacts • 10 resources	Direct: Permanent/ minor to major impacts • 39 resources Indirect: Temporary/ negligible to minor impacts • 39 resources	Direct: Permanent/ minor to major impacts • 10 resources Indirect: Permanent/ negligible to minor impacts • 10 resources	Direct: Permanent/ minor to major impacts • 10 resources Indirect: Temporary/ negligible to minor impacts • 10 resources	Direct: Permanent/ minor to major impacts • unknown resources Indirect: Temporary/ negligible to minor impacts • unknown resources	Direct: Permanent/ minor to major impacts • unknown resources Indirect: Temporary/ negligible to minor impacts • unknown resources
Previously recorded historic resources	Direct: No impacts • 0 resources Indirect: Temporary to permanent/ negligible to minor impacts • 128 resources	Direct: No impact • 1 resource Indirect: Temporary to permanent/ negligible to minor impacts • 214 resources	Direct: No impact • 0 resources Indirect: Temporary to permanent/ negligible to minor impacts • 662 resources	Direct: Temporary to permanent/ minor to major impacts • unknown resources Indirect: Temporary to permanent/ negligible to minor impacts • 59 resources	Direct: Temporary to permanent/ minor to major impacts • unknown resources Indirect: Temporary to permanent/ negligible to minor impacts • 59 resources	Direct: Temporary to permanent/ negligible to major impacts • unknown resources Indirect: Temporary to permanent/ negligible to minor impacts • unknown resources	Direct: Temporary to permanent/ negligible to major impacts • unknown resources Indirect: Temporary to permanent/ negligible to minor impacts • unknown resources

Table 5.4.4-1. Summary of Potential Impacts on Cultural Resources for the Applicant's Proposed Project and Certificate of Need Alternatives[a,b]

Impact	Applicant's Proposed Project[c]	Continued Use of Existing Line 3[d]	System Alternative SA-04[e]	Rail Alternative[f]	Truck Alternative[g]	Existing Line 3 Supplemented by Rail[d,f]	Existing Line 3 Supplemented by Truck[d,g]

[a] No single dataset in this summary table provides a complete indication of all relevant impacts to cultural resources. Each dataset contains useful information, but also has limitations. However, together these datasets provide a reasonably comprehensive indication of the potential impacts. For example, the number of resources alone does not account for the size or significance of a particular resource. However, data from the National Register dataset (and where available, survey information) in combination can aid the reader in understanding the number of resources along the route already known to be significant and how they may be impacted by the proposed route or the alternatives. The individual rows containing quantitative information should not be viewed in isolation; they should be viewed together to gain a comprehensive understanding of project impacts. The appropriate weight to place on any given dataset is a subject of debate, even among technical experts; therefore, the weight that the user places on one dataset versus another may legitimately vary based on individual preferences and values.

[b] Quantitative information in this table should be coupled with an understanding of the duration and magnitude descriptions in the table (terms defined in Section 5.1.3), as well as the qualitative descriptions of impacts that are contained in the text in this section on pages 5-632 through 5-646. The table above, for example, includes counts of cultural resources within the ROI and a general assessment of the duration and magnitude of potential impacts; however, a more complete discussion of the qualitative nature of impacts that could occur to is contained in the text of this section.

[c] The Applicant's proposed Project parallels existing corridors, including crude oil and electrical transmission corridors. Impacts reported in this EIS are the incremental impacts of the Applicant's proposed project on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-634 to 5-636. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[d] Continued use of existing Line 3 will occur within the existing mainline corridors. Impacts reported in this EIS are the incremental impacts of continuing to use existing Line 3 on the resources that currently exist within the ROI along the mainline corridor. The nature of these incremental impacts is discussed on pages 5-636 to 5-637. Where the fact that existing Line 3 is in an existing corridor influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[e] SA-04 parallels an existing natural gas pipeline corridor. Impacts reported in this EIS are the incremental impacts of SA-04 on the resources that currently exist within the ROIs adjacent to the existing corridor. The nature of these incremental impacts is discussed on pages 5-638 to 5-639. Where corridor paralleling influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[f] The rail alternative uses existing rail corridors. Impacts reported in this EIS are the incremental impacts of the rail alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-639 to 5-641. Where the fact that the rail alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

[g] The truck alternative uses existing transportation corridors. Impacts reported in this EIS are the incremental impacts of the truck alternative on the resources that currently exist within the ROIs adjacent to the existing corridors. The nature of these incremental impacts is discussed on pages 5-641 to 5-643. Where the fact that the truck alternative uses existing corridors influences the extent of the incremental impacts, relevant discussion is included in the text of the impacts assessment.

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