Sandpiper Pipeline and Line 3 Replacement Projects

Wisconsin Department of Natural Resources
Wisconsin Supporting Environmental Data

FEBRUARY 2014

ENBRIDGE

Table of Contents

EXECUTIVE SUMMARY 1
1.0 INTRODUCTION 2
1.1 Project Description and Need 2
1.1.1 Sandpiper Pipeline Project 2
1.1.2 Line 3 Replacement Project 3
1.1.3 Pipeline Facilities 3
1.2 Land Requirements 5
1.2.1 Construction Right-of-Way 5
1.2.2 Additional Temporary Workspace Areas 6
1.2.3 Access Roads 9
1.2.4 Pipe Storage and Contractor Yards 9
1.2.5 Aboveground Facilities 10
1.3 Project Schedule 10
1.4 Authorizations and Approvals 10
1.5 Enbridge History 11
1.6 Operation, Integrity, and Emergency Response 12
1.6.1 Integrity Management Program 13
1.6.2 Valve Placement 13
1.6.3 Leak Detection 14
1.6.4 Emergency Response 15
1.7 Construction Procedures 17
1.7.1 Preparation of the Right-of-Way 17
1.7.2 Clearing and Grading 17
1.7.3 Hauling and Stringing Pipe 19
1.7.4 Trenching 19
1.7.5 Trench Dewatering 19
1.7.6 Bending 19
1.7.7 Line-up, Welding, and Weld Inspection 19
1.7.8 Lowering In 19
1.7.9 Backfilling 20
1.7.10 Pressure Testing 20
1.7.11 Cleanup and Right-of-Way Restoration 20
2.0 ALTERNATIVES 20
2.1 Comparison of Route Alternatives 21
2.1.1 No-Action Alternative 21

2.1.2 System Alternatives 22
2.1.3 Alternative Energy Sources, Transport Modes, and Energy Conservation 23
2.2 Route Alternatives – Sandpiper Pipeline and Line 3 Replacement Projects 26
2.2.1 Route Alternatives A1 and A2 29
2.2.2 Route Alternatives B1 and B2 30
2.2.3 Route Alternatives C1 and C2 34
2.2.4 Route Option Summary 35
3.0 ENVIRONMENTAL ANALYSIS 38
3.1 Landowners 38
3.1.1 Public Outreach 38
3.1.2 Land Ownership 38
3.1.3 Right-of-Way Acquisition 39
3.2 Soils 39
3.2.1 Identification of Soil Conditions 39
3.2.2 General Construction and Operation Impacts and Mitigation 41
3.3 Geology and Groundwater 44
3.3.1 Geology and Physiography 44
3.3.2 Groundwater 45
3.3.3 General Construction and Operation Impacts and Mitigation 46
3.3.4 Blasting 47
3.3.5 Spills and Leaks 47
3.4 Surface Waters and Wetlands 47
3.4.1 Major Basins and Watersheds 47
3.4.2 Surface Waters 48
3.4.3 Wetlands 52
3.5 Vegetation, Wildlife, and Fisheries 57
3.5.1 Vegetation 57
3.5.2 Wildlife 62
3.5.3 Fisheries 65
3.5.4 Threatened and Endangered Species 68
3.6 Land Use and Public Lands 74
3.6.1 Forest Land 75
3.6.2 Agricultural Land 79
3.6.3 Wetlands 79
3.6.4 Open Land 79
3.6.5 Shrubland 80

3.6.6 Developed Land....80
3.6.7 Special Land Uses....80
3.7 Socioeconomic Resources....80
3.7.1 Existing Socioeconomic Conditions....81
3.7.2 General Construction and Operation Impacts and Mitigation....81
3.8 Cultural Resources....85
3.8.1 Environmental Review of Impacts on Historic Sites....85
3.8.2 Previously Recorded Archaeological and Historic Sites....86
3.8.3 Previously Conducted Investigations....86
3.8.4 Phase I Survey Approach....87
3.8.5 Cultural Resource Impacts and Mitigation....87
3.9 Air Quality....87
3.9.1 Existing Air Quality....88
3.9.2 Applicable Air Quality Rules....91
3.9.3 General Construction and Operation Impacts and Mitigation....92
4.0 CUMULATIVE IMPACTS AND CONCLUSIONS....93
4.1 Conclusions....94
4.1.1 Alternatives Considered....95
4.1.2 Soils....95
4.1.3 Groundwater....96
4.1.4 Surface Water....96
4.1.5 Wetlands....97
4.1.6 Vegetation....97
4.1.7 Wildlife....97
4.1.8 Fisheries....98
4.1.9 Special Status Species....99
4.1.10 Land Use and Public Lands....99
4.1.11 Socioeconomics....100
4.1.12 Cultural Resources....101
4.1.13 Air Quality and Noise....101
4.1.14 Cumulative Effects....101
5.0 REFERENCES....102

List of Tables

Table 1.2.2-1 Typical Dimensions of Additional Temporary Workspaces for the Project 6
Table 1.2.3-1 Proposed Access Roads for the Project 9
Table 1.5-1 Agency Permits/Approvals in Wisconsin 10
Table 2.1.3-1 Total Daily Rail Requirements 24
Table 2.1.3-2 Total Daily Truck Requirements 25
Table 2.2-1 Environmental Features Comparison – Route Alternatives A1 and A2 29
Table 2.2-2 Environmental Features Comparison – Route Alternatives B1 and B2 33
Table 2.2-3 Environmental Features Comparison – Route Alternatives C1 and C2 34
Table 2.2-4 Comparison of Features Along the Project Route Options 35
Table 3.2.1-1 Soil Characteristics Comparison of Project Route Options 40
Table 3.2.1-2 Soil Characteristics Crossed 40
Table 3.2.1-3 Topsoil Depths and Slope Class in the Project Area 41
Table 3.4.1-1 Watersheds and Ecosystem Boundaries Crossed 47
Table 3.4.2-1 Waterbody Crossing Comparison Along the Route Options 49
Table 3.4.2-2 Waterbody Crossings 50
Table 3.4.3-1 Wetland Impacts 54
Table 3.4.3-2 Wetland Impact Comparison of Project Route Options 55
Table 3.5.1-1 NHI Occurrences of Natural Communities Within 1 Mile of the Project 58
Table 3.5.1-2 NHI Occurrences of Plant Species Within 1 Mile of the Project 59
Table 3.5.2-1 Species of Greatest Conservation Need Associated with the Pokegama-Nemadji Wetlands COA 63
Table 3.5.2-2 NHI Occurrences of Wildlife Species Within 1 or 2 Miles of the Project 64
Table 3.5.3-1 Native Fish Species in the Pokegama River and Other Tributaries of the St. Louis River Estuary 66
Table 3.5.3-2 NHI Occurrences of Fish Species Within 1 or 2 Miles of the Project 67
Table 3.5.4-1 Status of Federally Listed Species and Designated Critical Habitat 68
Table 3.5.4-2 Plant Species Targeted for Field Surveys in the Project Area 71
Table 3.5.4-3 Wildlife Species Targeted for Habitat Assessments in the Project Area 71
Table 3.5.4-4 Rare Plant Species Observed During 2013 Botanical Field Surveys Within the Project Area 73
Table 3.6-1 Land Use Classifications Affected by Construction and Operation of the Project 76
Table 3.6-2 Land Use Comparison of the Project Route Options 78
Table 3.6.1-1 Tracts Enrolled in the Managed Forest or Forest Crop Law Program 79
Table 3.7.1-1 Existing Socioeconomic Conditions in the Project Area 81
Table 3.7.2-1 Demographic Conditions in the Project Area 85
Table 3.8.4-1 Reports documenting previously conducted Phase I reconnaissance surveys within the Project Area 86
Table 3.9.1-1 National Ambient Air Quality Standards (NAAQS) 40 CFR 50 and WI Administrative Code NR 404.04 88
Table 3.9.1-2 Ambient Air Quality Concentrations 90
Table 4-1 Current, Proposed, and Future Projects in the General Project Area 94

List of Figures

Figure 1.1-1 Route Overview Map 4
Figure 1.2-1 Typical Existing Right-of-Way Configuration 7
Figure 1.2-2 Typical Greenfield Right-of-Way Configuration 8
Figure 1.7-1 Typical Pipeline Construction Sequence 18

Figure 2.2-1 Overview of Route Alternatives 27
Figure 2.2-2 Route Alternative A1 and A2 31
Figure 2.2-3 Route Alternative B1 and B2 32
Figure 2.2-4 Route Alternative C1 and C2 36
Figure 2.2-5 Route Options 37

List of Appendices

Appendix A Detailed Route Maps
Appendix B Environmental Protection Plan
Appendix C Agricultural Protection Plan
Appendix D Unanticipated Discoveries Plan

List of Acronyms

API	American Petroleum Institute
AQCR	Air Quality Control Region
ASNRI	Area of Special Natural Resource Interest
ATWS	additional temporary workspace
BACT	Best Available Control Technology
BGEPA	Bald and Golden Eagle Protection Act
bpd	barrels per day
BSA	Bank Service Area
CAA	Clean Air Act
CCRG	Commonwealth Cultural Resources Group, Inc.
CH_4	methane
CO	carbon monoxide
$CO_{2\text{-eq}}$	carbon dioxide equivalents
COA	Conservation Opportunity Area
COE	U.S. Army Corps of Engineers
CPM	Computational Pipeline Monitoring
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
DATCP	Wisconsin Department of Agriculture, Trade, and Consumer Projection
DOT	U.S. Department of Transportation
ECS	Ecological System
EIA	U.S. Energy Information Administration
Enbridge	Enbridge (U.S.) Inc. and Enbridge Energy, Limited Partnership
EPP	Environmental Protection Plan
ERP	emergency response plan
ESA	Endangered Species Act
FCL	Forest Crop Law
GHGs	greenhouse gases
GLIFWC	Great Lakes Indian Fish and Wildlife Commission
GRP	Grassland Reserve Program
GWP	global warming potential
HCA	high consequence area
HUC	hydrologic unit code
ICP	Integrated Contingency Plans
IVP	Intelligent Valve Placement
Line 13	Southern Lights Pipeline
Line 67	Alberta Clipper Pipeline
MBS	Material Balance System
MBTA	Migratory Bird Treaty Act
MFL	Managed Forest Law
MLRA	Major Land Resource Area
N_20	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHI	Natural Heritage Inventory
NHPA	National Historic Preservation Act
NLCD2006	National Land Cover Database 2006

NO_2	Nitrogen Dioxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRT	National Response Team
NTSB	National Transportation Safety Board
OSHA	Occupational Safety and Health Administration
PAA	Plains All American Pipeline L.P.
Pb	lead
PEM	Palustrine Emergent
PFO	Palustrine Forested
PHMSA	Pipeline Hazardous Materials Safety Administration
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
PNW	Priority Navigable Waters
PRF	Public Rights Features
PSD	Prevention of Significant Deterioration
PSS	Palustrine Scrub-scrub
PUB	Palustrine Unconsolidated Bottom
R2UB	Riverine Lower Perennial Unconsolidated Bottom
R4SB	Riverine Intermittent Streambed
RR	Remediation & Redevelopment Sites
SCADA	Supervisory Control and Data Acquisition
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SLRCAC	St. Louis River Citizens Action Committee
SNA	State Natural Area
SO_2	sulfur dioxide
SSURGO	Soil Survey Geographic Database
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VITF	Voigt Intertribal Task Force
VOC	volatile organic compound
WDNR	Wisconsin Department of Natural Resources
WGNHS	Wisconsin Geological and Natural History Survey
WHS	Wisconsin Historical Society
WRP	Wetland Reserve Program
WWAP	Wisconsin's Wildlife Action Plan

EXECUTIVE SUMMARY

Enbridge (U.S.) Inc. and Enbridge Energy, Limited Partnership (collectively referred to as "Enbridge") own and operate a pipeline system that transports crude petroleum to serve refineries in the Midwestern states. Currently, Enbridge plans to construct a new crude oil pipeline and replace an existing pipeline in Douglas County, Wisconsin.

The proposed Sandpiper Pipeline will span approximately 616 miles from Tioga, North Dakota to Superior, Wisconsin. From the existing Beaver Lodge station south of Tioga, North Dakota border to a new Enbridge Clearbrook Terminal, Sandpiper will consist of a 24-inch-diameter crude oil pipeline and associated facilities. Exiting Clearbrook to the south, Sandpiper will consist of a 30-inch-diameter crude oil pipeline and associated facilities to Enbridge's Superior Terminal in Superior, Wisconsin.

Sandpiper will deliver an annual capacity of:

- 250,000 barrels per day (bpd) from the existing Beaver Lodge station to Berthold, North Dakota;
- 225,000 bpd of crude oil from Berthold into Clearbrook, Minnesota; and
- 375,000 bpd of crude oil from Clearbrook, Minnesota to Superior, Wisconsin.

The purpose of Sandpiper is to transport the growing production of domestic crude oil from the Bakken and Three Forks formations in the Williston Basin[1] of eastern Montana and western North Dakota to meet the increased demands of refineries and markets in the Midwest and the East Coast.

In addition, Enbridge plans to replace its existing 34-inch-diameter Line 3 with new 36-inch-diameter pipe as part of an on-going maintenance program. In Wisconsin, the Line 3 pipeline replacement will be collocated and co-constructed with the proposed Sandpiper Pipeline from the Wisconsin state border to the Superior Terminal.

In Wisconsin, the Projects will require construction of new pipeline and associated aboveground facilities. Aboveground facilities associated with the proposed Projects include the portions of mainline valves that are above ground. In addition, Enbridge will install the following inside the existing fenced property of the Superior Terminal:

- receiving traps and pressure relief for both Projects; and
- custody transfer metering, a meter prover, pressure control valves, and a sampling facility for the Sandpiper Project.

[1] The Bakken formation is currently the largest contributor to the total crude oil production in the Williston Basin, the oil industry refers to all of the crude oil production in the Williston Basin as "Bakken crude oil". The Williston Basin spans parts of western North Dakota, eastern Montana and parts of Saskatchewan and Manitoba.

1.0 INTRODUCTION

Enbridge prepared this supporting environmental data in support of its applications to the Wisconsin Department of Natural Resources (WDNR) for wetland and waterway crossing permits, air quality permit for new infrastructure at the Superior Terminal, stormwater permit, and endangered species review for construction and operation of the Projects in Wisconsin. A brief description of each Project component is provided in Sections 1.1.1 and 1.1.2. This document provides an assessment of the existing environment along the Project's potential routes; an analysis of human and environmental impacts that could potentially result from pipeline right-of-way preparation, construction, operation, and maintenance of the Sandpiper Pipeline Project and Line 3 Replacement Project (collectively referred to as "Project" or "Projects"); and a summary of the protection and restoration measures to be implemented to avoid and/or minimize environmental impacts.

1.1 PROJECT DESCRIPTION AND NEED

1.1.1 Sandpiper Pipeline Project

The Sandpiper Pipeline Project is a new crude oil pipeline and associated facilities to increase crude oil transportation services from North Dakota to refineries in the Midwest and the East Coast in response to the demand for a growing supply of Bakken crude oil. The Sandpiper Project is approximately 616 miles long and will consist of a 373-mile-long, 24-inch-diameter crude oil pipeline and associated infrastructure from the existing Beaver Lodge station south of Tioga, North Dakota to a new Enbridge Terminal near Clearbrook, Minnesota and a 243-mile-long, 30-inch-diameter crude oil pipeline and associated facilities from Clearbrook, Minnesota to the Superior Terminal in Superior, Wisconsin.

The pipeline will deliver an annual capacity of:

- 250,000 barrels per day (bpd) from the existing Beaver Lodge station to Berthold, North Dakota;
- 225,000 bpd of crude oil from Berthold into Clearbrook, Minnesota: and
- 375,000 bpd of crude oil from Clearbrook, Minnesota to Superior, Wisconsin.

The pipeline's purpose is to transport the growing production of domestic crude oil from the Bakken and Three Forks formations in the Williston Basin[2] of eastern Montana and western North Dakota to meet the increased demands of refineries and markets in the Midwest and the East Coast. Shippers will use the pipeline to transport crude oil to an Enbridge terminal in Superior, Wisconsin. From there, the crude oil can be delivered to various other pipelines and refineries. The pipeline is a positive step toward North American energy security and independence that will increase access to a growing, long-term, and reliable domestic source of energy and decrease reliance on crude oil imports from countries that are often unstable to the United States' interests.

The need for the pipeline is based on several factors, including:

- increasing demand for crude oil produced in North America from refineries and markets in the Midwest and the East Coast;

[2] The Bakken formation is currently the largest contributor to the total crude oil production in the Williston Basin, the oil industry refers to all of the crude oil production in the Williston Basin as "Bakken crude oil." The Williston Basin spans parts of western North Dakota, eastern Montana, and parts of Saskatchewan and Manitoba.

- compared to other modes of transportation, transporting North Dakota crude oil by pipeline to Midwest refineries and beyond is the safer and more economic transportation alternative; and
- reducing United States dependence on foreign offshore oil through increased access to stable, secure domestic crude oil supplies.

1.1.2 Line 3 Replacement Project

Enbridge owns and operates the 324-mile-long Line 3, originally installed in 1968, as part of its U.S. mainline system. Enbridge conducted thorough internal inspections of Line 3 as part of its ongoing system-wide pipeline integrity program and is electing to replace all of Line 3 in Wisconsin. Replacing the pipe will increase its service life and will reduce the frequency and magnitude of the ongoing maintenance activities that would otherwise occur in order to maintain the safe operation of Line 3; thus providing significant benefits to landowners, local communities, and the environment. The existing pipeline will be purged of crude oil, filled with nitrogen, capped, cathodically protected, maintained and rendered inactive in accordance with 49 CFR 195.

Enbridge plans to replace the existing 34-inch-diameter Line 3 pipeline with new 36-inch-diameter pipe. The 36-inch is a more current industry standard size and also will be a more energy efficient pipeline.

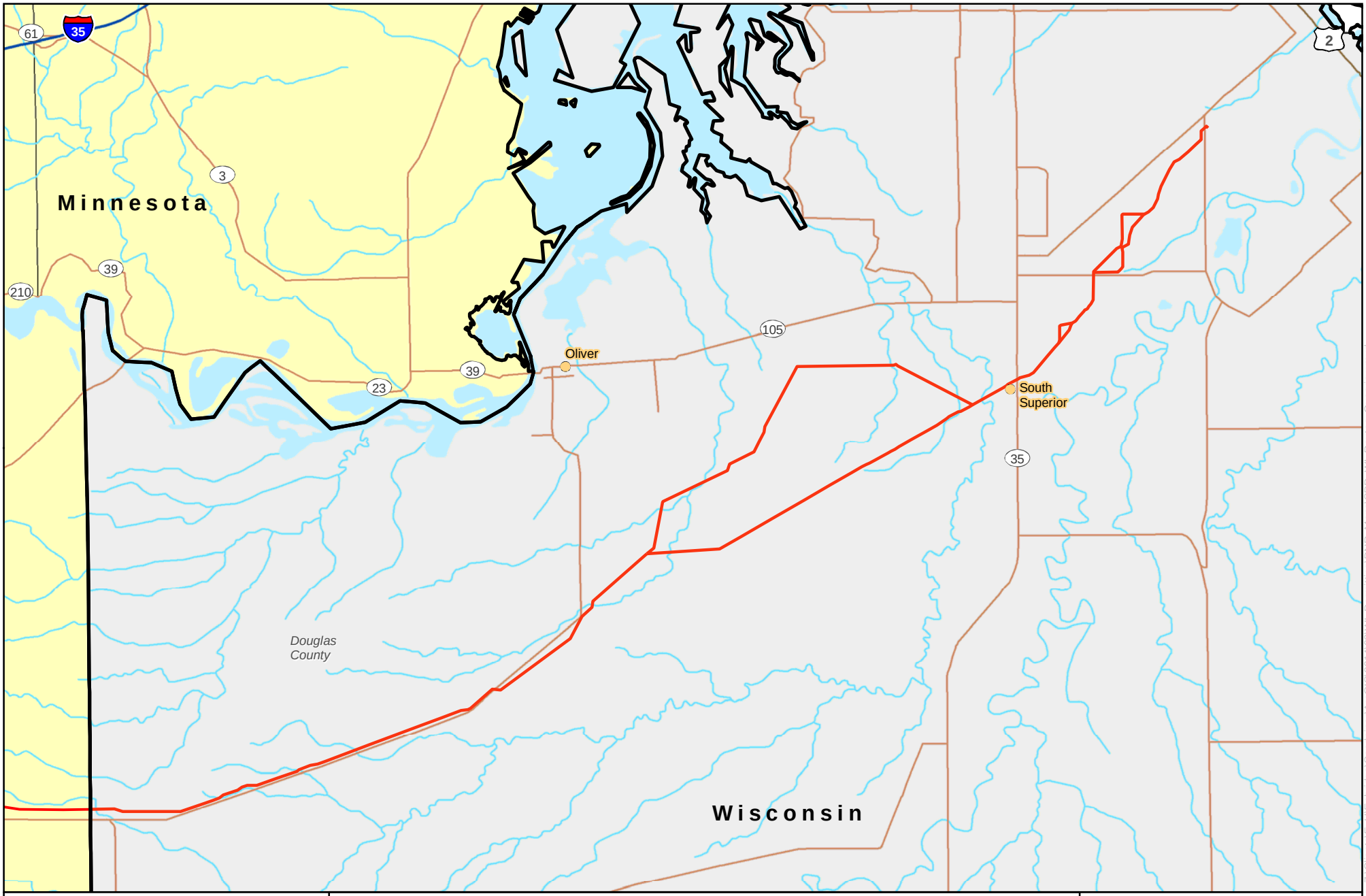
1.1.3 Pipeline Facilities

In Wisconsin, the Projects include construction and operation of the following:

- new 30- and 36-inch-diameter, underground crude oil pipelines from the Minnesota/Wisconsin border to Enbridge's terminal in Superior, Wisconsin;
- four mainline valves (two on each new pipeline);
- receiving traps and pressure relief within the fenced property of the Superior Terminal;
- a densitometer for batch detection on Line 3; and
- custody transfer metering, a meter prover, pressure control valves, and a sampling facility for the Sandpiper Project within the fenced property of the Superior Terminal.

Figure 1.1-1 provides a general location map depicting the Projects route. Appendix A includes recent aerial photograph-based Detailed Route Maps. The route falls within the WDNR Northern Region, and occurs within the following locations:

Superior Township	(T48N R14W)	Sections: 2, 8, 9, 10, 11, 16, 17, 18, 19, 20
	(T48N R15W)	Sections: 24, 25, 26, 27, 31, 32, 33, 34
	(T49N R14W)	Sections: 35, 36



0 0.5 1 Miles

1 inch = 1.3 miles

N W E S

ENBRIDGE

Figure 1.1-1
Sandpiper Pipeline and Line 3 Replacement Projects
Route Overview Map

Route Overview Map

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\02\WI_Permitting\DNR_Maps\SPP_WI_Routes_Overview.mxd

Date: (2/19/2014)

The pipe for the Projects will be American Petroleum Institute (API) 5L PSL 2, Grade X70 steel pipe with a 30- and 36-inch outside diameter, which will meet the U.S. Department of Transportation (DOT) Pipeline Hazardous Materials Safety Administration's (PHMSA) requirements under 49 CFR Part 195. The pipe will be manufactured and constructed in accordance with standards issued by the American Society of Mechanical Engineers, National Association for Corrosion Engineers, and API. All of the pipe will be manufactured with fusion-bond epoxy coating to protect against corrosion and will be inspected and integrity-tested at the factory.

Pipe wall thickness for the 30-inch pipeline will range from 0.469- to 0.625- inch, with the thickness dependent on the location of the pipe with a cross-country mainline wall thickness of 0.469-inch. For the 36-inch pipeline, wall thickness will range from 0.531- to 0.750-inch, with the thickness dependent on the location of the pipe with a cross-country mainline wall thickness of 0.531-inch.

At a minimum, Enbridge will be bury the pipeline in accordance with DOT regulations (40 CFR Part 195), which stipulate a minimum of 3 feet of top cover for normal excavations, and 18 to 30 inches of cover for rock excavations (depending on the location), to prevent damage to the pipeline from normal use of the land. The Projects depth of cover will vary from 36 to 60 inches, depending on state law, permit requirements, landowner agreements, and site-specific conditions (e.g., depth of drain tile). If a state-level agency specifies a more stringent requirement for pipeline depth than the DOT and/or landowner requirements, Enbridge may request a waiver of that requirement. Increased pipeline depth will result in greater amounts of ditch spoil and, consequently, may require additional temporary workspace for storage of the spoil.

Mainline valves are installed along pipelines that transport liquids to limit the volume of a spill if one were to occur. Enbridge is conducting an analysis to determine the most appropriate locations for mainline valves in compliance with the requirements of 49 CFR Part 195. Refer to Section 1.6.2 for additional details.

1.2 LAND REQUIREMENTS

1.2.1 Construction Right-of-Way

Enbridge generally proposes to use a combined 110-foot-wide construction right-of-way for the new 30- and 36-inch-diameter pipelines, which will allow for temporary storage of topsoil and spoil as well as accommodate safe operation of construction equipment. The construction corridor is generally comprised of existing permanently maintained rights-of-way and temporary workspaces. The construction right-of-way is divided between the spoil side (area used to store topsoil and excavated materials) and the working side (equipment work area and travel lane).

Enbridge utilized a combined construction workspace of generally 109 feet for the recently constructed 20-inch and 36-inch-diameter Alberta Clipper and Southern Lights projects (36- and 20-inch diameter pipelines, respectively). The Alberta Clipper and Southern Lights pipelines are spaced 21 feet apart and 18 feet from the nearest existing pipeline, while the Sandpiper pipeline will be placed 20 feet from the nearest existing pipeline (Alberta Clipper) and the Line 3 Replacement pipeline placed 20 feet from Sandpiper. Alberta Clipper and Southern Lights construction workspace per diameter inch of pipeline ratio is 1.95 feet. The Sandpiper and Line 3 Replacement Projects will utilize a ratio of 1.67 feet of construction workspace per diameter inch, a decrease of approximately 17 percent.

This reduction is in part obtained through utilization of Enbridge's existing cleared right-of-way. Due to the recent installation of the Alberta Clipper pipeline and its confirmed depth of cover, Enbridge will

utilize approximately 10 feet of construction workspace for spoil storage over the existing pipeline. In turn, this decreases the amount of new clearing required for the Projects construction workspace compared to previous projects. By narrowing the workspace and increasing utilization of Enbridge's existing cleared right-of-way, Enbridge proposes approximately 75 feet of new clearing impacts as opposed to the 82 feet of clearing that occurred on Alberta Clipper and Southern Lights.

Enbridge proposes a 120-foot-wide construction right-of-way for the portions of Route Alternatives A1 and A2 between Irondale Road and the railroad tracks/facility (refer to Section 2.2). Regardless of the selected route in this location, no feasible access road exists to allow for construction traffic to exit the right-of-way at the railroad tracks/facility or to cross the tracks/railyard. Therefore, all traffic must turn around at this point and travel back to the west. In order to facilitate efficient access in the event of an emergency during construction, Enbridge designed the additional 10 feet of workspace to include two lanes of traffic. When collocated with Enbridge's existing right-of-way, the spoil side is located within the current permanently maintained right-of-way and the working side is generally located outside of Enbridge's existing maintained right-of-way. An additional 35 feet of temporary workspace will be required outside of the edge of the new permanent right-of-way (refer to Figures 1.2-1 and 1.2-2).

1.2.2 Additional Temporary Workspace Areas

Additional temporary workspace (ATWS) areas are generally necessary where the proposed route crosses features such as waterbodies, wetlands, roads, railroads, and existing pipelines and utilities. These ATWS areas are construction areas that are temporarily needed outside of the typical construction right-of-way to stage equipment, stockpile spoil material, and conduct material fabrication and assembly. Enbridge identified known ATWS areas on its Detailed Route Maps (Appendix A). In some cases, due to site-specific conditions, ATWS may be sited within wetland boundaries (refer to Section 3.4). Table 1.2.2-1 below provides the typical dimensions used for ATWS.

TABLE 1.2.2-1

Typical Dimensions of Additional Temporary Workspaces for the Project

Feature	Dimensions On Each Side of Feature [a]
Open-cut Road Crossings	100 feet by 75 feet and 50 feet by 50 feet
Bored Road and Railroad Crossings	100 feet by 75 feet and 100 feet by 50 feet
Foreign Pipeline and Utility Crossings	100 feet by 75 feet and 100 feet by 50 feet
Pipeline Cross-Unders	100 feet by 75 feet
Horizontal Directional Drill	200 feet by 100 feet
Waterbody Crossings	100 feet by 75 feet
Wetland Crossings	100 feet by 75 feet

[a] Areas are in addition to the typical 110-foot-wide construction right-of-way

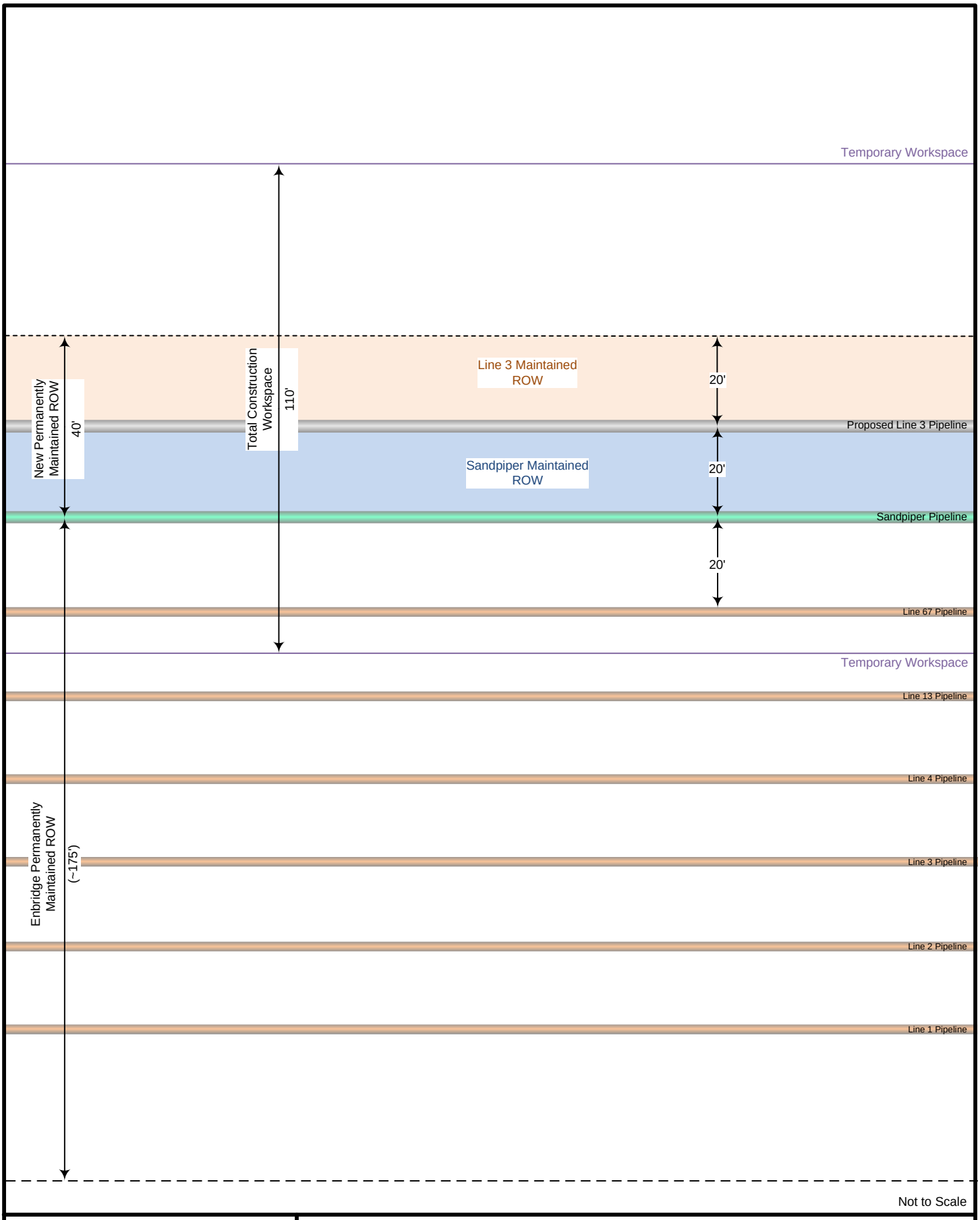
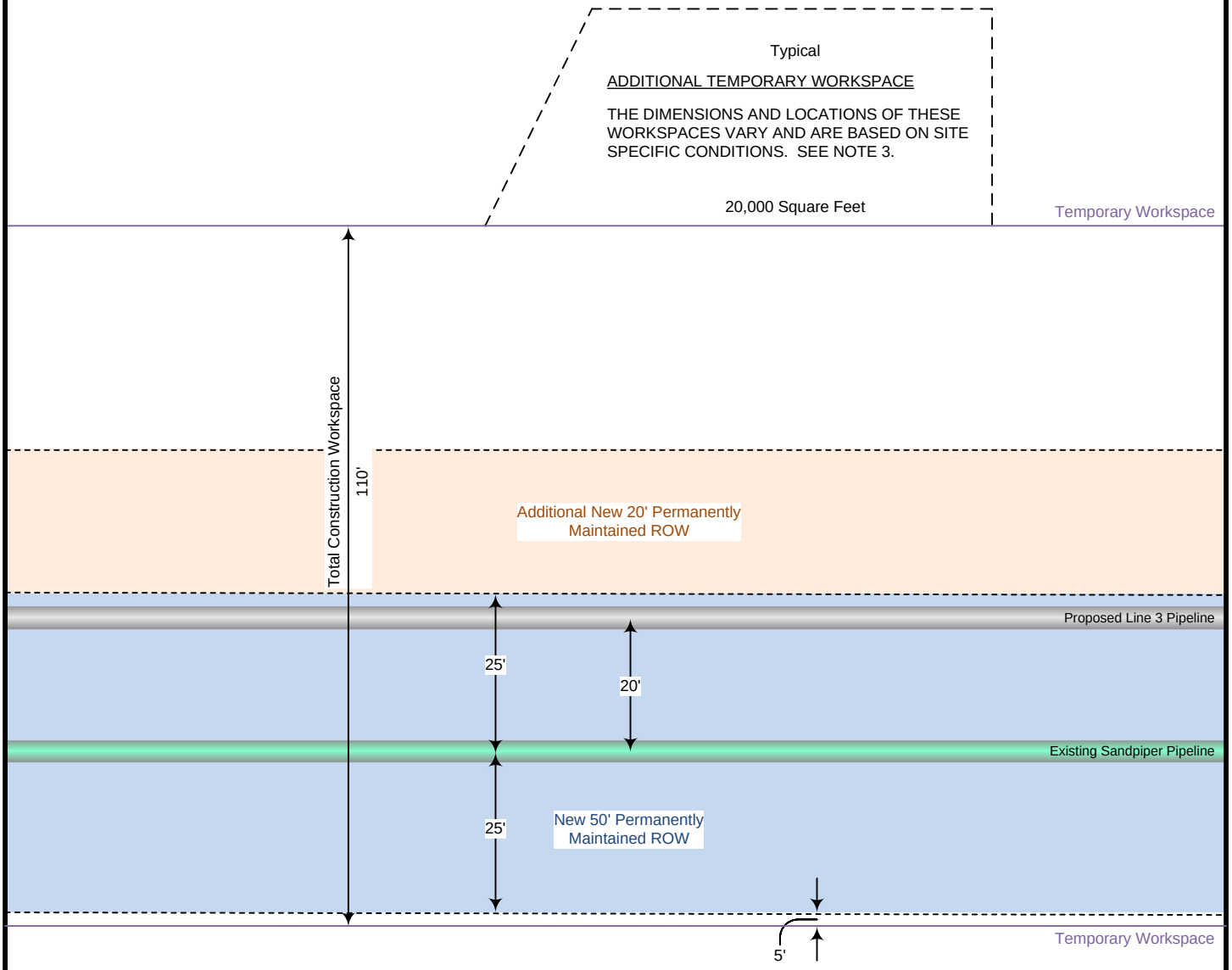


Figure 1.2-1
Line 3 Replacement and Sandpiper Pipeline Projects
Typical Right-of-Way Configuration Co-Located with Existing Right-of-Way
(Wisconsin Only)



NOTES:

1. ENBRIDGE WILL TYPICALLY UTILIZE A 110-FOOT-WIDE CONSTRUCTION WORKSPACE TO INSTALL THE PIPELINES AND WILL HAVE A 20-FOOT OFFSET FROM EXISTING PIPELINE.

2. OF THE 110-FOOT-WIDE CONSTRUCTION FOOTPRINT, THE SANDPIPER PIPELINE WILL HAVE A NEW 50-FOOT-WIDE PERMANENTLY MAINTAINED RIGHT-OF-WAY AND THE LINE 3 REPLACEMENT PIPELINE WILL HAVE A NEW 20-FOOT-WIDE PERMANENTLY MAINTAINED RIGHT-OF-WAY. THE REMAINING 40 FEET WILL BE USED AS TEMPORARY WORKSPACE.

3. ADDITIONAL TEMPORARY WORKSPACE MAY BE REQUIRED AT CIVIL AND ENVIRONMENTAL CROSSINGS OF UP TO 20,000 SQUARE FEET ON EACH SIDE OF THE CROSSING. THESE ADDITIONAL TEMPORARY WORKSPACES ARE GENERALLY USED AT ROAD, RAILROAD, WATERBODY, WETLAND CROSSING, AND UTILITY CROSSINGS. ADDITIONAL TEMPORARY WORKSPACE REQUIREMENTS WILL VARY PENDING TYPE OF CROSSING AND ANY SPECIAL CONDITIONS OR ENVIRONMENTAL FEATURES.

Not to Scale

ENBRIDGE

Figure 1.2-2
Line 3 Replacement and Sandpiper Pipeline Projects
Typical Greenfield Right-of-Way Configuration
(Wisconsin Only)

1.2.3 Access Roads

Enbridge proposes to use existing public and private roads to access the right-of-way and facilities to the extent practicable. In Wisconsin, Enbridge will limit access to either the construction right-of-way, or existing roads that require no modifications or impacts on wetlands. In the event a new temporary road is necessary, Enbridge will obtain applicable regulatory approvals prior to using the new access. A list of currently proposed access roads is included in Table 1.2.3-1.

TABLE 1.2.3-1

Proposed Access Roads for the Project

Access Road ID	Approximate Milepost (Intersects with Pipeline)	Public/Private Road
A-456	601.12	Private
A-457	602.03	Private
A-458	602.30	Private
A-459	602.63	Private
A-460	603.07	Private
A-461	603.34	Private
A-462	603.60	Private
A-463	604.61	Private
A-464	604.76	Private
A-465	605.89	Private
A-466	606.32	Private
A-466.1	607.53	Private
A-467	610.61	Private
A-468	610.91	Public

Newly constructed temporary roads may be left intact through mutual agreement with the landowner unless otherwise restricted by federal, state, or local regulations. If temporary roads are to be removed, Enbridge will restore the land used for access to the original conditions, as practicable, and seeded and stabilized pursuant to the Project-specific Environmental Protection Plan (EPP) (refer to Appendix B).

Enbridge will coordinate the use of public roads with the appropriate county or state road authority. Enbridge will coordinate the use of existing private roads with the landowner.

1.2.4 Pipe Storage and Contractor Yards

During construction, Enbridge will temporarily use off-right-of-way areas for pipe and materials storage. In addition, construction contractors will require off-right-of-way contractor yards to park equipment and stage construction activities.

Although subject to change, Enbridge tentatively identified one pipeyard necessary for construction near South Range, Wisconsin. Enbridge may identify additional pipeyards and contractor yards as Project planning and engineering progresses. Enbridge considers sensitive environmental features when planning the placement and use of these pipeyards to ensure no impacts. The yards are leased sites and will be restored upon the completion of the Project unless otherwise permitted or authorized by the landowner and applicable agencies.

1.2.5 Aboveground Facilities

Enbridge proposes to install four mainline valves (two on each pipeline) in Wisconsin. The Line 3 replacement pipeline will require installation of a densitometer for batch detection.

In addition, within the fenced property of Enbridge's existing Superior Terminal, each Project requires pressure relief and a receiving trap will. The Sandpiper Project requires installation of custody transfer metering, a meter prover, pressure control valves, and a sampling facility.

1.3 PROJECT SCHEDULE

Enbridge proposes beginning construction in the first quarter of 2015, pending regulatory approvals, with first quarter 2016 targeted for in-service.

1.4 AUTHORIZATIONS AND APPROVALS

The required local, state, and federal permits for the Project work in Wisconsin are provided in Table 1.5-1.

TABLE 1.5-1

Agency Permits/Approvals in Wisconsin

Name of Agency	Title of Permit/Approval	Date of Application [a]	Date of Decision [b]	Status
United States Army Corps of Engineers – St. Paul District	Clean Water Act Section 404	February 2014	January 2015	Application submitted
United States Fish and Wildlife Service (Section 7)	Section 7 Endangered Species Act Consultation	December 2013	January 2015	Initial consultation in December 2013.
Wisconsin Public Utilities Commission	Public Interest Determination	February 2014	December 2014	Pending Submittal
Wisconsin Department of Natural Resources	Chapter 30 Permit and NR 103 Water Quality Certification	February 2014	January 2015	Application submitted
	State Endangered Resources Review	February 2014	January 2015	Pending submittal
	Temporary Water Use Permit	August 2015	September 2015	Pending submittal
	Superior Terminal Air Permit	May 2014	March 2015	Pending submittal
	Hydrostatic Test Discharge Permit	August 2015	September 2015	Pending submittal
	WPDES Construction Stormwater General Permit – Pipeyards and Contractor Yards	April 2014	June 2014	Pending submittal
	WPDES Individual Construction Stormwater Permit – Pipeline Construction	December 2014	March 2015	Pending submittal
Wisconsin State Historic Preservation Office (Section 106)	Cultural Resources Consultation, NHPA Section 106 Clearance	November 2013	November 2014	Initial consultation with COE November 2013.
Wisconsin Department of Agriculture	Agricultural Protection Plan	April 2013	September 2014	Consultation initiated
Wisconsin Department of Transportation	Road Crossing Permits	TBD	TBD	Pending submittal

TABLE 1.5-1

Agency Permits/Approvals in Wisconsin

Name of Agency	Title of Permit/Approval	Date of Application [a]	Date of Decision [b]	Status
City of Superior	Erosion Control/Grading Permit	December 2014	February 2015	Pending submittal

[a] Actual date of initial consultation/anticipated dates for submission.
[b] Projected dates of action.

The Voigt Intertribal Task Force (VITF), a part of the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), recommends policy regarding inland harvest seasons and resource management issues. The VITF addresses matters that affect the treaty rights of the member tribes in the 1837 and 1842 Treaty ceded territories. The VITF recommends harvest seasons and regulations for each inland season to the respective tribal councils for ratification prior to becoming an ordinance. The WDNR will consult with the Voight Commission regarding Tribal issues.

1.5 ENBRIDGE HISTORY

Enbridge owns and operates the United States portion of the world's longest liquid petroleum pipeline system. Combined with the Canadian portion of the pipeline system, owned by Enbridge Pipelines, Inc., the operationally integrated pipeline system spans approximately 3,200 miles across North America, and has been in operation since 1950. Detailed information on Company ownership and structure is included on the Company's website at www.enbridgepartners.com or www.enbridge.com. Enbridge's pipeline system transports crude petroleum to serve refineries in the Midwestern states. Enbridge also transports smaller volumes of crude oil from the western U.S. through an interconnection with Enbridge Pipelines (North Dakota) LLC and from the Gulf of Mexico coast via interconnections with other pipeline systems. Today, Enbridge deliveries to refining centers in the Midwest account for approximately 10 percent of total U.S. oil imports.

In Wisconsin, the existing Enbridge right-of-way currently contains six pipelines: Line 1, Line 2, Line 3, Line 4, Line 13, and Line 67 (refer to Figure 1.2-1). A brief history of the pipelines is provided below and, where applicable, a permitting and monitoring history and status has also been provided.

- Line 1 is an 18-inch diameter crude oil pipeline installed in 1950. The installation of the pipeline occurred prior to the implementation of the Clean Water Act. No state wetland or waterbody permitting program at the federal or state level was in place at the time of installation. Enbridge completed construction of the pipeline in accordance with accepted pipeline construction and restoration practices at the time of installation.

- Line 2 is a 26-inch-diameter crude oil pipeline that was installed in 1957. The installation of the pipeline occurred prior to the implementation of the Clean Water Act. No state wetland or waterbody permitting program at the federal or state level was in place at the time of installation. Enbridge completed construction of the pipeline in accordance with accepted pipeline construction and restoration practices at the time of installation.

- Line 3 is a 34-inch-diameter crude oil pipeline that was installed in 1967. The installation of the pipeline occurred prior to the implementation of the Clean Water Act. No state wetland or waterbody permitting program at the federal or state level was in place at the time of installation. Enbridge completed construction of the pipeline in

accordance with accepted pipeline construction and restoration practices at the time of installation.

- Line 4 (also referred to as "Terrace 3") is a 36-inch-diameter crude oil pipeline that was installed in 2002. The project was regulated under section 404 and 401 of the Clean Water Act and Chapter 30 of the Wisconsin State Statutes. Enbridge obtained the appropriate federal and state wetland and waterbody permits for this project. The U.S. Army Corps of Engineers (COE) issued a permit under Section 404 of the Clean Water Act on January 18, 2002. A certificate of completion was submitted to the COE on October 13, 2004. The WDNR issued a permit for the following activities on March 27, 2002: Temporary Bridges (Wis. Stat.§30.123, Section 404 Clean Water Act); Grading, (Wis. Stat. §30.19, Section 404 Clean Water Act); Utility Crossing (Wis. Stat. § 30.20 and 30.12, Section 404 Clean Water Act); Wetland Water Quality Certifications (Section 401 Clean Water Act). Enbridge completed construction in early 2002 and restoration activities October 2002.

- The Alberta Clipper (Line 67) and Southern Lights (Line 13) pipelines are collocated 36- and 20-inch-diameter crude oil pipelines, respectively, that were co-constructed in 2009 and 2010. The project was regulated under Sections 404 and 401 of the Clean Water Act and Chapter 30 of the Wisconsin State Statutes. Enbridge obtained the appropriate federal and state wetland and waterbody permits for this project. The COE issued a permit under Section 404 of the Clean Water Act on August 11, 2009. The WDNR issued a permit for the following activities on June 19, 2009: Temporary Bridges (Wis. Stat. §30.123, Section 404 Clean Water Act); Grading, (Wis. Stat. §30.19, Section 404 Clean Water Act); Utility Crossing (Wis. Stat. § 30.20 and 30.12, Section 404 Clean Water Act); Wetland Water Quality Certifications (Section 401 Clean Water Act). Enbridge completed construction in March 2010 and restoration activities in the fall of 2011.

1.6 OPERATION, INTEGRITY, AND EMERGENCY RESPONSE

Enbridge is taking numerous proactive steps to prevent spills into waterbodies through the design, operation, and maintenance of the Sandpiper and Line 3 Replacement pipelines. As explained below, Enbridge implements a comprehensive integrity management program to identify, excavate, repair and/or replace anomalies that may cause a release. In the event of a release, for example, Enbridge incorporates remotely operated valves in order to mitigate the extent of a release. Enbridge also has in place sophisticated leak detection methods and procedures, as well as a newly-revised emergency response program to cleanup a release, including submerged oil.

Enbridge implemented a number of improvements to those programs following the Line 6B incident near Marshall, Michigan, including improvements made in response to the July 10, 2012 National Transportation Safety Board (NTSB) report on that incident. The Sandpiper and Line 3 Replacement pipelines will benefit from the continuous improvements to Enbridge's programs implemented following the Line 6B incident, which will help to mitigate any risks associated with the future and ongoing operation.

Enbridge will construct the Sandpiper and Line 3 Replacement pipelines to the highest standards, including a corrosion-protection epoxy coating that will be fusion-bonded to the pipe at the factory, where all pipe sections will be inspected by Enbridge and re-inspected in the field upon installation. Cathodic protection will be installed to protect the pipeline from corrosion during operation.

The following sections summarize the procedures that Enbridge implements to mitigate the risk of spills from the Sandpiper and Line 3 Replacement pipelines.

1.6.1 Integrity Management Program

Enbridge implements an industry-leading and PHMSA-compliant integrity management program to evaluate risks associated with cracks, corrosion, and geometry-related issues. For example, Enbridge takes the following steps to reduce the incidence and impacts of each including: inspecting all of its mainline system from the inside out using inline inspection tools; establishing rigorous monitoring programs for cracks using high resolution ultrasonic in-line inspection technology; analyzing data for indications of corrosion and using anti-corrosion coatings and cleaning tools; and monitoring to prevent third party damage to the pipelines by having appropriate signage and participating in a public awareness campaign.

In addition, Enbridge's corrosion management group is responsible for both internal and external pipeline corrosion, which includes monitoring and inspecting for corrosion primarily through in-line inspections. Enbridge also evaluates pipeline internal corrosion susceptibility by integrating and evaluating data on pipeline characteristics, in-line inspection data, operating conditions, pipeline cleanliness, crude and sludge sampling, and historical leak data. Any features discovered by in-line inspection that meet specified criteria are identified for further examination through excavations, which are conducted to: (i) evaluate the in-line inspection results; (ii) to remediate or repair features; and (iii) to examine the condition of the pipeline segment.

The Sandpiper and Line 3 Replacement pipelines, and ancillary facilities, will be constructed to accommodate internal inspection instruments, such as in-line inspection devices also referred to as "smart pigs" to identify "features" that may be areas of internal corrosion, dents, cracks, or other features that could compromise pipeline integrity. Such inspections are required periodically under PHMSA's regulations at 49 CFR Part 195.

Specifically, Part 195 requires than an operator must continually assess a pipeline's integrity at five-year intervals, not to exceed 68 months. Because there are multiple in-line inspection technologies used to detect various types of possible pipeline features, that often means that a variation of tools are run more frequently over a 5-year period to assess varying feature types. In addition, Enbridge assesses certain features via a risk-based approach which may require multiple tool runs over a 5-year period. Part 195 requires a baseline assessment prior to operation.

Further, Enbridge took steps to double the number of staff dedicated to integrity and devoted increased resources to pipeline integrity management in recent years, resulting in an increase in the number of in-line inspection programs and integrity digs (including excavation, examination, maintenance and repair by welded sleeve or pipe segment replacements).

1.6.2 Valve Placement

The placement of valves on the Sandpiper and Line 3 Replacement pipelines will help to mitigate the risk of any discharges. Enbridge is reviewing the potential impacts from a release and determining the appropriate placement of valves.

Specifically, Enbridge's Operation and Risk Management Group is conducting an Intelligent Valve Placement (IVP) study for the Sandpiper and Line 3 Replacement pipelines. The IVP will identify optimal valve locations that will protect major water crossings and high consequence areas (HCAs) in the

event of a pipeline release. PHMSA regulations require that valves be placed in certain proximity to a water crossing. See 49 C.F.R. § 195.260 (a valve must be installed on each side of a water crossing that is more than 100 feet wide from high-water mark to high-water mark). The IVP study also considers:

- Locations that will reduce the potential consequence of a release;
- Construction limitations;
- Pump station locations;
- Presence of potential HCA as defined by PHMSA;
- Proximity to densely populated areas;
- Accessibility;
- Operational considerations; and
- Future pipeline expansion potential.

In the event of a release from the Sandpiper and Line 3 Replacement pipelines, Enbridge can remotely close these valves from its control center, thereby mitigating the impact of any release.

1.6.3 Leak Detection

In accordance with PHMSA regulations and industry standards, Enbridge has a number of leak detection capabilities. In compliance with PHMSA requirements set forth in 49 CFR Part 195.402, Enbridge has procedures for handling abnormal operating conditions and emergencies.

In accordance with Section 195.402, Enbridge monitors its liquid petroleum pipelines twenty-four (24) hours a day using four primary methods, each having a different focus and featuring different technology, resources, and timing. Used together, those methods provide an overlapping and comprehensive leak detection capability. PHMSA inspects each of the methods for compliance with Integrity Management Rules for Pipelines in HCAs, as per regulatory requirements set forth at 49 CFR Part 195. Such methods include the following:

- Controller monitoring - Enbridge's pipeline controller monitors pipeline conditions (such as pipeline pressure) through its Supervisory Control and Data Acquisition (SCADA) system. The SCADA system identifies unexpected operational changes, such as pressure drops outside normal variations that may indicate a release. The controller also utilizes additional sensors at pumping stations monitored through SCADA to identify potential leaks.

- Computational Pipeline Monitoring - computer-based pipeline monitoring systems utilize measurements and pipeline data to detect abnormal operating conditions, such as pressures that are above or below pre-established limits that could indicate possible releases. The pipeline monitoring system that Enbridge uses provides a sophisticated computer model of our pipelines, and continuously monitors changes in their calculated volume of liquids. The Sandpiper and Line 3 Replacement pipelines will employ two computational pipeline monitoring systems.

- The primary Computational Pipeline Monitoring system (CPM) for the Sandpiper and Line 3 Replacement pipelines will be a Material Balance System (MBS) and is a hydraulic-based real-time transient model. The software calculates material balance, and display alarms when imbalances exceed pre-specified thresholds. The software performs material balance calculations on individual flow meter to flow meter sections as well as overlapping flow meter to flow meter sections. The sensitivity of the CPM system

depends on the quantity, repeatability, quality, and accuracy of various types of instrumentation on the pipeline.

- Enbridge will also utilize a secondary, statistical-based CPM system as part of the Sandpiper and Line 3 Replacement pipelines. The statistical CPM system works by applying a sequential probability ratio test to the corrected flow balance system after a comprehensive data validation process. The system continuously calculates the statistical probability of a release based on fluid flow and pressure measured at remote valve locations and the inlets and outlets of a pipeline. In addition, pattern recognition techniques are used to identify changes in the relationship between the pipeline pressure and flow when a release occurs. This CPM can detect the location of releases and also improves release detection capability under transient conditions.

- Scheduled line balance calculations - These are calculations of oil inventory in operational pipelines that Enbridge conducts at fixed intervals, typically every 2 and 24 hours. Enbridge also maintains a rolling 24-hour calculation based on the calculations done at the prescribed set times. The purpose of the calculations is to identify unexpected losses of pipeline inventory during pipeline flow conditions that may indicate a possible release.

- Visual surveillance and reports - Those are reports of oil or oil odors from third parties and from Enbridge's aerial and ground line patrols. Enbridge handles third-party reports through an emergency telephone line. Enbridge typically conducts aerial line patrols every two weeks as per PHMSA requirements. It also may conduct a focused additional aerial and ground patrol upon review of the status of a pipeline. Enbridge has an extensive public awareness program, which facilitates communication with those who live along the pipeline route; public officials, excavators and emergency responders. As part of that public awareness program, Enbridge provides information on how to recognize, react and report abnormal conditions or observations that could be the result of an oil release.

Further, Enbridge's Control Center has a protocol for addressing abnormal operating conditions, which consists of notifying local emergency responders to respond to the site of a suspected release. Enbridge requires its initial emergency to physically respond to an incident and be on location within sixty minutes or less. Enbridge would supplement the initial response with personnel from other Enbridge locations and contract resources as necessary.

In addition to the methods described above, Enbridge continues to pursue the development and implementation of other leak detection technologies. For example, Enbridge recently partnered with TransCanada to research the potential use of fiber optics for purposes of leak detection.

1.6.4 Emergency Response

PHMSA regulations to which Enbridge is subject, set forth in 49 CFR Part 194, provide standards and guidelines for preparing emergency response plans, including the listing of resources and capabilities of responding to a potential incident. Enbridge must submit the plans to PHMSA for review and approval.

Enbridge has new Integrated Contingency Plans (ICP) that serve as the emergency response plan (ERP) for Enbridge's pipelines. Enbridge's ICP was approved by PHMSA on July 11, 2013. The ICP follows an industry recognized format for response planning, which was developed by the National Response

Team (NRT) as a means by which to consolidate multiple facility response plans. The U.S. Environmental Protection Agency (USEPA), U.S. Coast Guard, and the Occupational Safety and Health Administration (OSHA), among other agencies, all provided input into the ICP format. Those federal agencies agreed that the ICP, when prepared in accordance with that guidance, will be the preferred method of response planning and documentation (refer to NRT ICP Guidance, at 61 Fed. Reg. 28642 [June 5, 1996]).

Enbridge's ICP is the first and only industry plan thus far to undergo an extensive, multi-agency review process, which included participation by USEPA. The ICP addresses the gaps identified in the NTSB report on the Line 6B incident, and strengthens Enbridge's emergency response capabilities to any incident that might occur on Enbridge's pipelines. The "Core Plan" serves as the primary response tool within the ICP, and is supported by additional Annexes which are specific to geographical Response Zones and/or specific sites. Enbridge review the ICP annually to reflect operational or regulatory changes when required. Enbridge will request approval for the ICP from PHMSA, as necessary, in order for the ICP to apply to the Sandpiper and Line 3 Replacement pipelines.

Furthermore, Enbridge developed a Submerged Oil Recovery Plan, which provides an analysis to assess what tactical methods are to be employed to address submerged oil, based on the specific impacts in a particular submerged oil scenario.

In addition to the operational changes noted above, Enbridge is also implementing changes to its Pipeline Public Awareness and Emergency Response Programs by:

- Developing an online and in-person training tool to provide Enbridge-specific information to emergency responders in its host communities;
- Addition of Community Relations positions in key locations along Enbridge liquid pipeline routes;
- Increased spending ($50 million) between 2012 and 2013 to improve programs, equipment and capabilities, develop better tools to deal with particular waterborne spills, and improve training programs;
- Implementation of specialized training for a cross-business unit response team, to respond to large-scale events anywhere in North America that would require more resources than a single Enbridge liquid pipeline operating region or business unit could provide;
- Conducting an emergency-response preparedness assessment to identify additional strategic equipment purchases to enhance capabilities to more rapidly respond and contain a significant release anywhere in the Enbridge system.
- Addition of personnel in each Enbridge liquid-pipeline operating region to improve emergency-preparedness planning and coordination.

Enbridge's Superior Terminal has emergency response equipment and trained personnel. Also, Enbridge contracts with, a full service environmental and emergency response company and a classified Oil Spill Response Organization, to supplement Enbridge's own resources located at designated terminals, pumping stations and pipeline maintenance facilities along the existing pipeline system. Those

companies are located in many areas throughout the United States and maintain Response Teams equipped to quickly respond to emergencies upon notification.

Enbridge also provides MSDS information to local responders on an annual basis in accordance with PHMSA requirements.

1.7 CONSTRUCTION PROCEDURES

Figure 1.7-1 provides a schematic depicting the typical pipeline construction sequence. The subsequent sections of this document include descriptions of the typical and specialized construction techniques (e.g., waterbody crossings). Also refer to Enbridge's EPP (Appendix B) for more detailed construction and restoration information.

1.7.1 Preparation of the Right-of-Way

Civil survey crews will stake the construction right-of-way prior to clearing of vegetation or ground disturbance. Crews will modify or remove fences when encountered within the construction area or, if necessary, for right-of-way access.

1.7.2 Clearing and Grading

The Contractor will clear the right-of-way in accordance with permits and limit to the extent needed for access and construction of the pipelines. The Contractor will protect trees to the extent possible and will remove stumps when necessary during grading and pipeline installation. The Contractor will haul stumps and debris created from preparation of the construction area to an approved disposal sites, mulch, or otherwise handle in accordance with the Project permits.

Enbridge will not allow the Contractor to burn non-merchantable wood unless they acquire all applicable permits and approvals (e.g., agency and landowner) and in accordance with all state and local regulations.

The Contractor will grade the construction area only to the extent needed to provide a safe work area and will do so in a manner that minimizes effects on natural drainage and slope stability. The Contractor will restore graded areas and side hill cuts to original conditions to the extent possible upon completion of construction.

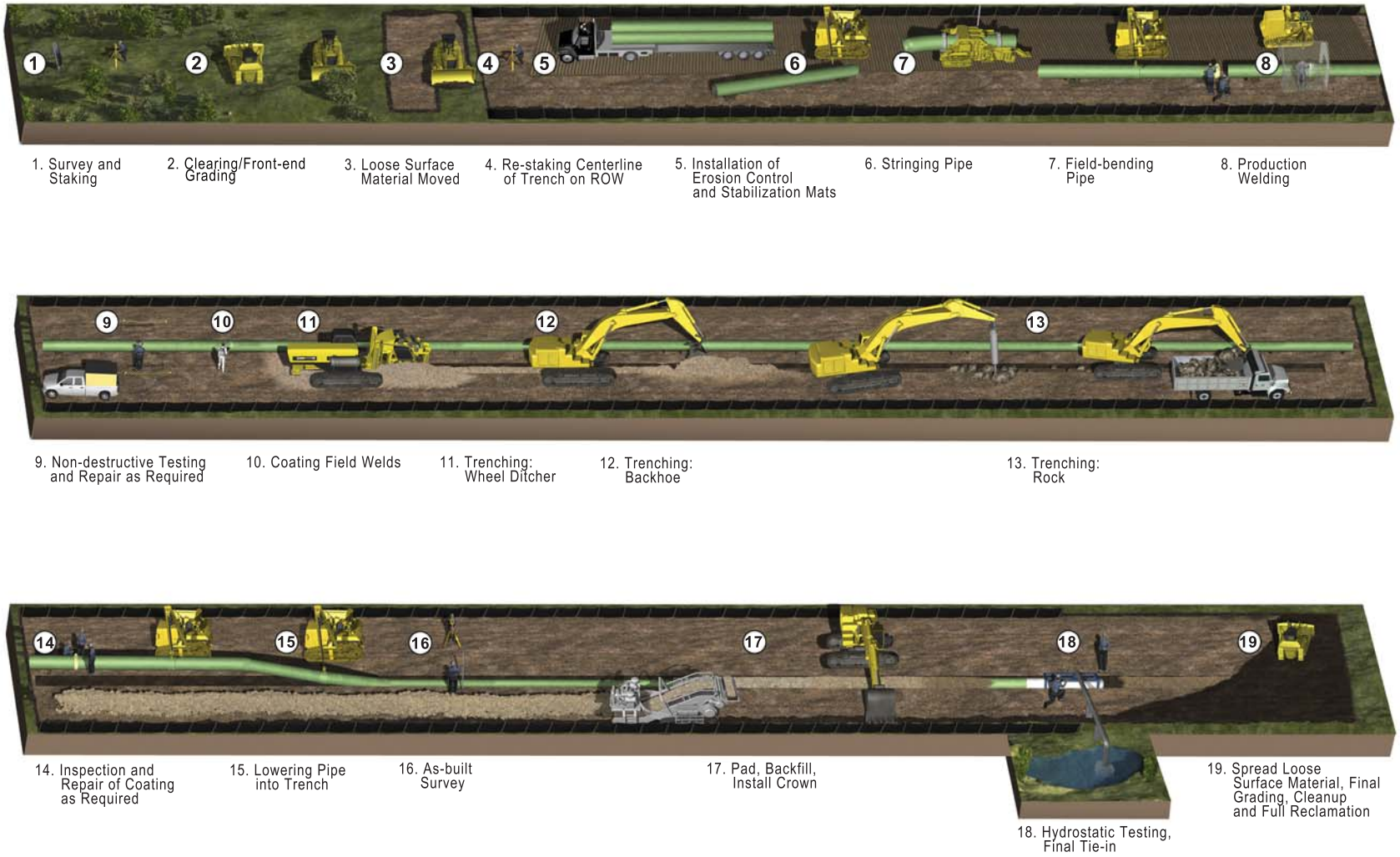


Figure 1.7-1
Sandpiper Pipeline Project
Typical Construction Sequence

Copyright 2011 Merjent, Inc.

The Contractor will segregate topsoil in hayfields, pastures, residential areas, golf courses, unsaturated wetlands, and other areas as requested by the landowner or as specified in the Project plans, commitments, and/or permits. Refer to the Section 1.10 of the EPP provided as Appendix B for a more detailed discussion of topsoil segregation. The Contractor will segregate the topsoil and subsoil piles in a manner as to avoid mixing.

1.7.3 Hauling and Stringing Pipe

The Contractor will transport coated pipe, valves, and fittings by truck from material storage yards to various points along the Project route and will off-load the materials along the construction route using side boom tractors, mobile cranes, or vacuum lifting equipment.

1.7.4 Trenching

Typically, the Contractor conducts trenching activities using a backhoe or crawler-mounted, wheel-type ditch digging machine. The equipment operator will sidecast (stockpile) excavated material within the approved construction right-of-way separate from topsoil (refer to Section 1.10 of the EPP [Appendix B]). Enbridge will coordinate with landowners to minimize disruption of access caused by the trench during construction.

The Contractor will take precautions to adequately protect, repair, and/or replace damaged drainage systems (e.g., ditches, drainage tiles).

1.7.5 Trench Dewatering

Groundwater or stormwater runoff may accumulate in the trench during construction activities. If trench dewatering is necessary to complete the installation of the pipe, the Contractor will pump the discharge into a sediment filter bag or a straw bale dewatering structure in such a manner that no heavily silt-laden water flows into streams or wetlands (refer to Section 5.0 of the EPP [Appendix B]). Enbridge will obtain all applicable permits for these discharge activities.

1.7.6 Bending

The Contractor will bend individual sections of the pipe to conform to the contours of the trench and terrain, where necessary using a track-mounted, hydraulic pipe-bending machine for this purpose. Enbridge may also utilize prefabricated pipe bends depending on the necessary angles required.

1.7.7 Line-up, Welding, and Weld Inspection

Following bending, the Contractor lines up the sections of pipe and welds them together. Enbridge non-destructively inspects each individual weld prior to coating.

1.7.8 Lowering In

Enbridge inspects the trench for proper depth, rocks, or other obstructions prior to lowering in the pipeline. Sideboom tractors, spread out along the pipe segment, will simultaneously lift the welded pipeline sections and move it over the open trench. The sideboom tractors will then lower the pipeline segment into the trench.

1.7.9 Backfilling

The Contractor will backfill the trench following the lowering-in of welded pipeline strings. Angle blade dozers, draglines, or backhoes will replace the spoil. The Contractor will replace the subsoil first in areas where topsoil segregation occurred followed by the topsoil.

1.7.10 Pressure Testing

After backfilling is complete, the Contractor will hydrostatically test each pipeline to verify the integrity of the pipeline. Hydrostatic testing involves filling the new pipe segments with water acquired in accordance with applicable permits, raising the internal pressure level, and holding that pressure for a period of time, in accordance with DOT specifications. The Contractor may hydrostatically test pre-built sections prior to installation at significant streams and wetland crossings. The Contractor will depressurize the line after completing the hydrostatic test and the water expelled. During withdrawal and discharge, Enbridge will sample the water as required by permits and will measure and record water volumes. The Contractor will discharge the water used for hydrostatic testing in accordance with applicable permits.

Enbridge identified the Pokegama River as a potential source and discharge location for the hydrostatic testing of the test segment in Wisconsin. If selected as a source, Enbridge will obtain all applicable permits for this activity.

1.7.11 Cleanup and Right-of-Way Restoration

The Contractor will remove construction debris and restore the workspace upon completion and testing of the pipelines. The Contractor will take precautions to protect against potential spills or releases from construction equipment. Enbridge requires Contractors to locate equipment refueling areas a minimum of 100 feet from waterways and wetlands unless additional site-specific precautions have been implemented. Enbridge developed comprehensive Spill Prevention, Containment and Control measures (refer to Section 10.0 of the EPP in the Appendix B).

The Contractor will install permanent erosion controls where necessary. The Contractor will reseed upland portions of the right-of-way in accordance with Section 7.0 (Revegetation and Monitoring) of the EPP (Appendix B). The Contractor will reseed of wetlands in conformance with the COE and the WDNR specifications, and in accordance with the EPP.

After construction and completion of final cleanup, Enbridge's land agents will contact landowners to address any remaining restoration concerns.

2.0 ALTERNATIVES

Enbridge identified and evaluated alternatives to the Project to determine whether the alternatives would be reasonable and environmentally preferable. These alternatives include the No-Action Alternative, system alternatives, and route alternatives. Enbridge used the following criteria for considering alternatives:

- ability to meet the Project objectives;
- technical and economic feasibility; and
- significant socioeconomic and environmental advantage over the proposed Project.

Not all conceivable alternatives have the ability to meet the Project objectives, and an alternative that does not meet the Project objectives will not be pursued by Enbridge. In addition, not all conceivable alternatives are technically or economically feasible. Some alternatives may be impractical because they are unavailable and/or incapable of being implemented after taking into consideration costs and logistics in light of the overall Project purpose. Enbridge focused its analysis on those alternatives that may reduce impacts and/or offer substantial environmental advantage without merely transferring impacts from one area or group of landowners to another. The following subsections describe Enbridge's process for selecting the Project route and provide an analysis of alternatives.

2.1 COMPARISON OF ROUTE ALTERNATIVES

2.1.1 No-Action Alternative

Line 3 Replacement Project

Enbridge could continue to operate and maintain Line 3 under its long-term integrity program. However, maintenance costs for the pipeline system would be greater, and landowners would likely be impacted numerous times over subsequent years. Since 2010, Enbridge conducted 46 digs on Line 3 from the Wisconsin border to the Superior Terminal (approximately 13 miles).

Repairs typically involve mitigation of a feature by: the installation of welded full-encirclement around the existing pipeline; the cutting out and replacement of smaller sections of the existing pipeline; or a combination of these methods. Employing the repair, or no-action alternative provides no advantage over replacement in attempting to minimize environmental impacts as they would likely be similar to those anticipated as part of this Project, will occur over a longer duration, and would require repetitive impacts to landowners and the environment. Therefore, Enbridge believes that replacing the pipeline is the most practical, cost-effective, and least intrusive method of maintaining its pipeline. Furthermore, it reduces future maintenance activities, which would otherwise be conducted to assure safe operation of Line 3 under Enbridge's long-term integrity management program.

Sandpiper Pipeline Project

The No-Action Alternative does not meet the objectives of the Sandpiper Pipeline Project. In light of the overall increase in Bakken production and the requirements of Enbridge's shippers to increase pipeline capacity, the "no action" alternative is unacceptable to Enbridge and its shippers, and to the petroleum-consuming public which require secure and reliable sources. Enbridge, its shippers, and residents of Wisconsin and neighboring states will be negatively impacted without the capacity expansion afforded by this Project. The "no action alternative" is not a viable option as Enbridge would not be able to meet its shippers' near-term or future transportation requirements.

A No Action Alternative would require Wisconsin, Minnesota, and North Dakota to either seek other transportation means that are less safe and more costly than the proposed pipeline or reduce production of petroleum-based products. This Project is the most efficient and cost-effective means by which to deliver the necessary Bakken crude oil to refineries in the Midwest and beyond. Production of petroleum-based products and a shift in the current supply and demand model are likely to occur if the refineries decrease production because the capacity is not available to meet shippers' demands.

Although the No-Action Alternative would avoid environmental impacts because Enbridge would not implement the Project, other companies would likely construct similar projects in substitute in light of the known demand for shipping capacity out of the Bakken formation. Such alternative projects could

require the construction of additional and/or new pipeline facilities in the same or other locations to transport the oil volumes proposed for Sandpiper. These projects would result in their own set of specific environmental impacts that could be equal to or greater than those described for this Project. The crude oil produced in the Bakken Formation could continue to be shipped by rail or truck; however, those alternatives have their own significant environmental impacts (refer to Sections 2.1.2.3 and 2.1.2.4).

2.1.2 System Alternatives

The purpose of identifying and evaluating system alternatives is to determine whether potential environmental impacts associated with construction and operation of the proposed facilities would be avoided or reduced by using another pipeline system, while still meeting the purpose and need of the proposed Project. System alternatives are those that would make use of other existing, modified, or proposed pipeline systems—or non-pipeline systems—to meet the purpose and need of the proposed Project. A system alternative would make it unnecessary to construct all or part of the proposed Project, although it may require some modifications or additions to other existing pipeline systems to increase their capacity. These modifications or additions may result in environmental impacts that are less than, similar to, or greater than those associated with construction of the proposed Project.

The following analysis examines several existing and proposed crude oil pipeline systems that currently or will eventually serve the markets targeted by the proposed Project. The analysis considers whether those systems would meet the proposed Project purpose and need while offering an environmental advantage.

2.1.2.1 New Pipeline System Alternatives

Line 3 Replacement Project

Enbridge did not evaluate new system alternatives as they would not meet the purpose and need to replace the segment of the existing Line 3 pipeline.

Sandpiper Pipeline Project

Plains All American Pipeline L.P. (PAA) announced its plans to reverse its Wascana pipeline system and build a new pipeline, Bakken North, to provide additional takeaway capacity for growing Bakken crude production. The Bakken North pipeline, consisting of approximately 79 miles of new 12-inch-diameter pipeline, extends from Trenton, North Dakota to the southern terminus of Plains' Wascana system approximately 2.5 miles north of the town of Outlook in Sheridan County, Montana. The new pipeline will have an initial design capacity of 48,000 bpd, with a maximum capacity of up to 75,000 bpd. PAA plans to reverse the flow of its Wascana System in order to provide further transportation service to Regina, Saskatchewan. At Regina, PAA connects to third-party carriers providing access to Cushing, Oklahoma and PADD 2 delivery points. No in-service date is available; however, North Dakota Public Service Commission filings show construction was to be completed in late 2012.

Industry forecasts for supply growth from the Bakken formation consistently show supply growth in excess of 1.0 million bpd by 2015. With this significant supply growth, Sandpiper and the other potential pipeline projects are not competing for the same production volumes, but are necessary to meet the market demand for additional pipeline export capacity. New and increasing production volumes will be in apportionment if additional pipeline capacity is not available or such volumes transported to market by truck or rail, which are discussed in further detail in Section 2.1.3.

Any other pipeline system would require entirely new right-of-way as well as new pump station sites, power supplies, valve sites, and potential access roads that would likely be equal to or greater in impact than the Sandpiper Project.

2.1.3 Alternative Energy Sources, Transport Modes, and Energy Conservation

The use of alternative energy sources is an option to reduce the need for crude oil should Line 3 be deactivated or Sandpiper not be built. Potential alternative energy sources to crude oil include coal, natural gas, nuclear energy, and electricity, as well as more innovative sources including solar, wind, geothermal energy, and biofuels. All of these alternate energy sources, depending on the location of the source, will require additional energy gathering facilities and the construction or expansion of transmission/distribution facilities to be a viable alternative to the Projects.

Energy conservation reduces the need for crude oil, its refined petroleum products, and other energy sources, and has been effective in slowing the growth in United States demand for petroleum products. Therefore, energy conservation could potentially be a future partial alternative to crude oil transportation and refining. Federal and state governmental agencies advocate energy conservation measures; however, conservation programs and individual efforts are not capable of alleviating the current need for crude oil and operation of the Line 3 and Sandpiper pipelines. For energy conservation to become viable, it will require widespread industry research and development efforts (e.g., to produce more energy efficient vehicles, engines, machinery), and increased support and conservation practices by consumers, as well as political support. U.S. Energy Information Administration (EIA) projected there will be an increase in energy conservation through 2035; however, growth projections suggest that the demand for energy, including crude oil, will exceed cost-effective programs designed to stimulate energy conservation (EIA, 2010). Therefore, the regional demand for new sources of energy, while maintaining current sources, including crude oil, will continue into the future. While energy conservation may provide an alternative to crude oil use in the future, energy conservation, by itself, is not viable to meet the current energy demand and supply currently provided by Enbridge's Line 3 as well as the proposed Sandpiper pipeline.

2.1.3.1 Railroad – Sandpiper Pipeline Project

As an alternative to Sandpiper, Enbridge could potentially transport crude oil by rail from its Tioga, North Dakota facility to the Superior, Wisconsin terminal.

A typical rail car carries 600 barrels of crude oil. For the purpose of this analysis, Enbridge assumes rail transportation providers will optimize the use of their rail tank cars to transport the same crude oil volumes as the Project. Enbridge also assumes that the rail service provider will use long-haul unit or manifest trains with deliveries at intermediate stops between the Beaver Lodge Station and Superior, Wisconsin. Enbridge also assumes that the numerous manifest or unit trains would be required to make the following deliveries equivalent to this Project:

- Leaving Beaver Lodge Station near Tioga, North Dakota with a rail fleet capacity of 250,000 bpd, and the ability to offload deliveries of 25,000 bpd of crude oil supplies at Berthold, North Dakota; no guarantee that empty rail tank cars would return to Beaver Lodge for reloading;

- Leaving Berthold with a rail fleet capacity of 225,000 bpd and the ability to offload entire capacity of rail fleet at Superior, Wisconsin; no guarantee that empty rail fleet would return to Beaver Lodge for reloading; and

- Leaving Clearbrook, Minnesota with a rail fleet capacity up to 150,000 bpd, and the ability to offload entire capacity of rail fleet at Superior, Wisconsin; no guarantee that empty rail fleet would return to Clearbrook for reloading.

In order to transport the same incremental 25,000 bpd of crude oil from Beaver Lodge to Berthold, 225,000 bpd from Beaver Lodge to Superior, and up to 150,000 bpd from Clearbrook to Superior as proposed by Enbridge, a fleet of 2,052 rail cars would be required. Table 2.1.3-1 provides details on the total rail requirements to meet objectives of the Project.

TABLE 2.1.3-1

Total Daily Rail Requirements

Railroad Segment	Crude oil volume (bpd)	Number of rail cars in transit	Number of rail cars returning empty	Number of rail cars loading and unloading (assumed 20%)	Total rail car requirements
Beaver Lodge, ND to Berthold, ND	25,000	42	42	17	101
Beaver Lodge, ND to Superior, WI	225,000	563	563	225	1,351
Clearbrook, MN to Superior, WI	150,000	250	250	100	600
TOTAL					**2,052**

This alternative would require the construction (by Enbridge or its shippers) of rail car loading and off-loading facilities adjacent to the Enbridge Terminal in Superior, Wisconsin which would likely require permanent wetland fill. Construction of new lateral aboveground rail service lines would be required and would pose additional risk and impact to landowners and the public. Rail service would result in the burning of fossil fuels. In addition, the reliability of this alternative in a northern climate is compromised by periodic restriction in truck traffic required to deliver crude oil to rail facilities due to winter storms and spring road restrictions, and other weather related or road capacity restrictions. This alternative also would be subject to delays caused by scheduling conflicting rail traffic and a significant mechanical/maintenance requirement.

While rail tanker cars are a vital part of the short-haul distribution network for crude oil, pipelines are a safer and more economic transportation alternative. The estimated cost of shipping the volume of crude oil transported by a pipeline (incorporating operation and maintenance costs along with fuel costs) would be in the range of hundreds of millions of dollars per year, which is significantly greater than the cost of transporting the oil by pipeline. Furthermore, accident data consistently illustrate that pipelines are the safest form of transportation for bulk liquids, including crude oil.

The safety and environmental risks, logistical requirements, and high cost eliminate the rail option as a viable alternative.

2.1.3.2 Trucking – Sandpiper Pipeline Project

As an alternative to Sandpiper, Enbridge could potentially transport crude oil from its Tioga, North Dakota facility to the Superior, Wisconsin terminal by truck.

A typical truck carries 200 barrels of crude oil. For the purpose of this analysis, Enbridge assumes a trucking company will optimize the use of its trucking fleet to transport the same crude oil volumes as this Project. Enbridge further assumes that the trucking company will divide its transportation requirements into three individual truck hauls that will make round-trips between specified locations: two

beginning at the Beaver Lodge Station near Tioga, North Dakota and ending at Berthold, North Dakota or Superior, Wisconsin and a third that begins at Clearbrook, Minnesota and ends at Superior. To achieve maximum optimization of its trucking operations, Enbridge also assumes that a fleet of trucks would be scheduled to run round-trip deliveries between the following three locations:

- Leaving Beaver Lodge Station near Tioga, North Dakota to deliver 25,000 bpd at Berthold, North Dakota; returning empty from Berthold back to Beaver Lodge;
- Leaving Beaver Lodge to deliver 225,000 bpd at Superior, Wisconsin; returning empty from Superior back to Beaver Lodge; and
- Leaving Clearbrook, Minnesota to deliver up to 150,000 bpd at Superior Wisconsin; returning empty from Superior back to Clearbrook.

In order to transport the same incremental 25,000 bpd of crude oil from Beaver Lodge to Berthold, 225,000 bpd from Beaver Lodge to Superior, and 150,000 bpd from Clearbrook to Superior as Enbridge proposes, a fleet of 4,354 trucks would be required. Table 2.1.3-2 provides details on the total truck requirements to meet objectives of the Project.

TABLE 2.1.3-2

Total Daily Truck Requirements

Truck Segment	Crude oil volume (bpd)	Number of trucks in transit	Number of trucks returning empty	Number of trucks loading and unloading (assumed 20%)	Total truck requirements
Beaver Lodge, ND to Berthold, ND	25,000	32	32	13	77
Beaver Lodge, ND to Superior, WI	225,000	1,407	1,407	563	3,377
Clearbrook, MN to Superior, WI	150,000	375	375	150	900
TOTAL					**4,354**

Even if the truck capacity issue could be resolved, Enbridge or its shippers would need to expand truck loading/unloading facilities at suitable locations to allow receipt into the Enbridge Superior Terminal Facility. The estimated cost of trucking the volume of crude oil transported by a pipeline (incorporating operation and maintenance costs along with fuel costs) would be in the range of hundreds of millions of dollars per year, which is significantly greater than the cost of transporting the oil by pipeline, which is the primary reason trucking is not considered a long-term, stable method to move crude oil.

In Wisconsin, the trucks will primarily use U.S. Highway 2 and local routes in the City of Superior, which already carry a substantial volume of commercial traffic. The additional truck traffic, and associated loads, on Wisconsin roads will result in an increased need for repair and/or expansion, and the burning of fossil fuels through the trucks' combustion engines. The reliability of this alternative in a northern climate is compromised by periodic restrictions on truck traffic due to winter storms, spring road restrictions, other weather conditions, and road weight capacity restrictions.

Furthermore, accident data consistently illustrates that pipelines are the safest form of transportation for bulk liquids, including crude oil. The likelihood of truck accidents as compared to pipeline accidents is significantly higher. The safety risk is magnified significantly by the impact created by increased truck

traffic on Wisconsin highway routes. A trucking alternative would significantly overburden current public road capacity. Data from other states impacted by development in the Bakken Formation suggests that the use of trucking is negatively impacting communities and roadways, and that additional pipeline infrastructure would alleviate transportation concerns (North Dakota Office of the Governor, 2012).

The safety and environmental risks, logistical requirements, and high cost eliminate the trucking option as a viable alternative.

2.1.3.3 Trucking and Railroad – Line 3 Pipeline Replacement

It is technically feasible to deliver crude oil into this region by rail or truck. However, these options are not as economical or reliable year-round modes of transit in order to efficiently deliver large volumes over long distances. Furthermore, since Line 3 will be replaced and tied into the existing infrastructure, truck and rail alternatives are not a relevant or feasible alternative to the Line 3 Replacement Project.

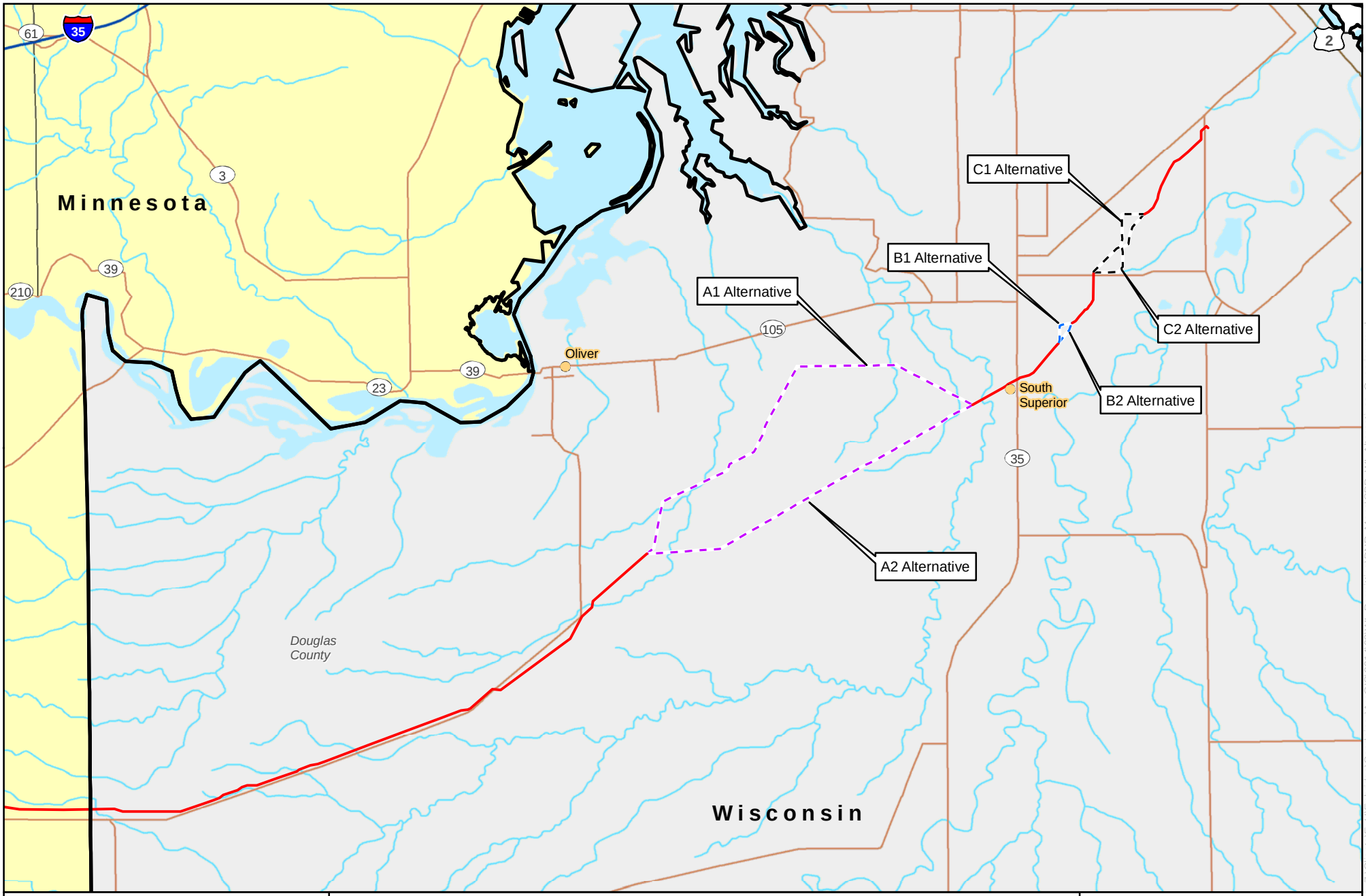
2.2 ROUTE ALTERNATIVES – SANDPIPER PIPELINE AND LINE 3 REPLACEMENT PROJECTS

A "practicable alternative" is defined as one "available and capable of being implemented after taking into consideration cost, available technology and logistics in light of overall project purpose." Wis. Admin. Code § NR 103.07(2). Accordingly, Enbridge evaluated alternatives to determine whether the Projects would avoid or minimize impacts on natural resources, reduce or eliminate engineering and constructability concerns, and avoid or minimize conflicts with existing or proposed residential and agricultural land uses.

The alternative analysis focused on minimizing the length of the pipeline to the extent practicable, while also minimizing the environmental impacts to specific resources. For context, each mile of the Project would generally impact approximately 13 acres during construction (exact acreage is dependent on exact construction methods, workspaces, access roads, etc.). Similarly, it is impossible to avoid all resources due to the extent, shape, and prevalence of many resources.

Consideration of potential alternative corridors was also influenced by the existence of Enbridge control points. Control points at specific locations along the pipeline route serve to anchor the route at the beginning and end, and possibly midpoints, thereby defining specific portions of the final route. Primary control points were identified at the delivery point to Wisconsin at the Minnesota border and the Superior Terminal in Superior, Wisconsin.

Enbridge considered the corridor for which it received authorization to construct its most recent projects (Alberta Clipper and Southern Lights pipelines) as the baseline for this analysis. Therefore, Enbridge conducted a detailed quantitative analysis of environmental impacts for only those areas that may deviate from the previously permitted construction right-of-way (refer to Figure 2.2-1).



0 0.5 1 Miles

1 inch = 1.3 miles

N W E S

ENBRIDGE

Figure 2.2-1
Sandpiper Pipeline and Line 3 Replacement Projects
Overview of Alternatives

Proposed Project Route
A1/A2 Route Alternative
B1/B2 Route Alternative
C1/C2 Route Alternative

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\02\WI_Permitting\DNR_Maps\SPP_WI_Alternatives_Overview.mxd
Date: (2/19/2014)

The analysis uses actual field survey/delineation data were available as well as sources of publicly available environmental data to compare a variety of factors, including:

- adjacency to existing rights-of-way;
- wetlands (including extensive saturated wetlands);
- highly wind erodible soils;
- bedrock outcrops;
- prime farmland soils;
- perennial waterbodies;
- state, county, or municipal forest land;
- State Natural Areas;
- Lake Superior National Estuarine Research Reserve properties;
- Priority Wetlands as identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00;
- Priority Navigable Waterway;
- Area of Special Natural Resource Interest;
- Wild Rice production area drainages as identified by the WDNR and Great Lakes Indian Fish and Wildlife Commission;
- roads and railroads crossed;
- residences or schools within 300 feet; and
- other site-specific issues that may occur.

Enbridge completed a detailed evaluation of each alternative corridor based on the above-referenced factors. Enbridge considered field delineated wetlands, WWI-mapped wetlands, wetlands within the City of Superior that are indicated as "Protected" in the SAMP, and Priority Wetlands as identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-0 to conduct its alternative analysis in accordance with Wis. Admin. Code § NR 103.07(2). The remaining factors have been considered as part of the overall environmental review required for the Project per Wis. Admin. Code § NR 150.

Most impacts are reported as a linear measurement in lieu of an area measurement; with the exception of temporary and permanent impacts on wetlands. Enbridge calculated permanent wetland impacts using the footprint of what will constitute the new permanently maintained right-of-way.

Because Enbridge will not allow trees and shrubs to fully regenerate within the permanent maintained right-of-way to facilitate aerial inspections, impacts on forested wetlands will be long-term and impacts within the permanent right-of-way will represent a conversion of forested wetlands to scrub-shrub or emergent wetlands. Furthermore, the fragmentation of habitat and land use will be minimized by the collocation of the proposed pipeline with Enbridge's existing pipelines and/or existing linear features, whereas the creation of an entirely new utility corridor elsewhere in the Project area would lead to additional fragmentation concerns.

Sections 2.2.1 through 2.2.4 provide a brief overview of each alternative. Section 3.0 provides an additional environmental analysis of each alternative.

2.2.1 Route Alternatives A1 and A2

Due to the proximity to existing residences and the Pokegama-Carnegie State Natural Area (SNA), Enbridge prepared an evaluation of Route Alternatives A1 and A2 between approximate MPs 607.0 and 611.2 (refer to Figure 2.2-2). Table 2.2-1 provides a comparison of the prominent land use features of these alternatives.

TABLE 2.2-1

Environmental Features Comparison –Route Alternatives A1 and A2

Environmental Features	Unit	Route Alternative A1	Route Alternative A2
Length	miles	4.3	3.5
Adjacent to Existing Right-of-Way	miles	0.0	2.8
Greenfield Route [a]	miles	0.5	0.0
Wetland Crossing Length [b, c]	miles	2.6	2.8
Wetland Impact - Construction [b, d]			
PEM	acres	4.2	8.6
PSS	acres	22.9	26.3
PFO	acres	10.8	5.0
Wetland Impact - Operation [b, e]			
PEM	acres	0.0	0.0
PSS	acres	14.3	10.7
PFO	acres	6.4	2.1
Rare Plant Occurrences [b]	number	161	267
Hydric Soils	acres	51.4	48.3
Highly Wind Erodible Soils	acres	0.0	0.0
Agricultural Land	acres	0.0	0.0
Herbaceous Land	acres	0.3	0.3
Forest	acres	23.4	12.5
Prime Farmland Soils	acres	0.0	0.0
Intermittent Waterbodies Crossed [b]	number	0	0
Ephemeral Waterbodies Crossed [b]	number	8	0
Perennial Waterbodies Crossed [b]	number	7	2
Lake Superior National Estuarine Research Reserve Properties	number	0	0
Priority Wetlands [f]	miles	1.4	0.0
Priority Navigable Waterways Crossed	number	4	2
Areas of Special Natural Resource Interest	miles	1.4	0.0
Wild Rice Production Area Drainages [g]	miles	0.0	0.0
DNR Managed Lands	miles	0.0	0.0
State, County or Municipal Forest Land	miles	1.6	2.6
Railroads Crossed	number	1	1
Roads Crossed	number	2	1
Residences within 300 feet	number	0	1

TABLE 2.2-1

Environmental Features Comparison –Route Alternatives A1 and A2

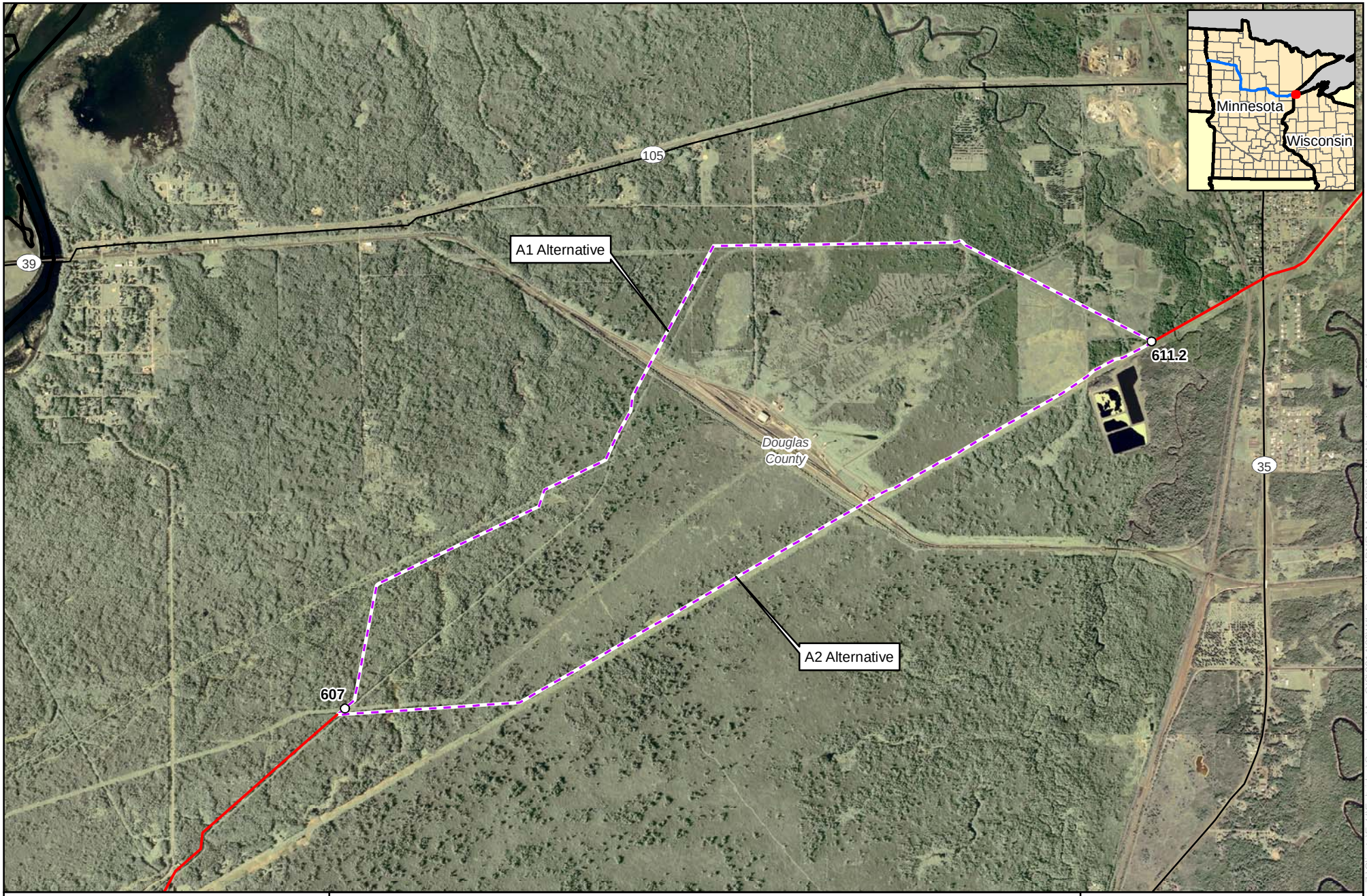
Environmental Features	Unit	Route Alternative A1	Route Alternative A2

[a] Greenfield locations include, for purposes of the alternatives analysis, as areas where the route is not within 200 feet of an existing right-of-way.
[b] Based on field delineated data from Fall 2013 surveys. Where 2013 survey was not completed, Enbridge utilized recent (2008 / 2009) wetland and waterbody field data from a previous project and WWI data.
[c] Crossing length of proposed pipeline centerline across wetlands.
[d] Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.
[e] Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.
[f] Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.
[g] Identified by the WDNR and Great Lakes Indian Fish and Wildlife Commission.

In an attempt to avoid construction-related impacts to the wetlands and rare plants found within the Pokegama-Carnegie State Natural Area, Enbridge installed Lines 67 and 13 (commonly referred to as the Alberta Clipper and Southern Lights Diluent Pipeline Projects) in 2009 and 2010 via horizontal directionally drilling. However, numerous inadvertent returns of drilling fluid occurred throughout the installations of both pipelines outside of the existing, permanently maintained right-of-way. Enbridge needed to extend the timber mat road beyond originally anticipated to allow vacuum trucks to access inadvertent return sites and recover the drilling fluid. Furthermore, because the Sandpiper and Line 3 Replacement pipelines are equal or greater diameter to Lines 67 and 13 (36- and 20-inches, respectively) and similar subsurface soil conditions regardless of selected route, Enbridge anticipates inadvertent returns of drilling fluid. Therefore, due to the high potential for inadvertent returns, Enbridge does not propose to utilize horizontal directionally drilling to avoid temporary construction impacts to wetlands and rare plants.

2.2.2 Route Alternatives B1 and B2

Enbridge prepared an evaluation of Route Alternatives B1 and B2 between MPs 612.2 and 612.5 (refer to Figure 2.2-3) due to outstanding legal issues with a landowner. The legal issues include the rights and interests involved in particular real property and have ascended to the Wisconsin State Supreme Court and are now on remand to the Circuit Court of Douglas County. Enbridge developed these route alternatives because the final resolution of the legal issues is indeterminable at this time. Therefore, Enbridge prefers Route Alternative B1 even though it deviates from the existing corridor and results in additional greenfield land crossed. Table 2.2-2 provides a comparison of the prominent land use features of these alternatives.



Milepost

Proposed Project Route

A1/A2 Route Alternative

0 0.25 0.5 Miles

N

Figure 2.2-2
Sandpiper Pipeline and Line 3 Replacement Projects
Route Alternatives A1 and A2

ENBRIDGE

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\02\WI_Permitting\DNR_Maps\SPP_WI_Alternatives_A1_A2.mxd

Date: (2/19/2014)

Milepost

Proposed Project Route

B1/B2 Route Alternative

0 0.05 0.1 Miles

N

Figure 2.2-3
Sandpiper Pipeline and Line 3 Replacement Projects
Route Alternatives B1 and B2

ENBRIDGE

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\02\WI_Permitting\DNR_Maps\SPP_WI_Alternatives_B1_B2.mxd

Date: (2/19/2014)

TABLE 2.2-2

Environmental Features Comparison –Route Alternatives B1 and B2

Environmental Features	Unit	Route Alternative B1	Route Alternative B2
Length	miles	0.3	0.2
Adjacent to Existing Right-of-Way	miles	0.0	0.2
Greenfield Route [a]	miles	0.2	0.0
Wetland Crossing Length [b, c]	miles	0.3	0.2
Wetland Impact - Construction [b, d]			
PEM	acres	1.0	0.8
PSS	acres	2.7	1.8
PFO	acres	0.7	0.0
Wetland Impact - Operation [b, e]			
PEM	acres	0.0	0.0
PSS	acres	0.0	0.9
PFO	acres	0.5	0.0
Rare Plant Occurrences [b]	number	0	0
Hydric Soils	acres	4.4	2.6
Highly Wind Erodible Soils	acres	0.0	0.0
Agricultural Land	acres	0.0	0.0
Herbaceous Land	acres	0.0	0.0
Forest	acres	2.9	2.6
Prime Farmland Soils	acres	0.0	0.0
Intermittent Waterbodies Crossed [b]	number	0	0
Ephemeral Waterbodies Crossed [b]	number	0	0
Perennial Waterbodies Crossed [b]	number	0	0
Lake Superior National Estuarine Research Reserve Properties	number	0	0
Priority Wetlands [e]	miles	0.0	0.0
Priority Navigable Waterway	number	0	0
Areas of Special Natural Resource Interest	miles	0.0	0.0
Wild Rice Production Area Drainages [f]	miles	0.0	0.0
DNR Managed Lands	miles	0.0	0.0
State, County or Municipal Forest Land	miles	0.0	0.0
Railroads Crossed	number	0	0
Roads Crossed	number	0	0
Residences within 300 feet	number	0	0

[a] Greenfield locations include, for purposes of the alternatives analysis, as areas where the route is not within 200 feet of an existing right-of-way.

[b] Based on field delineated data from Fall 2013 surveys. Where 2013 survey was not completed, Enbridge utilized recent (2008 / 2009) wetland and waterbody field data from a previous project and WWI data.

[c] Crossing length of proposed pipeline centerline across wetlands.

[d] Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.

[e] Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.

[f] Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.

[g] Identified by the WDNR and Great Lakes Indian Fish and Wildlife Commission.

2.2.3 Route Alternatives C1 and C2

Enbridge prepared an evaluation of Route Alternatives C1 and C2 located at approximately MPs 613.1 to 614.0 (refer to Figure 2.2-4) due to the Nemadji Golf Course. Since Route Alternative C2 crosses the Nemadji Golf Course, normal business operations will be impacted during construction and restoration. There is also congestion along Route Alternative C2 where it crosses into the golf course, due to the railroad tracks, existing pipelines, and snowmobile trail. Enbridge prefers Alternative C1 to avoid disrupting golf course operations. Table 2.2-3 provides a comparison of the prominent land use features of these alternatives.

TABLE 2.2-3

Environmental Features Comparison –Route Alternatives C1 and C2

Environmental Features	Unit	Route Alternative C1	Route Alternative C2
Length	miles	0.9	0.9
Adjacent to Existing Right-of-Way	miles	0.0	0.4
Greenfield Route [a]	miles	0.4	0.0
Wetland Crossing Length [b, c]	miles	0.8	0.3
Wetland Impact - Construction [b, d]			
PEM	acres	3.5	2.9
PSS	acres	8.0	2.4
PFO	acres	0.6	0.0
Wetland Impact - Operation [b, e]			
PEM	acres	0.0	0.0
PSS	acres	6.0	0.0
PFO	acres	0.6	0.0
Rare Plant Occurrences [b]	number	56	20
Hydric Soils	acres	13.2	11.9
Highly Wind Erodible Soils	acres	0.0	0.0
Agricultural Land	acres	0.0	0.0
Herbaceous Land	acres	1.2	0.5
Upland Forest	acres	7.5	0.4
Prime Farmland Soils	acres	0.0	0.0
Intermittent Waterbodies Crossed [b]	number	7	4
Ephemeral Waterbodies Crossed [b]	number	0	0
Perennial Waterbodies Crossed [b]	number	0	0
Lake Superior National Estuarine Research Reserve Properties	number	0	0
Priority Wetlands [e]	miles	0.0	0.0
Priority Navigable Waterway	number	0	0
Areas of Special Natural Resource Interest	miles	0.0	0.0
Wild Rice Production Area Drainages [f]	miles		
DNR Managed Lands	miles	0.0	0.0
State, County or Municipal Forest Land	miles	0.0	0.0
Railroads Crossed	number	1	1
Roads Crossed	number	0	0
Residences within 300 feet	number	0	0

TABLE 2.2-3

Environmental Features Comparison –Route Alternatives C1 and C2

Environmental Features	Unit	Route Alternative C1	Route Alternative C2

[a] Greenfield locations include, for purposes of the alternatives analysis, as areas where the route is not within 200 feet of an existing right-of-way.
[b] Based on field delineated data from Fall 2013 surveys. Where 2013 survey was not completed, Enbridge utilized recent (2008 / 2009) wetland and waterbody field data from a previous project and WWI data.
[c] Crossing length of proposed pipeline centerline across wetlands.
[d] Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.
[e] Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.
[f] Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.
[g] Identified by the WDNR and Great Lakes Indian Fish and Wildlife Commission.

2.2.4 Route Option Summary

Enbridge defined eight total route variation options, illustrated on Figure 2.2-5, based on the alternatives discussed above. Table 2.2-4 provides a summary of the all the potential route options. Section 3.0 contains additional information on each route option related to specific resources.

TABLE 2.2-4

Comparison of Features Along the Project Route Options

Features	Unit	Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H
Length	Miles	14.2	13.4	14.2	14.25	14.19	13.48	13.49	13.43
Adjacent to Existing Rights-of-Way	Miles	12.9	13.2	13.1	13.3	13.51	12.60	13.01	13.21
Wetlands [a, b]	Acres	38.1	24.0	38.5	31.5	31.9	30.0	23.4	30.5
Rare Plants Occurrences [c]	Number	240	310	240	204	204	346	310	346
Prime Farmland Soils [c]	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waterbodies [a]	Number								
Priority Wetlands	Miles	0.0	1.4	0.0	0.0	0.0	1.4	1.4	1.4
Priority Navigable Waterway	Number	0	0	0	0	0	0	0	0
ASNRI-Designated Lands	Miles	0.0	1.4	0.0	0.0	0.0	1.4	1.4	1.4
ASNRI-Designated Waters Crossed	Number	7	5	7	7	7	5	5	5
Wild Rice Production Area Drainages	Number	0	0	0	0	0	0	0	0
DNR Managed Lands	Miles	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
State, County or Municipal Forest Land	Miles	1.8	2.9	1.8	1.8	1.8	2.9	2.9	2.9
State Natural Areas	Miles	0.0	1.4	0.0	0.0	0.0	1.4	1.4	1.4
Railroads Crossed	Number	4	4	4	4	4	4	4	4
Roads Crossed	Number	13	12	13	13	13	12	12	12

[a] Based on field delineated data from Fall 2013 surveys. Where 2013 survey was not completed, Enbridge utilized recent (2008 / 2009) wetland and waterbody field data from a previous project and WWI data.
[b] Acreages within new permanently maintained easement
[c] Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.

Milepost

Proposed Project Route

C1/C2 Route Alternative

0 0.05 0.1 Miles

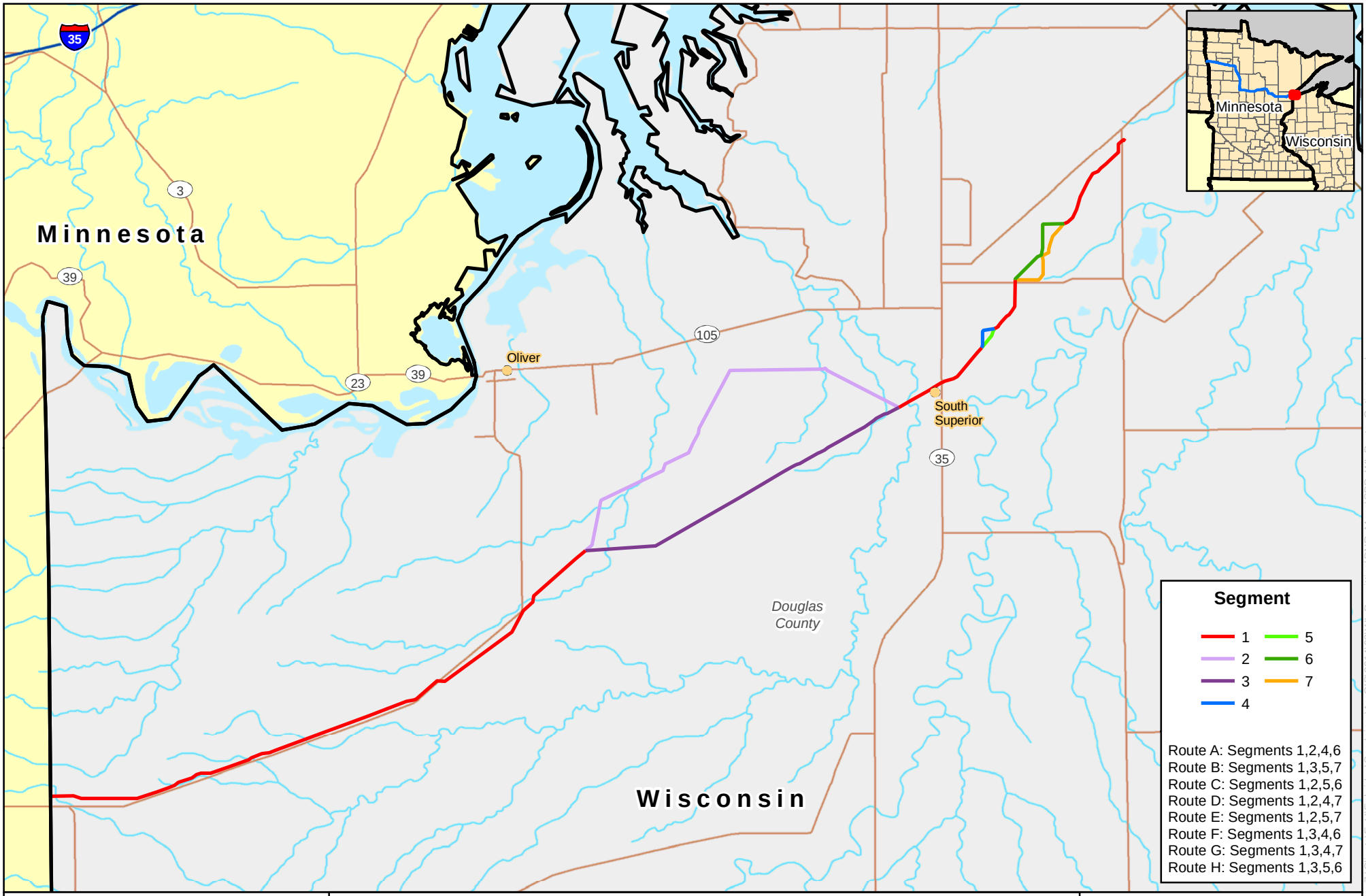
N

Figure 2.2-4
Sandpiper Pipeline and Line 3 Replacement Projects
Route Alternatives C1 and C2

ENBRIDGE

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\02\WI_Permitting\DNR_Maps\SPP_WI_Alternatives_C1_C2.mxd

Date: (2/19/2014)



0 0.5 1 Miles

1 inch = 1.3 miles

N W E S

Figure 2.2-5

Sandpiper Pipeline and Line 3 Replacement Projects

Route Options A, B, C, D, E, F, G, and H

ENBRIDGE

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\02\WI_Permitting\DNR_Maps\SPP_WI_Route_Options.mxd

Date: (2/19/2014)

3.0 ENVIRONMENTAL ANALYSIS

3.1 LANDOWNERS

3.1.1 Public Outreach

Enbridge initiated outreach with landowners and local, county, state, and federal elected officials within the Project area. All landowners of record have received a mailing introducing the Project in their area. Included in the distribution were mayors, city managers, city council members, county commissioners, treasurers, assessors, engineers, economic development directors, governors, attorney's general, state agency commissioners, state legislators and legislative leadership, and members of the U.S. Congressional delegation.

Enbridge conducted an open house at the Superior Village Hall on Monday, August 19, 2013. Approximately 90 people attended, including representatives from village, township, city, county, and state levels of government. Enbridge promoted the open house in ads in local newspapers and on the Sandpiper Project website (www.enbridge.com/SandpiperProject). In addition, Enbridge sent invitations to elected officials of all jurisdictions the proposed route crosses and landowners and adjacent landowners. The open house was one of eight held across the pipeline route stretching from North Dakota to Wisconsin. Enbridge will continue public outreach efforts throughout the process.

3.1.2 Land Ownership

The Project route predominantly crosses private lands located outside of municipal areas. The Project will not cross federal or Native American Reservation land. The Project crosses land owned by the City and Village of Superior, and Douglas County Forest. Enbridge will work with the municipalities to address any concerns and will obtain permits as required prior to construction.

The Project will cross approximately 0.2-mile of Douglas County Forest, as well as either an additional 1.6 or 2.6 miles depending on which Route Alternative (A1 or A2) is selected (refer to Section 2.2). The woodlands crossed are used primarily as residential property, recreation, and/or domestic wood products. Also, 0.3-mile of state WDNR-managed land will be crossed.

Construction activities through county forest land could temporarily disrupt recreational uses on and adjacent to the right-of-way. Enbridge will work with local and state agencies to minimize potential impacts associated with construction across county forest land.

Enbridge consulted with the Natural Resources Conservation Service (NRCS) in April 2013 and confirmed there are no conservation easement lands crossed the proposed route, such as Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Grassland Reserve Program (GRP), or Wetland Reserve Program (WRP).

As discussed above, Enbridge is committed to working with and providing information to landowners about the Project and keeping them informed throughout all phases of the Project. Enbridge notified affected landowners of the Project by mail. In addition, Enbridge's Land Agents are contacting affected landowners to discuss the Project and document specific concerns they may have. Enbridge will maintain close contact with the landowners along the route before, during, and after construction.

3.1.3 Right-of-Way Acquisition

Enbridge generally has existing blanket easement agreements that allow for expansion of the corridor for multiple lines. Landowners will receive monetary compensation in return for temporary loss of use during construction, crop damages, and the restoration of unavoidable damage to property during construction.

3.2 SOILS

The Project will cross the Superior Lake Plain Major Land Resource Area (MLRA). The Superior Lake Plain MLRA consists of till plains mixed with lake plains, lake terraces, beaches, flood plains, swamps, and marshes. This MLRA is also characterized by some rocky knobs, hills, and low mountains. The dominant soil types in this area are Alfisols, Spodosols, Inceptisols, and Entisols. Soils in the Project area are largely made up of clayey lacustrine soils and have a frigid soil temperature regime, a udic or aquic soil moisture regime, and mixed orisotic mineralogy (USDA NRCS, 2006).

3.2.1 Identification of Soil Conditions

3.2.1.1 Background and Methodology

Enbridge identified and assessed detailed soil characteristics along the route and alternatives using the Soil Survey Geographic Database (SSURGO) (USDA NRCS, 2013a) for Douglas County, Wisconsin. The SSURGO database is a digital version of the original county soil surveys developed by NRCS for use with GIS. It provides the most detailed level of soils information for natural resource planning and management. The NRCS gathered the majority of the details at a scale of 1:12,000. Soil maps are linked in the SSURGO database to information about the component soils and their properties (USDA NRCS, 2013b).

SSURGO attribute data consists of physical properties, chemical properties, and interpretive groupings. Attribute data applies to the whole soil (e.g., listed hydric, prime farmland soils, or slope class), as well as to layer data for soil horizons (e.g., texture or permeability). The soil attribute data can be used in conjunction with spatial data to describe the soils in a particular area.

3.2.1.2 Soil Characteristics and Assessments

Enbridge digitized and overlaid the route and additional temporary workspaces onto SSURGO database data to identify soil mapping units in the Project area. Based on that analysis, Enbridge identified soil characteristics that could affect or be affected by pipeline construction. These characteristics include highly erodible soils, prime farmland and hydric soils, compaction-prone soils, presence of stones and shallow bedrock, droughty soils, depth of topsoil, and percent slope.

Tables 3.2.1-1, 3.2.1-2 and 3.2.1-3 provide summaries of significant soil characteristics identified along the route and alternatives according to the SSURGO database. The following sections discuss the individual soil characteristics separately.

TABLE 3.2.1-1

Soil Characteristics Comparison of Project Route Options

Soil Characteristic	Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H
Total Route Option Acreage [a]	**210.5**	**197.8**	**208.7**	**209.2**	**207.4**	**200.8**	**199.6**	**197.8**
Prime Farmland [b]	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Farmland of Statewide Importance [c]	139.3 (66%)	118.0 (60%)	136.8 (66%)	141.7 (68%)	139.1 (67%)	118.3 (59%)	120.6 (60%)	118.0 (60%)
Compaction Prone	37.6 (18%)	52.8 (27%)	38.4 (18%)	34.1 (16%)	34.9 (17%)	55.6 (28%)	52.0 (26%)	52.8 (27%)
Highly Wind Erodible	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Highly Water Erodible	32.7 (16%)	24.8 (13%)	32.7 (16%)	32.7 (16%)	32.7 (16%)	24.8 (12%)	24.8 (12%)	24.8 (13%)
Droughty	71.1 (34%)	78.4 (40%)	71.9 (34%)	67.6 (32%)	68.3 (33%)	81.2 (40%)	77.6 (39%)	78.4 (40%)
Stony/Rocky	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Shallow Bedrock	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)

[a] Acreage is based generally on a typical 110-foot-wide construction right-of-way and does not include access roads, additional temporary workspace, or open water, and does not account for reductions in the width of the right-of-way that Enbridge will implement in wetlands.

[b] Includes land listed by the NRCS as potential prime farmland if a limiting factor is mitigated (e.g., artificial drainage).

[c] Farmland of Statewide Importance is land other than prime farmland that is of statewide or local importance for the production of food, feed, fiber, forage or oilseed crops.

TABLE 3.2.1-2

Soil Characteristics Crossed [a]

	MP 600.8 – 607.0	**MP 607.0 – 611.2**		**MP 611.2 – 612.2**	**MP 612.2 – 612.5**		**MP 612.5 – 613.1**	**MP 613.1 – 614.0**		**MP 614.0 – 615.1**
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
Prime Farmland [b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Farmland of Statewide Importance [c]	68.2	38.0	16.9	10.5	3.5	0.9	6.1	6.3	8.6	6.7
Compaction Prone	6.2	13.4	31.3	1.4	0.9	1.7	1.7	6.9	3.3	7.1
Highly Wind Erodible	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Highly Water Erodible	17.1	10.9	3.0	3.8	0.0	0.0	0.0	0.0	0.0	0.9
Droughty	23.3	24.3	34.4	6.0	0.9	1.7	1.7	6.9	3.3	8.1

TABLE 3.2.1-2

Soil Characteristics Crossed [a]

	MP 600.8 – 607.0	MP 607.0 – 611.2		MP 611.2 – 612.2	MP 612.2 – 612.5		MP 612.5 – 613.1	MP 613.1 – 614.0		MP 614.0 – 615.1
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
Stony/Rocky	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shallow Bedrock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL SEGMENT ACREAGE	**91.5**	**62.3**	**52.7**	**16.5**	**4.4**	**2.6**	**7.8**	**13.2**	**12.0**	**14.8**

[a] Acreage is based generally on a typical 110-foot-wide construction right-of-way and does not include access roads, additional temporary workspace, or open water, and does not account for reductions in the width of the right-of-way that Enbridge will implement in wetlands.

[b] Includes land listed by the NRCS as potential prime farmland if a limiting factor is mitigated (e.g., artificial drainage).

[c] Farmland of Statewide Importance is land other than prime farmland that is of statewide or local importance for the production of food, feed, fiber, forage or oilseed crops.

TABLE 3.2.1-3

Topsoil Depths and Slope Class in the Project Area [a]

Route Option	Total Acres in Route Option [b]	Topsoil Depth (inches) in Acres (percent)				Slope Class (percent) in Acres (percent)				
		0-6	>6-12	>12-18	>18	0-5	>5-8	>8-15	>15-30	>30
Route A	210.5	210.5	0.0	0.0	0.0	177.8	0.0	5.3	24.9	2.5
Route B	197.8	197.8	0.0	0.0	0.0	173.0	0.0	6.1	18.6	0.1
Route C	208.7	208.7	0.0	0.0	0.0	176.0	0.0	5.3	24.9	2.5
Route D	209.2	209.2	0.0	0.0	0.0	176.6	0.0	5.3	24.9	2.5
Route E	207.4	207.4	0.0	0.0	0.0	174.8	0.0	5.3	24.9	2.5
Route F	200.8	200.8	0.0	0.0	0.0	176.0	0.0	6.1	18.6	0.1
Route G	199.6	199.6	0.0	0.0	0.0	174.8	0.0	6.1	18.6	0.1
Route H	197.8	197.8	0.0	0.0	0.0	173.0	0.0	6.1	18.6	0.1

[a] Acreage is based generally on a typical 110-foot-wide construction right-of-way and does not include access roads, additional temporary workspace, or open water, and does not account for reductions in the width of the right-of-way that Enbridge will implement in wetlands.

3.2.2 General Construction and Operation Impacts and Mitigation

Pipeline construction activities such as clearing, grading, trench excavation, and backfilling, as well as the movement of construction equipment along the right-of-way, may result in impacts on soil resources. Clearing removes protective cover and exposes soil to the effects of wind and precipitation, which may increase the potential for soil erosion and movement of sediments into sensitive environmental areas. Grading and equipment traffic may compact soil, reducing porosity and percolation rates, which could result in increased runoff potential. Trench excavation and backfilling could lead to a mixing of topsoil and subsoil and may introduce rocks to the soil surface from deeper soil horizons. Contamination from release of fuels, lubricants, and coolants from construction equipment could also impact soils. Enbridge

will minimize or avoid these impacts on soils by implementing the measures described in the EPP and APP (refer to Appendices B and C, respectively).

3.2.2.1 Prime Farmland and Topsoil Segregation

Prime Farmland

The USDA defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, few or no rocks, and is permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time and it either does not flood frequently during the growing season or is protected from flooding (USDA NRCS, 2013d). Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by controlling soil moisture conditions through artificial drainage). The Project will not impact prime farmland soils.

Farmland of statewide importance is land other than prime or unique farmland that is of statewide or local importance for the production of food, feed, fiber, forage, or oilseed crops. The appropriate State of local government determines statewide important farmland with concurrence from the State Conservationist. Generally, these farmlands produce high yields of crops when treated and managed according to acceptable farming methods. In some states or localities, farmlands of statewide importance may include tracts of land that have been designated for agriculture by state law or local ordinance. Refer to Tables 3.2.1-1 and 3.2.1-2 for acreages of temporary impacts to farmland of statewide importance.

Impacts on farmland of statewide importance from construction of the Project could include interference with agricultural drainage (if present), mixing of topsoil and subsoil, and compaction and rutting of soil. These impacts could result from right-of-way clearing, trench excavation and backfilling, and vehicular traffic within the construction right-of-way. However, with the measures specified in the APP (refer to Appendix C), these impacts will be temporary and will not result in a permanent decrease in soil productivity.

Enbridge will implement the measures described in its APP to minimize impacts on farmland of statewide importance and promote the long-term productivity of the soil. These measures will include topsoil segregation, compaction alleviation, removal of excess rock, and restoration of agricultural drainage systems and existing erosion control structures.

Topsoil Segregation

Topsoil thickness is the result of factors such as wetness, topography, climate, and the predominant vegetation present when the soil was being formed. Other factors being equal, prairie soils have more topsoil than forest soils; and wet soils have more topsoil than dry soils. According to data presented in Table 3.2.1-3, topsoil depths are less than 6 inches in all areas of the Project.

To minimize topsoil disturbance and topsoil/subsoil mixing associated with pipeline construction, Enbridge will remove and segregate topsoil in cropland, hay fields, pasture, residential areas, and other areas as requested by the landowner (refer to the EPP typical drawings presented as Figures 1, 2, and 3 in

Appendix B). Enbridge will strip topsoil to a maximum depth of 12 to 18 inches unless otherwise requested by the landowner. If less-than-specified maximum depths of topsoil are present, every effort will be made to segregate to the depth that is present. Enbridge will stockpile the segregated topsoil and subsoil separately and replaced in the proper order during backfilling and final grading of the construction right-of-way.

3.2.2.2 Soil Compaction and Rutting

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, and cause rutting. The degree of compaction depends on moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist or saturated during construction are the most susceptible to compaction and rutting. Refer to Tables 3.2.1-1 and 3.2.1-2 for acreages of temporary impacts to compaction prone soils.

Enbridge will minimize compaction and rutting impacts by implementing the measures described in its EPP and APP (refer to Appendices B and C, respectively). These measures may include temporarily suspending certain construction activities on susceptible soils during wet conditions, constructing from timber mats, or using low-ground-weight equipment in wetlands. Enbridge utilize deep tillage operations during restoration activities on agricultural land to alleviate compaction impacts.

3.2.2.3 Erosion by Wind and Water

Erosion is a continuing natural process that can be accelerated by human activity. Factors that influence the degree of erosion include soil texture, soil structure, length and percent of slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to erosion by water are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Refer to Tables 3.2.1-1 and 3.2.1-2 for acreages of temporary impacts to soils highly susceptible to water erosion.

Wind erosion processes are less affected by slope length or steepness. Clearing, grading, and equipment movement could accelerate the erosion process and, without adequate protection, result in discharge of sediment to adjacent waterbodies and wetlands. The Project will not impact highly wind erodible soils.

Enbridge will implement the erosion control measures described in the EPP (refer to Appendix B) to minimize erosion both during and after construction activities. These measures may include construction of silt fences, installation of slope breakers, temporary sediment barriers, and permanent trench breakers, as well as revegetation and mulching of the construction right-of-way. Enbridge will inspect and maintain erosion and sedimentation controls as necessary until final stabilization. Enbridge also will implement dust mitigation measures, including the use of water trucks, as needed, to reduce impacts from wind erosion.

3.2.2.4 Droughty Soils

Enbridge identified droughty, or dry, soils on the basis of surface texture and drainage class. Well drained to excessively drained soils with a coarse surface texture (i.e., fine sand or coarser) may be difficult to revegetate. Drier soils contain less water to aid in the germination and eventual establishment of new vegetation. Coarser textured soils also have a lower water holding capacity, which could result in moisture deficiencies in the root zone, creating unfavorable conditions for many plants. Refer to Tables 3.2.1-1 and 3.2.1-2 for acreages of temporary impacts to droughty soils.

Enbridge will minimize the impacts of pipeline construction on droughty, non-cultivated soils by timely reseeding using species tolerant of dry conditions and by applying mulch to conserve soil moisture. Enbridge initiated consultation with appropriate soil conservation authorities and will continue to work with these authorities to develop seed mixes and seeding dates adapted to the Project area, including droughty soil areas.

3.2.2.5 Stony/Rocky Soils and Shallow Bedrock Soils

Trenching or grading can bring stones or rocks to the soil surface where they can damage farm equipment and interfere with planting. Similarly, backfilling shallow bedrock could redistribute rock to an overlying soil horizon, which may reduce soil moisture-holding capacity. The Project will not impact stony or rocky soils.

Shallow bedrock (i.e., bedrock within five feet of the surface) is not present based on the analysis of the SSURGO soil data. If bedrock is encountered within the trench, Enbridge will only backfill with this rock to the depth of the original bedrock layer. During clean up, Enbridge will use rock pickers or other rock removal equipment to remove rocks of a greater size and density on the right-of-way than undisturbed areas adjacent to the right-of-way.

3.3 GEOLOGY AND GROUNDWATER

3.3.1 Geology and Physiography

The U.S. Geological Survey (USGS) has defined geologic provinces within the United States. In Wisconsin, the Project crosses the Laurentian Upland Province—Superior Upland geologic province (USGS, 2004). The Superior Upland is a southern extension of the Laurentian Upland Province. The basement rocks of this province are associated with the 2.5-billion-year-old Kenoran Orogeny, a mountain-building event, and are part of the Canadian Shield. Regionally, the geologic terrain of this province is characterized by ancient pre-Cambrian igneous and metamorphic rocks that have been uplifted and eroded to a relatively low-relief plain, forming the stable geologic core of the North American continent, known as the craton. The North American craton has been tectonically stable for over 500 million years. The Project will be confined to an area known as the Superior lowland, an area characterized by flat to undulating topography underlain by thick red glacial clay (Clayton, 1984).

Bedrock below the Project is comprised of the pre-Cambrian Keweenawan feldspathic quartzose sandstone overlying Keweenawan basalt flows (Mudrey et al., 1982). The surficial geology beneath the route along the route is characterized by unconsolidated deposits from Pleistocene continental glaciation processes. Unconsolidated deposits of the Superior lowland are typified by clayey glacial and offshore sediments that were deposited largely within a pro-glacial lake formed during one or more episodes of glacial retreat (Clayton, 1984). Glacial Lake Duluth formed when the Wisconsin-aged Superior Lobe receded into the Lake Superior Basin, and was elevated up to 500 vertical feet above the existing level of Lake Superior. Glacial Lake Duluth persisted for approximately 2,000 years, resulting in the unusual red clay plain landform that consists of an anomalous thick accumulation of very fine textured red clay derived by glacial erosion of iron-rich rocks to the north.

In the area of the Project route, the dominant landform is an elevated, poorly developed lacustrine plain that is incised by narrow v-shaped valleys towards its margins, and relatively poorly drained interior as evidenced by the substantial occurrence of wetlands. Elevation along the Project ranges from 618 to 900 feet above mean sea level. The Wisconsin Geological and Natural History Survey (WGNHS) indicates the unconsolidated deposits beneath the project are typically at least 200 feet thick (WGNHS, 1983). This

is corroborated by inspecting water well logs maintained by the Wisconsin Department of Agriculture, Trade, and Consumer Projection (DATCP) for wells located within 0.5 mile of the Project (DATCP, 2014). Based on these well logs, depth to bedrock in the vicinity of the Project ranged from 100 to 325 feet below the ground surface, but was typically greater than 200 feet.

Wetlands in the area of the Project route are numerous, with drainage to the north and south towards the flanks of the elevated lake plain. Unprotected components of the landscape are particularly susceptible to sheet and rill erosion in the poorly drained uplands, and gully erosion in more steeply sloping areas near the major rivers towards the margins of the elevated lake plain.

As stated previously, the area he Project crosses has been tectonically stable for over 500 million years. This is corroborated by the National Atlas of the United States (2013a), which indicates that the probability of an earthquake or seismic activity of significant intensity to be low in the Project area.

3.3.1.1 Mineral Resources

Given the thick deposits of unconsolidated materials throughout the Project area, any mineral resources regionally associated with the bedrock formations are not readily accessible. Moreover, there are no active mines present in the bedrock formations that are near the surface in the region, indicating low potential for development of mineral resources. The database on mineral resources maintained by the National Atlas of the United States (2013b), which indicates the absence of mines within one mile of the Project, supports this conclusion. The fine-grained nature of the thick glacial lacustrine deposits along the route provide no potential as a source of aggregate material such as sand and gravel. An examination of 1:24,000 topographic map coverage and aerial photographs confirmed the absence of aggregate pits near the route.

3.3.1.2 Paleontology

Based on the thickness of the unconsolidated glacial material in the Project area, significant paleontological resources are not likely to be encountered during construction. Despite the fact that glacial deposits are of Pleistocene age, megafauna fossils tend to be scarce where glacial ice was present (Mather, 2009; Sloan, 2005). However, Enbridge developed an Unanticipated Discoveries Plan (included as Appendix D) that will be implemented in the event of an unanticipated paleontological find.

3.3.2 Groundwater

Groundwater is an important source of water for private, public, commercial, and industrial uses in rural northern Wisconsin. As discussed in Section 3.1, the Project route traverses glaciated terrain dominated by thick glacial lacustrine deposits with high content of red clay deposits. Therefore, productive glacial drift aquifers are generally not expected to occur in the vicinity of the Project with the exception of sand and gravel stringers that are occasionally encountered within the clayey sediments. The underlying Keweenawan sandstone is a productive aquifer, although it is typically 200 to 300 feet below the ground surface in the vicinity of the Project.

3.3.2.1 Existing Groundwater Resources

Public Water Supply Wells

The WDNR maintains a database that contains basic information for public wells within the state of Wisconsin (WDNR, 2014a). Enbridge utilized this database to identify public water supply wells located

within 0.5 mile of the pipeline route. Out of a total of 191 wells for Douglas County, only 102 had sufficient information to locate them. Of these remaining 102 wells, Enbridge identified three public water supply wells in the vicinity of the Project; one at a minimum approximate distance of 289 feet from the Project and the other two at a distance of over 2,100 feet.

Private Water Supply Wells

The WDNR maintains two databases that contain information on private water wells. DATCP (2014) contains records of wells constructed from 1936 to 1989, and WDNR (2014b) contains records for wells constructed for private home owners since 1987. Enbridge identified 25 well locations with 31 well logs (two logs for six of the locations) in DATCP (2014) that were located within 0.5 mile of the centerline of all corridor options. All except two well locations are located at a distance of at least 270 feet from all segment options of the Project. Logs for two wells (172 and 218 feet deep) were found for the well location closest to the Project at a distance of 7 feet. Since both of these wells were installed in the early to mid-1960s for two different owners, the location of one, if not both, of the wells is not accurate. This emphasizes the need for thorough field inspection prior to construction to avoid impacts to water wells. The other well was completed at a depth of 300 feet and is located a minimum distance of 59 feet from the Project.

Additionally, using data from WDNR (2014b), Enbridge identified 348 private wells constructed since 1987 in Douglas County, and was able to generate locations for 238 of them. Of these, 16 were determined to lie within 0.5-mile of the Project, the closest being 154 feet.

Federal and State Designated Aquifers

The pipeline route will not cross any USEPA-designated sole-source aquifers, since none occur in the State of Wisconsin (USEPA, 2014).

3.3.2.2 Contaminated Groundwater

Enbridge accessed the WDNR CLEAN—Remediation & Redevelopment Sites (RR) database (WDNR, 2014c) to identify contaminated sites within 0.5 miles of the project. This database includes completed and ongoing investigations and cleanups of contaminated soil and/or groundwater; public registry of sites with residual soil or groundwater contamination, or where continuing obligations have been put in place; cleanup of sites under the federal Superfund statute; liability exemptions and clarifications at contaminated properties (i.e., brownfields); and WDNR funding assistance. Closed sites with completed cleanup were removed from consideration. A total of 13 open sites were identified, and the minimum distance to the Project was 736 feet. Since all the sites are more than 500 feet from the Project, they are not anticipated to impact or be impacted by the Project. Since inaccuracies are inherent to the database, it will be necessary to field-evaluate facilities on a site-by-site basis. Prior to Project construction, Enbridge will assess the potential for encountering contaminated groundwater if any sites are actually located within 500 feet of the pipeline route. Enbridge will consult with the appropriate regulatory agencies to confirm the Project will not encounter contamination from the site. If necessary, appropriate avoidance or mitigation measures will be developed and implemented in accordance with applicable state and federal regulations.

3.3.3 General Construction and Operation Impacts and Mitigation

Construction of the Project is not expected to have long-term impacts on groundwater resources. Ground disturbance associated with pipeline construction is primarily limited to the upper 10 feet, which is above

the water table of most regional aquifers. Construction activities such as trenching, backfilling, and dewatering that encounter shallow surficial aquifers may result in minor short-term fluctuations in groundwater levels within the aquifer. Once the construction activity is complete, the groundwater levels typically recover quickly.

3.3.4 Blasting

Blasting to install the pipeline in a bedrock aquifer has the potential to adversely affect water quality and water yields in nearby water wells. Enbridge does not anticipate the need for blasting due to the lack of bedrock.

3.3.5 Spills and Leaks

The introduction of contaminants into groundwater due to accidental spills of construction related chemicals, fuels, or hydraulic fluid during construction could have an adverse effect on groundwater quality, most notably near shallow water wells. Spill-related impacts from pipeline construction are primarily associated with fuel storage, equipment refueling, and equipment maintenance. Enbridge's EPP (refer to Appendix B) includes measures to prevent accidental releases of fuels and other hazardous substances associated with construction activities. The EPP also describes response, containment, and cleanup procedures. By implementing the protective measures set forth in the EPP, long-term contamination due to construction activities is not anticipated.

Accidental leaks from the pipeline system during operations can also potentially affect groundwater. As part of the pipeline operation, which is regulated by PHMSA, Enbridge will implement an ongoing inspection program to monitor the integrity of the pipeline system. Monitoring activities include regular inspection of the cathodic protection system, which addresses the possible corrosion potential for a steel pipe installed below the ground surface. In addition, Enbridge will use computerized inspection tools that travel through the inside of the pipeline to check pipe integrity. Enbridge also performs regular aerial flyovers to inspect the pipeline right-of-way. As required by federal law, Enbridge will maintain an Emergency Response Plan to address pre-planning, equipment staging, notifications, and leak containment procedures to be implemented in the event of a pipeline leak.

3.4 SURFACE WATERS AND WETLANDS

3.4.1 Major Basins and Watersheds

The proposed pipeline route crosses the Lake Superior Major Basin located in Douglas County, Wisconsin. Within the Lake Superior Major Basin, wetland and waterbody crossings are further located within the Superior Coastal Plain Ecological Landscape of the St. Louis and Lower Nemadji River Watershed. Table 3.4.1-1 summarizes the Ecological Landscape, Watershed, and Major Basin crossings of the Projects.

TABLE 3.4.1-1

Watersheds and Ecosystem Boundaries Crossed

Major Basin	Watershed	WDNR ECS	County	Area in Watershed	Percent of Watershed
Lake Superior	St. Louis and Lower Nemadji River	Superior Coastal Plain	Douglas	278	0.2

Lake Superior is the largest freshwater body in the world, covering an area of 31,700 square miles, and is third largest by volume. Lake Superior is the coldest (average temperature is 40 degrees Fahrenheit) and deepest (maximum depth of 1,332 feet) of all the Great Lakes. The Lake Superior Watershed is a regional watershed that surrounds Lake Superior and covers approximately 9,126 square miles in Minnesota and Wisconsin. The portion of the Lake Superior Watershed located within Wisconsin occupies the northern state border and is referred to by the WDNR as the Lake Superior Major Basin.

Much of the land within the Lake Superior Major Basin is forested, with very little agriculture due to the cool climate and poor soils. 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.

The Lake Superior Major Basin is further partitioned into numerous local watersheds. The proposed Project crosses the local St. Louis and Lower Nemadji River Watershed located in the northwest corner of the Lake Superior Major Basin. The St. Louis and Lower Nemadji River Watershed is primarily comprised of the St. Louis River System. The St. Louis River System drains an area of 3,634 square miles in northern Minnesota and Wisconsin, forming a large fresh water estuary at its mouth. The lake actually drowns a portion of the lower river valley and its seiche effect influences river levels in the estuary. The 12,000-acre estuary includes forest, industrial and urban areas, and open lands within the twin ports of Superior, Wisconsin and Duluth, Minnesota (WDNR, 2010).

The St. Louis and Lower Nemadji River Watershed is almost entirely comprised of the Superior Coastal Plain Ecological System (ECS). The Superior Coastal Plain ECS climate is strongly influenced by Lake Superior. The major landform in this ECS is a nearly level plain of lacustrine clays that slope gently northward toward Lake Superior. Many streams in the clay plain have "flashy" flow regimes; water levels rise rapidly in response to precipitation because of the impermeable soils in the watershed. Sand layers within the soils of the clay plain can create unstable bluffs along stream banks and roadsides. The power from high and rapidly changing flows carves at stream banks and leads to slumping of sand and clay into the stream. Maintenance of forest cover and wetlands within the watershed help to ameliorate rapid runoff from the watershed and reduce stream flashiness that leads to stream bank erosion and subsequent aquatic habitat degradation.

Historically the Superior Coastal Plain ECS was almost entirely forested. A distinctive mixture of white pine, white spruce, balsam fir, paper birch, balsam poplar, trembling aspen, and white cedar occurred on the lacustrine clays. Mesic to dry-mesic forests of northern hardwoods or hemlock hardwoods were more prevalent on the glacial tills of the Bayfield Peninsula and throughout the Apostle Islands. Large peatlands occurred along the Lake Superior shoreline, often associated with drowned river mouths and well-developed sand spits. The most extensive of these wetland complexes were on the Bad and St. Louis Rivers. A few large peatlands also occurred at inland sites, such as Bibon Swamp, in the upper White River drainage, and Sultz Swamp on the northern Bayfield Peninsula. The present clay plain forest has been fragmented by agricultural use, and today approximately one-third of this landscape is non-forested. Most of the open land is in grass cover, having been cleared and then subsequently pastured or plowed. Aspen and birch forests occupy about 40 percent of the total land area, having increased in prominence over the boreal conifers (WDNR, 2010).

3.4.2 Surface Waters

3.4.2.1 Current Conditions

Enbridge completed an environmental field survey effort in the late summer and early fall of 2013 to identify and classify (perennial, intermittent, or seasonal) each waterbody as well as reviewed of

topographic maps, and other published data. Enbridge classified waterbodies with defined beds (unconsolidated substrate that differs from the surrounding soils) and evidence of continuous flow (aquatic vegetation present, little or no facultative vegetation present, aquatic life present, etc.) as perennial. Overall within the Project area, water drains to the Pokegama and St. Louis Rivers, which then discharge into Lake Superior.

Enbridge collected waterbody data on all accessible tracts along Project route and alternatives. Enbridge used NHD data in areas where access was not allowed; approximately 32 percent (inclusive of all route alternatives), which will be surveyed in the spring of 2014.

Table 3.4.2-1 identifies the number of waterbodies crossed along each route option.

TABLE 3.4.2-1

Waterbody Crossing Comparison Along the Route Options

Number of Waterbodies Crossed	Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H
Total Number Crossed	34	23	34	33	33	24	23	24
Perennial	9	7	9	9	9	7	7	7
Intermittent	11	10	11	10	10	11	10	6
Ephemeral	14	6	14	14	14	6	6	11
ASNRI-Designated	13	5	13	13	13	5	5	5

Enbridge classified the perennial waterbodies using the Cowardin Classification System as Riverine Lower Perennial Unconsolidated Bottom (R2UB). The R2UB-classified waterbodies are generally characterized by low gradient and slow water velocity. The substrate consists of different mediums, or combinations thereof, such as clay, silt, gravel, or sand. Generally the floodplain adjacent to these waterbodies is well developed (U.S. Fish and Wildlife Service [USFWS], 1979). These waterbodies are generally direct tributaries that lead to the primary watershed drainage outlets.

Enbridge classified intermittent waterbody crossings using the Cowardin Classification System as Riverine Intermittent Streambed (R4SB). The R4SB-classified waterbodies generally contain flowing water for only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent. The substrate is consists of different mediums, or combinations thereof, such as clay, silt, gravel, or sand (USFWS, 1979). These waterbodies are generally second or third order streams.

Enbridge classified ephemeral waterbody crossings using the Cowardin Classification System as Riverine Ephemeral (R6). The R6-classified waterbodies generally contain flowing water for only short durations following precipitation events. The stream beds are located above the water table year-round and groundwater is not a source of water for the stream. Rainfall is the primary source of hydrology. The substrate consists of different mediums, or combinations thereof, such as clay, silt, gravel, or sand (USFWS, 1979). These waterbodies are generally second or third order waterbodies.

Table 3.4.2-2 identifies the specific waterbody crossing methods Enbridge proposes to implement at each waterbody. Additional details are provided in Section 2.0 of Enbridge's EPP (refer to Appendix B).

In an attempt to minimize construction-related impacts on the Pokegama River, Enbridge installed Lines 67 and 13 (commonly referred to as the Alberta Clipper and Southern Lights Diluent Pipeline Projects) in

2009 and 2010 via horizontal directionally drilling. However, numerous inadvertent returns of drilling fluid occurred throughout the installations of both pipelines on the banks and within the river. During the installation of Line 67 (36-inch diameter), Enbridge needed to temporarily dam the river to isolate an inadvertent return and recover the drilling fluid. Furthermore, because the Sandpiper and Line 3 Replacement pipelines are equal or greater diameter to Lines 67 and 13 (36- and 13-inches, respectively) and similar subsurface soil conditions, Enbridge anticipates inadvertent returns of drilling fluid. Therefore, due to the high potential for inadvertent returns, Enbridge does not propose to utilize horizontal directionally drilling to avoid temporary construction impacts on the Pokegama River.

TABLE 3.4.2-2

Waterbody Crossings

Waterbody ID Number	Milepost	Waterbody Name	Flow Regime	Project Route Alternative Crossed [a]	ASNRI Water	Proposed Crossing Method [b, c]	Alternate Crossing Method [b, c]	Bridge Type [b, d]
04010201000307	600.88	Unnamed	P	-		DC	OC	Span
DO007aWB	601.89	Unnamed	E	-		OC	OC	Span
DO007bWB	601.97	Unnamed	E	-		OC	OC	Span
DO007bWB	602.06	Unnamed	E	-		OC	OC	Span
DO008aWB	602.34	Unnamed	E	-		OC	OC	Span
DO020aWB	603.50	Unnamed	P	-		DC	OC	Span
DO025aWB	604.39	Unnamed	I	-		OC	OC	Span
DO034_500bWB	606.18	Little Pokegema River	E	-	X	OC	OC	Span
DO034_500aWB	606.25	Little Pokegema River	P	-	X	DC	OC	Span
DO041_001bWB	607.40	Unnamed	E	A1	X	OC	OC	Span
DO041_500aWB	607.44	Unnamed	P	A1	X	DC	OC	Span
DO041_506aWB	607.53	Unnamed	E	A1		OC	OC	Span
DO041_506cWB	607.61	Little Pokegema River	E	A1	X	OC	OC	Span
DO041_506cWB	607.64	Little Pokegema River	E	A1	X	OC	OC	Span
DO041_200aWB	607.72	Little Pokegema River	E	A1	X	OC	OC	Span
DO041_200cWB	607.78	Little Pokegema River	E	A1	X	OC	OC	Span
DO041_200bWB	607.94	Little Pokegema River	P	A1	X	DC	OC	Span
DO041_508bWB	607.96	Little Pokegema River	E	A1		OC	OC	Span
DO041_200bWB	608.00	Little Pokegema River	P	A1	X	DC	OC	Span
DO041_534aWB	610.26	Unnamed Tributary: Pokegema River	E	A1	X	OC	OC	Span
DO041_534_200aWB	610.34	Unnamed Tributary: Pokegema River	P	A1	X	DC	OC	Span
DO057aWB	611.30	Pokegema River	P	-	X	DC	OC	Span
DO065_900RDcWB	611.77	Unnamed	I	-		OC	OC	Span
DO074aWB	612.11	Unnamed	I	-		OC	OC	Span
DO075aWB	612.13	Unnamed	E	-		OC	OC	Span
DO094_001aWB	612.90	Unnamed	P	-		DC	OC	Span
DO100_510aWB	613.10	Unnamed	I	-		OC	OC	Span
DO106_200bWB	613.19	Unnamed Ditch	I	C1		OC	OC	Span
DO106aWB	613.24	Unnamed Ditch	I	C1		OC	OC	Span
DO106_200aWB	613.27	Unnamed Ditch	I	C1		OC	OC	Span
DO106bWB	613.35	Unnamed Ditch	I	C1		OC	OC	Span
DO106bWB	613.38	Unnamed Ditch	I	C1		OC	OC	Span
DO106bWB	613.43	Unnamed Ditch	I	C1		OC	OC	Span
DO110_001aWB	614.03	Unnamed Ditch	I	-		OC	OC	Span
04010201001150	N/A	Little Pokegema River	P	A2	X	DC	OC	Span
DO055aWB	N/A	Unnamed	P	A2	X	DC	OC	Span

TABLE 3.4.2-2

Waterbody Crossings

Waterbody ID Number	Milepost	Waterbody Name	Flow Regime	Project Route Alternative Crossed [a]	ASNRI Water	Proposed Crossing Method [b, c]	Alternate Crossing Method [b, c]	Bridge Type [b, d]
DO100_510aWB	N/A	Unnamed Ditch	I	C2		OC	OC	Span
DO106_200bWB	N/A	Unnamed Ditch	I	C2		OC	OC	Span
DO106aWB	N/A	Unnamed Ditch	I	C2		OC	OC	Span
DO106bWB	N/A	Unnamed Ditch	I	C2		OC	OC	Span
DO110aWB	N/A	Unnamed Ditch	I	C2		OC	OC	Span

[a] Hyphen (-) denotes locations where no route alternative is present.
[b] Crossing method and bridge type apply to both Sandpiper and Line 3 Projects.
[c] OC: Open Cut - open trench method used in conditions of no flow, sometimes referred to as the "wet trench" method.
DC: Open trench method used in conditions where a discernible water flow is present in the waterbody; referred to as the "dry trench" method, water is routed around the excavation area using either a dam and pump or flume pipe.
[d] Span Bridge: Timber Mat or Rail Car

Sensitive or Protected Waterbodies

The WDNR developed special designations for sensitive or protected waterbodies as follows:

- Areas of Special Natural Resource Interest (ASNRI) – Includes trout streams; outstanding or exceptional resource waters; waters inhabited by endangered, threatened, or species of special concern; wild and scenic rivers; and more;

- Public Rights Features (PRF) – Waterbodies with sensitive areas such as fish and wildlife habitat necessary for breeding, nesting, nursery, and feeding—as well as physical features that ensure protection of water quality; areas navigated by recreational watercraft used in such activities as boating, angling, hunting, or enjoying natural beauty; and

- Priority Navigable Waters (PNW) – A navigable waterway (or a portion of one), that is identified as either an outstanding or exceptional resource water, a trout stream, a lake that is less than 50 acres in size, or waters that the WDNR has determined contain sensitive fish and aquatic habitat. This category also can include waterbodies classified as ASNRI and PRF.

The proposed Project does not cross any PRF- or PNW-designated waterbodies. However, as detailed in Table 3.4.2-1, the Project crosses either 13 or 5 ASNRI-designated waterbodies if Route Alternative A1 or A2, respectively, is selected.

3.4.2.2 General Impacts and Mitigation

Pipeline construction across waterbodies could result in short-term or long-term impacts. Installation of a pipeline across a stream or river can temporarily displace stream bottom sediments and increase erosion of soils adjacent to the waterbody. The magnitude and duration of these effects depends on the soils and topography of the site, and the proposed crossing method. Construction could also change the stream bottom profile, resulting in increased siltation or erosion at the site or further downstream. Enbridge developed the measures outlined in the EPP to minimize short- and long-term impacts on the waterbodies during and following pipeline construction.

Although certain alternative routes will have more waterbody crossings than others, some of the alternative routes are located higher in the watershed and, therefore, less chance of potential erosion and sediment reaching the sensitive downstream resources of wild rice beds, the St. Louis River Estuary, and Lake Superior.

Long-term impacts on water quality could result from alteration of stream banks and removal of riparian vegetation. Soil erosion associated with surface runoff and stream bank sloughing could also result in the deposition of sediments in waterbodies. Removal of riparian vegetation could lead to increased light penetration into the waterbody, causing increased water temperature which could potentially impact fisheries.

Enbridge would avoid and minimize impacts on waterbodies by implementing measures described in its EPP. Enbridge would also limit the duration of construction within waterbodies and limit equipment operation within waterbodies to the area necessary to complete the crossing. Disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation.

Spills from refueling operations, fuel storage, or equipment failure in or near a waterbody could affect aquatic resources and contaminate the waterbody downstream of the release point. Enbridge would minimize the potential impact of spills of hazardous materials by implementing the measures described in the Spill Prevention, Containment, and Control section of its EPP (refer to Section 10.0 of Appendix B).

Operation and maintenance of the Project would not be expected to result in long-term effects on water quality. Enbridge would periodically inspect the pipeline right-of-way from vehicles and perform routine removal of brush and trees; however, little disturbance is expected within the permanent right-of-way.

3.4.3 Wetlands

3.4.3.1 Current Conditions

Enbridge completed wetland delineations in 2013 on all accessible tracts along Project route and alternatives. Enbridge used WWI data in areas where access was not allowed; approximately 32 percent, which will be surveyed in the spring of 2014. Enbridge based the wetland delineations on the criteria and methods outlined in the *United States Army Corps of Engineers Wetlands Delineation Manual,* Technical Report Y-87-1 (1987) and subsequent guidance documents (COE, 1991; 1992), Guidelines for Submitting Wetland Delineations in Wisconsin to the St. Paul District Corps of Engineers (COE, 1996), the *Basic Guide to Wisconsin's Wetlands and their Boundaries* (Wisconsin Department of Administration Coastal Management Program, 1995), and applicable Regional Supplements to the Corps of Engineers Wetland Delineation Manual. Enbridge provided a delineation report including representative photos, data sheets, and maps to the WDNR under separate cover.

Palustrine Emergent (PEM) wetlands consist of: sedge- and rush-dominated wetlands adjacent to waterbodies, sedge meadows along existing pipeline right-of-way, and shallow marsh communities dominated by cattails and reed canary grass. Much of the emergent wetland is along existing utility rights-of-way, which is maintained free of woody vegetation.

Palustrine Scrub-scrub (PSS) wetlands are primarily comprised of shrub-carr communities dominated primarily by alders *(Alnus* spp.) and willows *(Salix* spp.). Herbaceous vegetation consists of a mix of sedges, cattails, or other hydrophytic species common to emergent wetlands.

Palustrine Forested (PFO) wetlands are primarily black ash *(Fraxinus nigra)* dominated depressions within the hardwood uplands. Black ash also occurs as a fringe or minor component to larger wetland complexes.

Table 3.4.3-1 compares the wetland impacts along the route alternatives.

TABLE 3.4.3-1

Wetlands Impacts

Wetland Type [a] **Wetland Impacts**	**MP 600.8 – 607.0**	**MP 607.0 – 611.2**		**MP 611.2 – 612.2**	**MP 612.2 – 612.5**		**MP 612.5 – 613.1**	**MP 613.1 – 614.0**		**MP 614.0 – 615.1**
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
PEM										
Crossing Length (feet) [b]	2.3	0.3	1.0	0.5	0.1	0.1	0.3	0.3	0.2	0.9
Construction Impacts (acres) [c]	23.6	4.2	8.6	4.3	1.0	0.8	2.4	3.5	2.9	7.6
Permanent Conversion (acres) [d]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PSS										
Crossing Length (feet) [b]	0.5	1.6	1.5	<0.1	0.1	0.1	0.0	0.5	0.1	0.0
Construction Impacts (acres) [c]	12.5	22.9	26.3	0.8	2.7	1.8	0.3	8.0	2.4	1.7
Permanent Conversion (acres) [d]	5.4	14.3	10.7	1.4	<0.1	0.9	0.0	6.0	0.0	0.0
PFO										
Crossing Length (feet) [b]	0.3	0.7	0.3	0.1	0.1	0.0	0.1	<0.1	0.0	<0.1
Construction Impacts (acres) [c]	6.2	10.8	5.0	1.7	0.7	0.0	1.7	0.6	0.0	1.2
Permanent Conversion (acres) [d]	2.2	6.4	2.1	0.3	0.5	0.0	0.8	0.6	0.0	0.1
PUB										
Crossing Length (feet) [b]	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Impacts (acres) [c]	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Permanent Conversion (acres) [d]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[a] PEM = Palustrine Emergent; PSS=Palustrine Scrub Shrub; PFO = Palustrine Forested; PUB = Palustrine Unconsolidated Bottom (Cowardin et al., 1979).
[b] Crossing length of pipeline centerline across wetlands.
[c] Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.
[d] Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.

3.4.3.2 General Impacts and Mitigation

The primary impact of pipeline construction and right-of-way maintenance activities on wetlands will be the temporary removal of wetland vegetation. Construction also will temporarily diminish the recreational and aesthetic value of the wetlands crossed. These effects will be greatest during and immediately following construction. In emergent wetlands, the impact of construction will be relatively brief, since herbaceous vegetation will regenerate within one or two seasons. In forested and shrub-dominated wetlands, the impact will last longer due to the longer recovery period of these vegetation types. Forested wetlands may not regenerate due to specific circumstances like altered conditions since the forest began or the competition of invasive species, among others. Clearing of wetland vegetation also will also temporarily remove or alter wetland wildlife habitat.

Typical pipeline construction in most wetlands will be similar to construction in uplands and will consist of clearing, trenching, dewatering, installation, backfilling, cleanup, and revegetation. However, due to the unstable nature of some wetland soils, construction activities may differ somewhat from standard upland procedures. Additional details are provided in Section 3.0 the EPP (refer to Appendix B).

Table 3.4.3-2 compares the wetland impacts for each route option.

TABLE 3.4.3-2

Wetland Impact Comparison of Project Route Options

Environmental Factor	Unit	Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H
Total Length	Miles								
Total Wetlands Affected	Length Crossed (mi) [a]	8.4	8.1	8.3	7.9	7.8	8.6	8.1	8.5
	Temp. Impact (acres)[b]	118.6	111.9	116.8	111.8	110.0	120.5	113.7	118.7
	Perm. Impacts (acres)[c]	38.1	24.0	38.5	31.5	31.9	30.0	23.4	30.5
Palustrine Emergent (PEM)	Length Crossed (mi) [a]	4.5	5.1	4.4	4.4	4.4	5.2	5.1	5.2
	Temp. Impact (acres)[b]	46.7	50.2	46.5	46.1	45.9	51.0	50.4	50.8
	Perm. Impacts (acres)[c]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palustrine Scrub/Shrub (PSS)	Length Crossed (mi) [a]	2.7	2.3	2.7	2.3	2.3	2.6	2.3	2.6
	Temp. Impact (acres)[b]	49.0	45.8	48.1	43.4	42.4	52.3	46.7	51.4
	Perm. Impacts (acres)[c]	27.2	18.5	28.1	21.2	22.1	23.5	17.5	24.4
Palustrine Forested (PFO)	Length Crossed (mi) [a]	1.2	0.7	1.2	1.2	1.1	0.8	0.7	0.7
	Temp. Impact (acres)[b]	22.9	15.8	22.2	22.3	21.6	17.1	16.4	16.4
	Perm. Impacts (acres)[c]	10.9	5.5	10.4	10.3	9.8	6.5	5.9	6.1
Palustrine Unconsolidated Bottom (PUB)	Length Crossed (mi) [a]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Temp. Impact (acres)[b]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

TABLE 3.4.3-2

Wetland Impact Comparison of Project Route Options

Environmental Factor	Unit	Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H
	Perm. Impacts (acres)[c]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[a] Crossing length of pipeline centerline across wetlands.
[b] Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.
[c] Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.

3.4.3.3 Wetland Mitigation

Enbridge is proposing to mitigate for wetland impacts through a Project-specific consolidated wetland mitigation site located in the Nemadji River watershed. The Wetland Mitigation Compensation Site Plan was provided to the WDNR under separate cover.

In Wisconsin, the Project will cross the following five fifth level hydrologic unit codes (HUC 10) in the Lake Superior Bank Service Area (BSA) in Douglas County:

- HUC 10 – 0401020116; Saint Louis River
- HUC 10 – 0401020115; Thompson Reservoir-Saint Louis River
- HUC 10 – 0401030105; Lower Nemadji River-Frontal Lake Superior
- HUC 10 – 0401030102; Upper Nemadji River
- HUC 10 – 0401030104; Middle Nemadji River

By providing compensatory mitigation within the same county and BSA, the Project will meet the goal of providing mitigation "in-place".

The Crawford Creek mitigation site (HUC 10 – 0401030105; Lower Nemadji River-Frontal Lake Superior) includes proposed preservation, enhancement, and restoration of wetlands.

The site is located in northern Douglas County, Lake Superior Basin; Nemadji River Watershed; in the NE 1/4 of Section 23, Township 48 North, Range 14 West in the Town of Superior on the east side of Darrow Road, south of the intersection of Darrow Road and County Highway C. The approximately 48.4-acre site includes two portions: a 29.4-acre ditched hayfield and an eastern 19.0-acre wooded area adjacent to Crawford Creek.

Enbridge will restore hydrology and wetland characteristics by blocking the man-made ditches in the hayfield and preventing channelized flow of water through the site into Crawford Creek. The plan includes placing 16 ditch plugs covering approximately 11,000 square feet. Enbridge will use the existing surrounding vegetation as a guide in developing the planting plan; vegetation design will also consider replacing impacted habitat types as closely as practicable. The primary goal of the wetland restoration is the re-development of more natural wetland hydrology and development of a diverse assemblage of wetland communities.

3.5 VEGETATION, WILDLIFE, AND FISHERIES

3.5.1 Vegetation

3.5.1.1 Existing Vegetation Resources

As described in Section 3.6, most of the area within the construction right-of-way is forest land consisting of deciduous, coniferous, and mixed forests. Additional vegetative cover types (in descending order of prevalence) include wetlands (including woody wetlands and emergent herbaceous wetlands), open land (which includes shrub/scrub areas and grasslands), and agricultural land (mainly pastures and hay fields).

Ecological Classifications

Based on Wisconsin's Ecological Landscapes (WDNR, 2012), the Project is located in the Superior Coastal Plain, a nearly level plain of lacustrine clay that slopes gently northward toward Lake Superior. The Superior Coastal Plain was originally dominated by white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), and white pine (*Pinus strobus*). Forests of aspen (*Populus* spp.) and birch (*Betula* spp.) currently occupy about forty percent of the Superior Coastal Plain, having increased in prominence over the boreal conifers. Approximately thirty percent of the Superior Coastal Plain is currently non-forested; most of the open land is in grass cover, having been cleared and then pastured or plowed (WDNR, 2005). Important land uses in the Superior Coastal Plain today include forestry, tourism, and agriculture, including specialty crops such as apples and cherries (WDNR, 2012).

Within the Superior Coastal Plain, the Project passes through a Landtype Association known as the Douglas Lake-Modified Till Plain, characterized by undulating modified lacustrine moraines with deep v-shaped ravines and clay soils. Common habitat types in the Douglas Lake-Modified Till Plain include associations of balsam fir, red maple (*Acer rubrum*), and black snakeroot (*Sanicula marilandica*); associations of balsam fir, maple (*Acer* spp.), black snakeroot, and partridgeberry (*Mitchella repens*); and forested lowlands (WDNR, 2012).

3.5.1.2 Natural Communities

Natural Communities included in Wisconsin's Natural Heritage Inventory (NHI) are communities the WDNR deems significant for reasons such as undisturbed condition or community extent. Although these communities are not protected by endangered species laws, their preservation helps protect valuable areas of genetic and biological diversity and important habitats for many of Wisconsin's rare species. Based on NHI review, there are three Natural Communities within 1 mile of the Project area (Table 3.5.1-1).

TABLE 3.5.1-1

NHI Occurrences of Natural Communities Within 1 or 2 Miles of the Project

Natural Community	MP 600.8 – 607.0	MP 607.0 – 611.2		MP 611.2 – 612.2	MP 612.2 – 612.5		MP 612.5 – 613.1	MP 613.1 – 614.0		MP 614.0 – 615.1
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
Boreal Forest [a]		X								
Emergent Marsh [a]		X								X
Ephemeral Pond [b]	X	X	X							
Northern Sedge Meadow [a]		X	X							X

[a] NHI occurrences within 1 mile of the Project.
[b] NHI occurrences within 2 miles of the Project.

The following community descriptions are from Epstein et al. (2002).

- Boreal Forest: In Wisconsin, the boreal forest is a transitional community between the mixed deciduous-coniferous forests to the south and the spruce-fir dominated forests of Canada, so tree species richness is often greater in this community. Mature stands of this upland forest community are dominated by white spruce and balsam fir. Most Wisconsin stands are associated with the Great Lakes, especially the clay plain of Lake Superior.

- Emergent Marsh: This community type actually describes a variety of areas – including open water, marshes, and estuaries – where permanent standing water is dominated by emergent macrophytes. Dominant species include cattails (*Typha* spp.), bulrushes (*Scirpus* spp.), bur reeds (*Sparganium* spp.), giant reed (*Phragmites australis*), pickerel-weed (*Pontederia cordata*), water-plantains (*Alisma* spp.), arrowheads (*Sagittaria* spp.), and larger species of spike-rush (such as *Eleocharis smallii*).

- Ephemeral Pond: These ponds are depressions with impeded drainage (usually in forest landscapes), that hold water for a period of time following snowmelt but typically dry out by mid-summer. Common aquatic plants of these habitats include yellow water crowfoot (*Ranunculus flabellaris*), mermaid weed (*Proserpinaca palustris*), Canada bluejoint grass (*Calamagrostis canadensis*), floating manna grass (*Glyceria septentrionalis*), spotted cowbane (*Cicuta maculata*), smartweeds (*Polygonum* spp.), orange jewelweed (*Impatiens capensis*), and sedges.

- Northern Sedge Meadow: This open wetland community is dominated by sedges and grasses. There are several community subtypes, depending on the species of grasses and/or sedges that dominate.

3.5.1.3 Sensitive Plant Species and Communities

According to the NHI review, ten plant species of special concern in Wisconsin are known to occur within 1 mile of the Project area: northwestern sticky aster (*Aster modestus*), slim-stem small reed grass (*Calamagrostis stricta*), Fernald's sedge (*Carex merritt-fernaldii*), smooth black sedge (*Carex nigra*), flat-stemmed spike-rush (*Eleocharis compressa*), mamillate spike-rush (*Eleocharis mamillata*), large-leaved avens (*Geum macrophyllum* var. *macrophyllum*), Vasey's rush (*Juncus vaseyi*), marsh horsetail

(*Equisetum palustre*), and large-flowered ground-cherry (*Leucophysalis grandiflora*) (refer to Table 3.5.1-2).

Based on the NHI review, eight state-threatened or state-endangered plant species are also known to occur within 1 mile of the Project area (Table 3.5.1-2). The threatened species are marsh grass-of-Parnassus (*Parnassia palustris*), arrow-leaved sweet-coltsfoot (*Petasites sagittatus*), seaside crowfoot (*Ranunculus cymbalaria*), tea-leaved willow (*Salix planifolia*), and clustered bur reed (*Sparganium glomeratum*). The endangered species are floating marsh-marigold (*Caltha natans*), slender spike-rush (*Eleocharis nitida*), and small yellow water crowfoot (*Ranunculus gmelinii*). The WDNR requested field surveys for these eight species as discussed in further detail under Section 3.5.4.2.

TABLE 3.5.1-2

NHI Occurrences of Plant Species Within 1 Mile of the Project

Species	**MP 600.8 – 607.0**	**MP 607.0 – 611.2**		**MP 611.2 – 612.2**	**MP 612.2 – 612.5**		**MP 612.5 – 613.1**	**MP 613.1 – 614.0**		**MP 614.0 – 615.1**
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
SPECIAL CONCERN										
northwestern sticky aster (*Aster modestus*)		X	X	X						
slim-stem small reed grass (*Calamagrostis stricta*)		X	X	X				X	X	X
Fernald's sedge (*Carex merritt-fernaldii*)										X
smooth black sedge (*Carex nigra*)										X
flat-stemmed spike-rush (*Eleocharis compressa*)										X
mamillate spike-rush (*Eleocharis mamillata*)	X	X	X							
marsh horsetail (*Equisetum palustre*)										X
large-leaved avens (*Geum macrophyllum* var. *macrophyllum*)			X							
Vasey's rush (*Juncus vaseyi*)	X	X	X	X	X	X	X	X	X	X
large-flowered ground-cherry (*Leucophysalis grandiflora*)				X	X	X	X	X	X	X
THREATENED										
marsh grass-of-Parnassus (*Parnassia palustris*)		X	X							
arrow-leaved sweet-coltsfoot (*Petasites sagittatus*)	X	X	X	X	X	X	X	X	X	X
seaside crowfoot (*Ranunculus cymbalaria*)		X	X	X	X	X	X	X	X	X
tea-leaved willow (*Salix planifolia*)	X	X	X	X	X	X	X			

TABLE 3.5.1-2

NHI Occurrences of Plant Species Within 1 Mile of the Project

Species	MP 600.8 – 607.0	MP 607.0 – 611.2		MP 611.2 – 612.2	MP 612.2 – 612.5		MP 612.5 – 613.1	MP 613.1 – 614.0		MP 614.0 – 615.1
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
clustered bur reed (*Sparganium glomeratum*)	X	X	X	X	X		X	X	X	X
ENDANGERED										
floating marsh-marigold (*Caltha natans*)	X	X	X							
slender spike-rush (*Eleocharis nitida*)	X	X	X	X	X	X	X	X	X	X
small yellow water crowfoot (*Ranunculus gmelinii*)	X	X	X	X	X	X	X	X	X	X

Pokegama-Carnegie Area of Special Natural Resource Interest

The Pokegama-Carnegie wetland complex, located within the Lake Superior drainage system, includes poorly drained, red clay flats in the headwaters of the Pokegama and Little Pokegama Rivers. In 2006, the WDNR designated a portion of the Pokegama-Carnegie wetland complex as a SNA. As an SNA, the Pokegama-Carnegie wetland complex is also considered an ASNRI.

The Pokegama-Carnegie wetland complex falls within Enbridge's existing right-of-way corridor along Route Alternative A2 and within Route Options B, F, G, and H. Enbridge has maintained a right-of-way corridor in the area since installation of its first pipeline in 1950.

The major plant communities at the Pokegama-Carnegie SNA/ASNRI are alder thickets, boreal forest remnants, aspen forest groves, and northern sedge meadows (Hlina and Anderson, 2011). Species with NHI occurrences that are known to occur within the Pokegama-Carnegie include *Caltha natans* and *Salix planifolia* (alder thickets), *Geum macrophyllum* var. *macrophyllum* (forest), *Juncus vaseyi* (pond/sedge meadow), and *Eleocharis nitida* and *Sparganium glomeratum* (wet disturbed corridors) (Hlina and Anderson, 2011).

Hydrogeologic Setting

The Pokegama-Carnegie wetland complex includes a broad, elevated inter-fluve between the Pokegama River, south and east, and the Little Pokegama River to the north. Soils on the site formed in very fine-textured red clays deposited in offshore environments in the bed of Glacial Lake Duluth. The red color of the clay is the result of glacial action incorporating iron-bearing bedrock that is common in the area. Relief within the wetland complex is flat. Micro-topography is limited to very subtle rises between small (0.25-acre) and medium sized (1 to 2 acre) depressions. Total relief between the rises and depression bottoms is approximately 1 foot or less.

Site hydrology is strongly influenced by the presence of micro-topography and the very low hydraulic conductivity (less than 10^{-8} cm/s) of the sediments. Very poorly drained Berglund soils (very-fine, mixed, semi-active, frigid Aeric Vertic Epiaqualfs) occupy ephemerally to seasonally ponded depressions. Somewhat poorly drained Cuttre (very-fine, mixed, active, frigid Aeric Glossaqualfs) and moderately well-drained Amnicon (Oxyaquic Vertic Glossudalfs) soils occupy successively drier inter-depressional areas. All of these soils are poorly developed and contain thin (1-2 inch) A-horizons over red clays.

Shallow peat Cathro soils (loamy, mixed, euic, frigid Terric Haplosaprists) are less frequently found. Cathro soils occupy the beds of larger and deeper, seasonally to semi-permanently flooded depressions. The full catena of the soils described here is within the Enbridge right-of-way in the Pokegama-Carnegie wetland complex.

Surface water feeds the majority of the wetland systems. Ponding occurs within most depressions very early in the year and immediately after heavy precipitation events. The area includes a complex net of subtle, poorly integrated drainages. Drainageways are ephemeral in nature and dependent upon precipitation intensity for flow. The elevated areas dominated by Cuttre and Amnicon soils between depressions are very rarely or never ponded.

3.5.1.4 General Construction and Operation Impacts and Mitigation

Clearing of herbaceous vegetation during construction will result in a short-term impact to vegetation. Active revegetation measures and rapid colonization by annual and perennial herbaceous species in the disturbed areas will restore most vegetative cover within the first growing season. Clearing of woody shrubs and trees will be the primary long-term impact on vegetation associated with the Project. Enbridge will allow woody shrubs and trees to recolonize the temporary construction right-of-way and extra workspaces as described in the EPP (Appendix B). However, recolonization of disturbed areas by woody shrubs and trees will be slower than herbaceous species. As natural succession is allowed to proceed in these areas, the early successional or forested communities present before construction will eventually reestablish. Enbridge will employ best management practices to control the spread of noxious weeds and invasive plants as described in the EPP (Appendix B).

Clearing trees in the construction right-of-way could affect undisturbed forest vegetation growing along the edges of the cleared areas. By exposing some edge trees to elevated levels of sunlight and wind, evaporation rates and the probability of tree knockdown could increase. Due to the increased light levels penetrating the previously shaded interior, shade-intolerant species will be able to grow, and the species composition of the newly created forest edge will likely change. The proposed clearing could also 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 site.

The Project will result in the clearing of forest land during construction and a portion of this forest land will be maintained clear of trees for operational purposes, including facilitating aerial inspections, preserving pipeline integrity, and providing access for maintenance or emergency work in compliance with federal regulations.

Enbridge will minimize impacts on vegetation adjacent to the Project area through adherence to soil erosion control specifications and by confining clearing activities to the approved right-of-way and extra workspaces. To prevent damage to adjacent trees, Enbridge will fell trees toward the cleared right-of-way. Upon completion of construction, Enbridge will revegetate disturbed areas in accordance with the EPP (refer to Appendix B) unless otherwise directed by landowners or land managing agencies. Timely restoration of the construction right-of-way and reseeding with an appropriate seed mix will minimize the duration of vegetative disturbance.

3.5.2 Wildlife

3.5.2.1 Existing Wildlife Resources

As described in Section 3.5.1.1, the Project will primarily impact forested areas and wetlands, though shrub/scrub areas, grasslands, and agricultural land may also be affected. The actual occurrence of wildlife species along the Project route depends on the availability of suitable habitat and other factors.

Based on the habitat descriptions and geographic distributions from WDNR (1997), mammalian species typical of Wisconsin's deciduous forests include eastern chipmunks (*Tamias striatus*), eastern gray squirrels (*Sciurus carolinensis*), porcupines (*Erethizon dorsatum*), and white-tailed deer (*Odocoileus virginianus*). Some of these species, as well as others such as red squirrels (*Tamiasciurus hudsonicus*), fishers (*Martes pennanti*), and black bears (*Ursus americanus*), also inhabit northern Wisconsin's coniferous forests. Other species, such as least chipmunks (*Neotamias minimus*) and snowshoe hares (*Lepus americanus*), are more unique to coniferous forests. The structural diversity of forests provides a variety of habitats that can support raptors such as northern goshawks (*Accipiter gentilis*) and sharp-shinned hawks (*Accipiter striatus*); migratory songbirds such as thrushes (Turdidae), vireos (Vireonidae), and warblers (Parulidae); and resident birds such as northern cardinals (*Cardinalis cardinalis*), nuthatches (*Sitta* spp.), and woodpeckers (Picidae).

Based on the habitat descriptions and geographic distributions from WDNR (1997), emergent wetlands and open water in northern Wisconsin provide habitat for a variety of aquatic wildlife, including mammals such as muskrats (*Ondatra zibethicus*), beavers (*Castor canadensis*), and river otters (*Lontra canadensis*); birds such as herons and egrets (Ardeidae), swallows (Hirundinidae), dabbling ducks (Anatidae), and red-winged blackbirds (*Agelaius phoeniceus*); and reptiles and amphibians such as painted turtles (*Chrysemys picta*), snapping turtles (*Chelydra serpentina*), eastern garter snakes (*Thamnophis sirtalis*), and mudpuppies (*Necturus maculosus*). Woody wetlands provide additional habitat for terrestrial mammals such as bobcats (*Lynx rufus*) and mink (*Neovison vison*); for birds such as barred owls (*Strix varia*), great horned owls (*Bubo virginianus*), wood ducks (*Aix sponsa*), and rose-breasted grosbeaks (*Pheucticus ludovicianus*); and amphibians such as red-backed salamanders (*Plethodon cinereus*), spring peepers (*Pseudacris crucifer crucifer*), and wood frogs (*Rana sylvatica*).

Based on the habitat descriptions and geographic distributions from WDNR (1997), mammals typical of northern Wisconsin's agricultural lands, shrub-scrub areas, grasslands, or areas of mixed habitats include moles (Talpidae), shrews (Soricidae), bats (Vespertilionidae), mice and voles (Cricetidae), jumping mice (Dipodidae), thirteen-lined ground squirrels (*Spermophilus tridecemlineatus*), woodchucks (*Marmota monax*), eastern cottontails (*Sylvilagus floridanus*), striped skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), weasels (*Mustela* spp.), badgers (*Taxidea taxus*), Virginia opossum (*Didelphis virginiana*), coyotes (*Canis latrans*), and red fox (*Vulpes vulpes*). These areas also support numerous species of birds, such as northern harriers (*Circus cyaneus*), red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), killdeer (*Charadrius vociferus*), sharp-tailed grouse (*Tympanuchus phasianellus*), and eastern bluebirds (*Sialia sialis*), as well as reptiles such as northern brown snakes (*Storeria dekayi*).

3.5.2.2 Sensitive Wildlife Species and Habitats

Species of Greatest Conservation Need and Priority Habitats

Wisconsin's Wildlife Action Plan (WWAP) defines Species of Greatest Conservation Need (SGCN) as native wildlife species that have low or declining populations and that are most at risk of no longer being a viable part of Wisconsin's fauna (WDNR, 2005). The WWAP also identifies habitats with which

SGCN are associated, locations where SGCN occur across the state, and conservation actions that can help keep SGCN from being listed as threatened or endangered in the future. According to the WWAP's Implementation Plan (WDNR, 2008), the Pokegama-Nemadji wetland complex is a Conservation Opportunity Area (COA) in the Superior Coastal Plain. The Pokegama-Nemadji wetland complex encompasses a larger area than the Pokegama-Carnegie SNA/ASNRI. Table 3.5.2-1 lists the SGCN associated with this COA.

TABLE 3.5.2-1

Species of Greatest Conservation Need Associated with the Pokegama-Nemadji Wetlands COA

Common Name	Scientific Name	Ecological Landscape Association Score[a]
MAMMALS		
gray wolf	*Canis lupus*	3
northern flying squirrel	*Glaucomys sabrinus*	3
silver-haired bat	*Lasionycteris noctivagans*	2
eastern red bat	*Lasiurus borealis*	2
hoary bat	*Lasiurus cinereus*	2
American marten	*Martes americana*	2
woodland jumping mouse	*Napaeozapus insignis*	3
water shrew	*Sorex palustris*	3
BIRDS		
veery	*Catharus fuscescens*	3
olive-sided flycatcher	*Contopus cooperi*	2
least flycatcher	*Empidonax minimus*	3
rusty blackbird	*Euphagus carolinus*	2
black-backed woodpecker	*Picoides arcticus*	2
Canada warbler	*Wilsonia canadensis*	3
AMPHIBIANS		
four-toed salamander	*Hemidactylium scutatum*	3
INVERTEBRATES		
bay underwing moth	*Catocala badia coelebs*	n/a[b]

[a] The Ecological Landscape Association Score indicates where the SGCN's association with the Superior Coastal Plain is high (score = 3) or moderate (score = 2) (WDNR, 2005).

[b] This species was listed in WDNR (2008) as an SGCN associated with the Pokegama-Nemadji Wetlands COA, but an Ecological Landscape Association Score for this species is not included in the SGCN profiles online at http://dnr.wi.gov/topic/WildlifeHabitat/profiles.asp as of February 19, 2014.

The WWAP's Implementation Plan (WDNR, 2008) also identifies Natural Communities that are a priority for SGCNs. Two of the Natural Communities (Boreal Forest and Emergent Marsh; refer to Section 3.5.1.2) found within 1 mile of the Project according to the NHI are a high priority for SGCN habitat in the Superior Coastal Plain, because this Ecological Landscape presents a major opportunity for sustaining these communities (WDNR, 2005).

Other Sensitive Areas and Species

According to WDNR online mapping, the Project avoids all WDNR Wildlife Areas in Douglas County.

Three bird species tracked by the NHI are known to occur within 1 mile of the Project area (refer to Table 3.5.2-2). Two of these species – Le Conte's sparrow (*Ammodramus leconteii*) and Connecticut warbler (*Oporornis agilis*) – are listed as special concern in Wisconsin. The status of the third species, upland sandpiper (*Bartramia longicauda*), was upgraded from special concern to threatened as of January 1, 2014. The WDNR requested a habitat assessment for the upland sandpiper (refer to Section 3.5.4.2 for additional details).

According to the NHI, there are no occurrences of other wildlife species within 1 mile of the Project. There are, however, occurrences of one threatened species of reptile, the wood turtle (*Glyptemys insculpta*), within 2 miles of the Project (refer to Table 3.5.2-2). The WDNR requested a habitat assessment for the wood turtle (refer to Section 3.5.4.2 for additional details).

Three invertebrate species of special concern are also known to occur within 2 miles of the Project: two species of mayfly (*Maccaffertium pulchellum* and *Sparbarus maculates*) and the forcipate emerald dragonfly (*Somatochlora forcipata*) (refer to Table 3.5.2-2). All three species are associated with wetland or aquatic habitats.

TABLE 3.5.2-2

NHI Occurrences of Wildlife Species Within 1 or 2 Miles of the Project

Species	**MP 600.8 – 607.0**	**MP 607.0 – 611.2**		**MP 611.2 – 612.2**	**MP 612.2 – 612.5**		**MP 612.5 – 613.1**	**MP 613.1 – 614.0**		**MP 614.0 – 615.1**
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
SPECIAL CONCERN										
Le Conte's sparrow (*Ammodramus leconteii*)[a]	X									
a flat-headed mayfly (*Maccaffertium pulchellum*)[b]		X	X	X	X	X	X			
Connecticut warbler (*Oporornis agilis*)[a]	X									
forcipate emerald dragonfly (*Somatochlora forcipata*)[b]		X								
a small square-gilled mayfly (*Sparbarus maculates*)[b]		X	X	X	X	X	X			
THREATENED										
upland sandpiper (*Bartramia longicauda*)[a]	X	X	X							
wood turtle (*Glyptemys insculpta*)[b]		X	X	X	X	X				

[a] NHI occurrences within 1 mile of the Project.
[b] NHI occurrences within 2 miles of the Project.

3.5.2.3 General Construction and Operation Impacts and Mitigation

Enbridge does not expect the construction and operation of the Project to have a significant impact on mammals, birds, reptiles, amphibians, or invertebrates. Temporary impacts will occur during construction due to clearing of vegetation and disturbance in the right-of-way.

Enbridge will limit long-term impacts to a loss of forest habitat because of clearing the temporary construction right-of-way and extra workspaces that are located in forested areas. Due to collocation with other existing pipelines and third-party rights-of-way, construction and operation of the Project will not significantly alter the character of the landscape for the majority of the preferred route. Landscape alteration will occur in areas of greenfield construction such as Alternatives A1, B1, and C1.

Clearing the construction right-of-way will remove vegetative cover and will cause temporary displacement of wildlife species along the preferred route. The construction right-of-way and extra workspaces will remain relatively clear of vegetation until mechanical restoration occurs. Some smaller, less mobile animals such as amphibians, reptiles, and small mammals may experience direct mortality during clearing and grading activities. Larger and more mobile animals will disperse from the Project area during construction. Displaced individuals may temporarily occupy adjacent, undisturbed areas, possibly causing increased competition with other individuals in those areas. Some individuals may return to their previously occupied habitats after construction has been completed and suitable habitat has become reestablished. The intensity of construction-related disturbances will depend on the particular species and the time of year during construction.

Clearing of herbaceous and shrub communities in the open areas of the temporary right-of-way, both in upland and wetland areas, will cause a short-term impact due to the relatively quick recolonization of plant species that comprise these communities. Enbridge will utilize herbaceous seed mixes on disturbed areas following the completion of pipeline construction. Enbridge expects that pre-existing herbaceous and shrub habitats will quickly become reestablished and that wildlife species that use these habitats will return relatively soon after construction. Enbridge will employ best management practices included in its EPP (refer to Appendix B) to limit the introduction or spread of invasive plant species.

Enbridge will allow forested areas outside of the permanently maintained right-of-way to revegetate naturally with tree and shrub species common to the area. There will be medium-term impacts on wildlife that use forests, due to the conversion of previously forested habitat to herbaceous-dominated habitat on the temporary construction right-of-way. Over time, natural growth and succession will restore the temporary portion of the construction right-of-way and extra workspaces to a forested community, with wildlife typical of forest habitats returning.

The Project will involve the permanent removal of forested habitat along the right-of-way, which convert to non-forest habitat for the life of the pipeline. Enbridge will minimize long-term impacts on wildlife species inhabiting undisturbed forests in areas where the Project parallels existing, maintained rights-of-way. Enbridge anticipates that the incremental loss of this forested habitat along the existing cleared right-of-way will not have a significant effect on wildlife species.

3.5.3 Fisheries

3.5.3.1 Existing Fisheries Resources

The Project will cross the Pokegama and Little Pokegama Rivers, unnamed tributaries of those rivers, and other intermittent, ephemeral streams, or ditches. The Pokegama and Little Pokegama Rivers enter into

the Pokegama and Little Pokegama Bays, respectively. Both bays are part of the St. Louis River estuary and provide habitat for many species of native fish. According to the City of Superior website, the Pokegama River is an important spawning area for walleye (*Stizostedion vitreum*), northern pike (*Esox lucius*), longnose suckers (*Catostomus catostomus*), white suckers (*Catostomus commersoni*), burbot (*Lota lota*), and other fish species. Table 3.5.3-1 lists native fish species found in the St. Louis River estuary in the mouths of clay-influenced tributaries, including the Pokegama River (based on Appendix 6 of St. Louis River Citizens Action Committee [SLRCAC], 2002). The actual occurrence of fish species in the Pokegama and Little Pokegama Rivers and their tributaries at waterbody crossings for the Project depends on the distance upstream from the estuary, the availability of suitable habitat, and other factors.

TABLE 3.5.3-1

Native Fish Species in the Pokegama River and Other Tributaries of the St. Louis River Estuary

Common Name	Scientific Name	Abundance	Spawn[a]		Nursery[a]				Adult[a]			
			Sp	Su	Sp	Su	F	W	Sp	Su	F	W
lake sturgeon	*Acipenser fulvescens*	common			Y	Y	Y	Y				
rockbass	*Ambloplites rupestris*	common		Y	Y	Y	Y	Y	Y	Y	Y	Y
longnose sucker	*Catostomus catostomus*	present			Y	Y			Y			
white sucker	*Catostomus commersoni*	common			Y	Y	Y	Y	Y	Y	Y	Y
lake chub	*Couesius plumbeus*	trace	Y	Y	Y	Y						
northern pike	*Esox lucius*	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
muskellunge	*Esox masquinongy*	present	Y		Y	Y	Y	Y	Y	Y	Y	Y
johnny darter	*Etheostoma nigrum*	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
black bullhead	*Ictalurus melas*	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
yellow bullhead	*Ictalurus natalis*	trace		Y	Y	Y	Y	Y	Y	Y	Y	Y
brown bullhead	*Ictalurus nebulosus*	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
channel catfish	*Ictalurus punctatus*	common	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
pumpkinseed	*Lepomis gibbosus*	trace		Y	Y	Y	Y	Y	Y	Y	Y	Y
bluegill	*Lepomis macrochirus*	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
burbot	*Lota lota*	present			Y	Y	Y	Y	Y			Y
smallmouth bass	*Micropterus dolomieui*	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
largemouth bass	*Micropterus salmoides*	trace		Y	Y	Y	Y	Y	Y	Y	Y	Y
silver redhorse	*Moxostoma anisurum*	common			Y	Y	Y	Y	Y	Y	Y	Y
shorthead redhorse	*Moxostoma macrolepidotum*	common			Y	Y	Y	Y	Y	Y	Y	Y
golden shiner	*Notemigonus crysoleucas*	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
emerald shiner	*Notropis atherinoides*	common		Y	Y	Y	Y	Y	Y	Y	Y	Y
common shiner	*Notropis cornutus*	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
spottail shiner	*Notropis hudsonius*	common		Y	Y	Y	Y	Y	Y	Y	Y	Y
mimic shiner	*Notropis volucellus*	present			Y	Y	Y	Y	Y	Y	Y	Y
tadpole madtom	*Noturus gyrinus*	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
yellow perch	*Perca flavescens*	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
log perch	*Percina caprodes*	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
trout perch	*Percopsis omiscomaycus*	common		Y	Y	Y	Y	Y	Y	Y	Y	Y
fathead minnow	*Pimephales promelas*	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
black crappie	*Poxomis nigromaculatus*	common	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

TABLE 3.5.3-1

Native Fish Species in the Pokegama River and Other Tributaries of the St. Louis River Estuary

Common Name	Scientific Name	Abundance	Spawn[a]		Nursery[a]				Adult[a]			
			Sp	Su	Sp	Su	F	W	Sp	Su	F	W
walleye	*Stizostedion vitreum*	common			Y	Y	Y	Y	Y	Y	Y	Y

[a] A "Y" indicates occurrence of species during different life stages in spring (Sp), summer (Su), fall (F), and winter (W), based on Appendix 6 of SLRCAC (2002).

3.5.3.2 Sensitive Fish Species and Habitats

According to the NHI review, two fish species of special concern are known to occur within 1 mile (American eel [*Anguilla rostrata*]) or 2 miles (lake sturgeon [*Acipenser fulvescens*]) of the Project (Table 3.5.3-2). These species are also SGCN, though the American eel has a low association score for the Superior Coastal Plain. All of the American eel occurrences are located in the St. Louis River/Superior Bay/Allouez Bay or in the Nemadji River and are more than 20 years old. The lake sturgeon has a high association score for the Superior Coastal Plain, but it prefers large rivers and lakes, which do not occur in the Project area.

According to WDNR online mapping, the Project avoids designated trout waters and the two WDNR Fisheries Areas in Douglas County, the St. Louis/Red River Stream Bank Protection Area and Person Lake.

TABLE 3.5.3-2

NHI Occurrences of Fish Species Within 1 or 2 Miles of the Project

Species	**MP 600.8 – 607.0**	**MP 607.0 – 611.2**		**MP 611.2 – 612.2**	**MP 612.2 – 612.5**		**MP 612.5 – 613.1**	**MP 613.1 – 614.0**		**MP 614.0 – 615.1**
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
lake sturgeon (*Acipenser fulvescens*)[b]	X	X	X							
American eel (*Anguilla rostrata*)[a]								X	X	X

[a] NHI occurrences within 1 mile of the Project.
[b] NHI occurrences within 2 miles of the Project.

3.5.3.3 General Construction and Operation Impacts and Mitigation

Installation of the pipeline across streams may temporarily impact movement of fish upstream and downstream of crossing sites due to disturbances associated with construction. The physical disturbance of the streambed may temporarily displace adult fish and may dislodge other aquatic organisms. Some mortality of less mobile organisms, such as small fish and invertebrates, may occur within the trenching area. Enbridge will remove aquatic plants, woody debris, and boulders that provide in-stream fish habitat during trenching. Noise disturbances upstream and downstream of the sites will deter fish that may otherwise inhabit the area. These disturbances will be temporary and are not expected to significantly affect fisheries resources.

Sediment loads may temporarily increase downstream during open-cut stream crossings. These increased loads may temporarily affect the more sensitive fish eggs, fish fry, and invertebrates inhabiting the downstream area. In a review of 27 case studies of open-cut pipeline water crossings, Reid and Anderson (1999) found that adverse effects on fish and fish habitat were not consistently documented. Where adverse effects did occur, the effects were short-term, and recovery generally occurred within a year of construction. Enbridge will install pipeline at stream crossings as quickly as possible to allow suspended sediment levels to return to pre-construction levels upon completion of in-stream work.

Enbridge will remove most streambank vegetation across the right-of-way during construction. After construction, Enbridge will maintain an area over the pipeline in an herbaceous state, and trees that are located near the pipeline will be cut and removed from the right-of-way to facilitate routine aerial inspections. Changes in the light and temperature characteristics of some streams may affect the behavioral patterns of fish, including spawning and feeding activities, at the pipeline crossing locations. The maintained streambanks, however, are not wide enough to have a significant impact on general temperature and light conditions of the affected streams.

To minimize the potential for adverse impacts on the fisheries at river and stream crossings, Enbridge will implement erosion and sediment control measures specified in the EPP (refer to Appendix B) and limit the duration of construction in these waterbodies.

3.5.4 Threatened and Endangered Species

3.5.4.1 Federal Threatened and Endangered Resources

Enbridge identified federally listed and candidate species under the Endangered Species Act (ESA) located within the Project area by researching USFWS county-specific species lists on the USFWS website, and by evaluating via desktop analysis, if potential habitat exists within the Project area.

Four federally listed and one proposed species have been documented in Douglas County (refer to Table 3.5.4-1). Designated critical habitat for the piping plover also occurs in Douglas County.

TABLE 3.5.4-1

Status of Federally Listed Species and Designated Critical Habitat [a]

Species	Status	Habitat
Piping Plover - Great Lakes population (*Charadrius melodus*)	Endangered Critical Habitat	Sandy beaches, bare alluvial and dredge spoil islands
Kirtland's warbler (*Dendroica kirtlandii*)	Endangered	Young jack pine stands (5-25 years old)
Canada lynx (*Lynx canadensis*)	Threatened	Northern forest
Northern long-eared bat (*Myotis septentrionalis*)	Proposed	Cavities or crevices of both live and dead trees.
Fassett's locoweed (*Oxytropis campestris var. chartacea*)	Threatened	Open sandy lakeshore

[a] http://ecos.fws.gov

Enbridge analyzed the potential for project-related impacts under the ESA. Enbridge assessed the effects for each species in the Project area by evaluating historic and present occurrences, availability of potential habitat within the Project area, the species' natural history, and results of desktop and field-based habitat assessments and surveys. Following USFWS terminology, Enbridge evaluated each species and determined the direct, indirect, and cumulative effects of the proposed activities on each species based on

past pipeline projects and USFWS interactions on those projects. Potential determination outcomes reached for federally listed species under the ESA include:

- No effect;
- May affect, but is not likely to adversely affect; or
- May affect, and is likely to adversely affect.

Canada Lynx (*Lynx canadensis*)

The Canada lynx is a medium-size cat that generally inhabits moist boreal forests that have cold, snowy winters and a high-density snowshoe hare prey base. The predominant vegetation of boreal forests is conifer trees, primarily species of spruce (*Picea* spp.) and fir (*Abies* spp.). In the contiguous United States, the boreal forest type transitions to deciduous temperate forest in the Northeast and Great Lakes, and to subalpine forest in the west. Individual lynx maintain large home ranges generally between 12 to 83 square miles. Noise and/or physical disturbance would prompt lynx to vacate the area for a short period of time. Project effects, if any, are expected to be minor and temporary. Because the lynx is a mobile species, Enbridge anticipates that any lynx will move away from the local area of disturbance, and may begin using the area again shortly after cessation of activities. Lynx movement may be temporarily impeded and individuals may be displaced, but the impact on the lynx population would be minimal. Den sites are likely to be located around downed logs and windfalls in the forest interior away from the cleared pipeline corridor. Therefore, Enbridge concludes the Project is not likely to adversely affect the Canada lynx, subject to concurrence of the USFWS.

Kirtland's Warbler (*Dendroica kirtlandii*)

The Kirtland's warbler is a habitat specialist of dense, patchy jack pine (*Pinus banksiana*) forests. Most occupied stands have a limited hardwood component that may include aspen, northern pin oak (*Quercus ellipsoidalis*), black oak (*Quercus velutina*), and black cherry (*Prunus serotina*) (WDNR, 2014d). Suitable breeding habitat conditions were created in pre-settlement times by repeated forest fires, but forest fragmentation and fire suppression have severely reduced the extent of wildfire-regenerated jack pine habitat in Wisconsin. Although wildfire regenerated habitat provides optimal conditions for this species, most occupied habitat now occurs on plantations either managed specifically for this species or for timber.[3] As explained in Section 3.5.1.1, the Project occurs within the Superior Coastal Plain Ecological Landscape. According to the WWAP, the nearest Ecological Landscape with Kirtland's warbler habitat (pine barrens and northern dry forest) is the Northwest Sands (WDNR, 2005). The nearest portion of the Northwest Sands Ecological Landscape occurs more than 12 miles southeast of the Project.[4] Furthermore, there were no NHI occurrences of Kirtland's warbler within 1 mile of the Project area. As a result, Enbridge concludes the Project will have no effect on the Kirtland's warbler, subject to concurrence of the USFWS.

Piping Plover (*Charadrius melodus*)

The Great Lakes population of piping plovers utilizes the open, sandy beaches, barrier islands, and sand spits formed along the perimeter of the Great Lakes. They do not inhabit lakeshore areas where high bluffs formed by severe erosion have replaced beach habitat. They prefer sparsely vegetated open sand, gravel, or cobble for their nesting sites. Many of the coastal beaches traditionally used by piping plovers

[3] http://dnr.wi.gov/topic/EndangeredResources/Animals.asp?mode=detail&SpecCode=ABPBX03180

[4] http://dnr.wi.gov/topic/landscapes/index.asp?mode=detail&Landscape=2

for nesting have been lost to commercial, residential, and recreational developments.[5] The habitat along the Project route is comprised of an herbaceous utility corridor with mainly forestland adjacent, and the Project is located within the interior of Douglas County over 1.5 miles from the shoreline of Superior Bay. Furthermore, there were no NHI occurrences of piping plover within 1 mile of the Project area. As a result, Enbridge concludes the Project will have no effect on the piping plover, subject to concurrence of the USFWS.

Fassett's Locoweed (*Oxytropis campestris* var. *chartacea*)

Fassett's locoweed is a perennial in the pea family that grows on gentle slopes in sand-gravel shorelines around shallow lakes that are subject to water level fluctuations. The plant depends on a large seed bank and the open habitat (above the water line) provided when lake levels are low for long-term population maintenance.[6] As stated above, the habitat along the Project route is comprised of an herbaceous utility corridor with forestland adjacent in most locations. Furthermore, there were no NHI occurrences of Fassett's locoweed within 1 mile of the Project area, and Enbridge did not identify any Fassett's locoweed in the Project area during botanical field surveys, nor the did WDNR request Fassett's locoweed be targeted for botanical field surveys (refer to Section 3.5.4.2 for additional details). As a result, Enbridge concludes the Project will have no effect on Fassett's locoweed, subject to concurrence of the USFWS.

Northern Long-Eared Bat (*Myotis septentrionalis*)

The northern long-eared bat ranges across much of the eastern United States. During the summer, adult females form breeding or maternity colonies that range in size from a few individuals to 30 or 60 adults (Caceres and Barclay, 2000; WDNR, 2013a). Males typically roost alone (Lacki and Schwierjohann, 2001). Overall, the species appears to be opportunistic in selecting summer roosts (USFWS, 2013). Roost sites may include both live and dead trees and can occur under bark and in crevices or cavities, suggesting that northern long-eared bats are habitat generalists. The species' plasticity in roost selection may allow it to adapt to changes in forestry practices in its home range (Timpone et al., 2010).

Northern long-eared bats typically hibernate in caves and mines in mixed species groups, beginning hibernation in September or October and emerging in May (WDNR, 2013a). The species does not migrate great distances between its summer roosting habitat and winter hibernacula (USFWS, 2011).

The USFWS proposed to list the northern long-eared bat as endangered under the ESA on October 2, 2013; a listing is tentatively planned for fall of 2014. Enbridge is evaluating the species as though it is currently listed, because although no legal requirement exists to protect under review proposed species, this species may become listed prior to the completion of construction of the Project.

Enbridge is assessing the potential for suitable habitat initially through desktop analysis of forested areas along the Project route. Potential impacts on individual bats may occur if clearing or construction occurs when the species is occupying its summer habitat. Bats may be disturbed due to noise or human presence or may be killed or injured if the tree that they are occupying is felled. Potential mitigation measures may include clearing trees or constructing while the species is in hibernation. These effects are not likely to cause long-term declines in populations in the area. Enbridge will use the data from the desktop analysis to inform surveys, evaluate potential impacts and develop appropriate conservation measures, as necessary, based on future discussions with USFWS.

---

5 http://ecos.fws.gov/docs/life_histories/B079.html

6 http://www.fws.gov/midwest/endangered/plants/fassetts/index.html

USFWS Consultation – Sandpiper Pipeline Project

Enbridge initiated informal consultation on the Sandpiper Pipeline Project in early 2013 with the Midwest Region Ecological Services Field Office (Region 3) of the USFWS. The initial consultation letter included a list of federally endangered, threatened, and candidate species that may occur in the Project area in Wisconsin. The letter also requested discussions with USFWS to ensure that Enbridge considered recommendations regarding the ESA, Migratory Bird Treaty Act (MBTA), and Bald and Golden Eagle Protection Act (BGEPA) during Project planning.

The COE initiated Section 7 informal consultation in late 2013. Informal consultations with COE, USFWS, and Enbridge will continue in 2014.

USFWS Consultation – Line 3 Replacement Project

Enbridge initiated informal consultation on the Line 3 Replacement Project with the USFWS Region 3's Green Bay Field Office in September 2013. Enbridge received concurrence with its determinations of Project impacts on federally listed species in a letter dated October 18, 2013. However, Enbridge will continue to work with the USFWS and COE as the northern long-eared bat was not addressed in the initial consultation.

3.5.4.2 State Threatened and Endangered Resources

In May 2013, Enbridge prepared a preliminary WDNR Proposed Endangered Resources Review, which includes the NHI review described above and identifies the need for habitat assessments and/or species-specific field surveys along the Project route. The WDNR requested field surveys for the eight plant species listed in Table 3.5.4-2 and habitat assessments for the two wildlife species listed in Table 3.5.4-3.

TABLE 3.5.4-2

Plant Species Targeted for Field Surveys in the Project Area

Common Name	Scientific Name	State Status
arrow-leaved sweet-coltsfoot	*Petasites sagittatus*	threatened
floating marsh-marigold	*Caltha natans*	endangered
marsh grass-of-Parnassus	*Parnassia palustris*	threatened
clustered bur reed	*Sparganium glomeratum*	threatened
seaside crowfoot	*Ranunculus cymbalaria*	threatened
slender spike-rush	*Eleocharis nitida*	endangered
small yellow water crowfoot	*Ranunculus gmelinii*	endangered
tea-leaved willow	*Salix planifolia*	threatened

TABLE 3.5.4-3

Wildlife Species Targeted for Habitat Assessments in the Project Area

Common Name	Scientific Name	State Status
upland sandpiper	*Bartramia longicauda*	threatened
wood turtle	*Glyptemys insculpta*	threatened

Botanical Field Surveys

Enbridge conducted the majority of planned botanical field surveys in Wisconsin in 2013. The goal of the surveys was to determine whether the threatened and endangered plant species listed in Table 3.5.4-1 occur along the Project route. Because survey access was not available for all sites during the early season window (between June 15 and July 15) in 2013, Enbridge will re-evaluate the need for early season flora surveys at the targeted locations in 2014.

Enbridge identified survey sites along the Project route through a desktop habitat assessment that incorporated existing data from its recent projects, NHI occurrences, and interpretation of aerial photography. Biologists utilized targeted intuitive-meander surveys to search suitable habitat and microhabitat in the field between June 27 and September 30, 2013. They documented all threatened and endangered species, as well as species of special concern, at survey sites when observed.

There were 527 occurrences of 8 species within the Project area. The biologists observed all species listed in Table 3.5.4-2 (except *Caltha natans*), plus *Juncus vaseyi* (a species of special concern in Wisconsin; refer to Section 3.5.1.3), at one or more sites. *Salix planifolia* was the most frequently observed species, followed by *Petasites sagittatus*. The least frequently observed species were *Ranunculus cymbalaria* and *Ranunculus gmelinii*. Refer to Table 3.5.4-4.

Enbridge submitted the *2013 Wisconsin Protected Flora Field Survey Report* to the WDNR under separate cover.

TABLE 3.5.4-4

Rare Plant Species Observed During 2013 Botanical Field Surveys Within the Project Area

Species [Total Number of Occurrences]	**MP 600.8 – 607.0**	**MP 607.0 – 611.2**		**MP 611.2 – 612.2**	**MP 612.2 – 612.5**		**MP 612.5 – 613.1**	**MP 613.1 – 614.0**		**MP 614.0 – 615.1**
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
SPECIAL CONCERN										
Vasey's rush [67] (*Juncus vaseyi*)	X	X						X	X	X
THREATENED										
marsh grass-of-Parnassus [7] (*Parnassia palustris*)			X							
sweet coltsfoot [159] (*Petasites sagittatus*)		X	X							
seaside crowfoot [2] (*Ranunculus cymbalaria*)										X
tea-leaved willow [267] (*Salix planifolia*)	X	X	X					X	X	X
clustered bur reed [5] (*Sparganium glomeratum*)	X	X								
ENDANGERED										
neat spike-rush [18] (*Eleocharis nitida*)		X	X					X		X
small yellow water crowfoot [2] (*Ranunculus gmelinii*)			X							

Wildlife Habitat Assessments

Upland Sandpiper

Enbridge conducted a habitat assessment for the upland sandpiper in Wisconsin in 2013. The WDNR upgraded the upland sandpiper from a species of special concern to a state-threatened species as of January 1, 2014. The Natural Community known as Surrogate Grasslands (i.e., unmowed grasses, pastures, hayfields) is the highest priority habitat for the upland sandpiper in the Superior Coastal Plain (WDNR, 2005).

A desktop assessment yielded 36 sites with potentially suitable habitat for upland sandpipers along the Project route. Survey crews visited these sites in the field between September and October 2013. The crews were not able to access three of the sites due to lack of landowner permission. At the remaining 33 sites, the crews assessed habitat to determine if the areas identified in the desktop assessment met the criteria for Surrogate Grasslands. They ranked habitat quality as high, moderate, or low based on its suitability for upland sandpipers.

The survey crews ranked 5 of the 33 sites in the field as high quality, 3 as moderate quality, and 25 as low quality. The survey crews did not observe individuals of any federally listed or state-listed bird species (including state special-concern species) during the field habitat assessments in 2013.

Based on consultation with WDNR, Enbridge may conduct field surveys for breeding upland sandpipers during the 2014 nesting season at the sites having high- or moderate-quality habitat. Enbridge submitted the *Wisconsin 2013 Upland Sandpiper Habitat Assessment Report* to the WDNR under separate cover.

Wood Turtle

Enbridge conducted a desktop habitat review for the wood turtle in Wisconsin in 2013. The wood turtle uses moderate- to fast-flowing, clear streams or rivers associated with forested riparian corridors for primary overwintering, courtship, basking, and foraging habitat (WDNR, 2013b). Typically these 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 (WDNR, 2013b).

Enbridge used data from 2013 field surveys of waterbodies along the Project route to identify potentially suitable habitat for wood turtles. The data included flow rate, dominant stream bed substrate material, and photographic documentation of water clarity at each waterbody.

Two surveyed waterbodies along the Project met the criteria of potentially suitable habitat for the wood turtle. The survey crews did not observe any individual wood turtles during waterbody field surveys.

Enbridge plans to conduct a field assessment of these two waterbodies within and adjacent to the Project area in spring 2014 to determine if suitable habitat is present, and will continue to work with the WDNR to identify the proper avoidance and/or mitigation measures for construction activities in these areas, as necessary. Enbridge submitted the *Wisconsin 2013 Wood Turtle Habitat Assessment Report* to the WDNR under separate cover.

3.5.4.3 General Construction and Operation Impacts and Mitigation

Enbridge will continue to consult with the USFWS and the WDNR on the status of mitigation strategies for protected species. If any of these species are identified in the construction right-of-way during surveys, Enbridge will work with these agencies to develop mitigation plans to avoid or minimize impacts on the potentially affected species.

3.6 LAND USE AND PUBLIC LANDS

Enbridge classified the land use using the National Land Cover Database 2006 (NLCD2006) Classification System, which is distributed by the USGS (Fry et al., 2011). This system utilizes satellite imagery to classify land use into 29 categories. Enbridge combined these land use categories into six general categories: forest land, developed land, wetlands, open land, agricultural land, and shrubland, based on prevalent land use and vegetation cover types. Definitions of the six land use categories (per the NLCD2006 Classification System) include:

- Forest Land consists of areas classified as deciduous forest, evergreen forest, and mixed forest.
- Developed Land consists of areas classified as low intensity developed, medium intensity developed, high intensity developed, and developed open space.
- Wetlands consists of areas classified as woody wetlands.

- Open Land consists of areas classified as grasslands or herbaceous areas.
- Agricultural Land consists of areas classified as cultivated crops and pasture.
- Shrubland consists of areas classified as shrub/scrub.

The total land requirements for the Projects generally include a 105-foot-wide construction right-of-way, with ATWS at feature crossings (e.g., roads, waterbodies). Table 3.6-1 presents the land use requirements for the Project. Table 3.6-2 compares the land use impacts along the route options. As shown in Table 3.6-2, forest land and wetlands are the most prevalent land uses along the route options, followed by developed land, shrubland, open land, and finally agricultural land.

3.6.1 Forest Land

Construction in most forested areas will be adjacent to existing pipeline or other linear rights-of-way. The forest land crossed is currently in ownership by Douglas County or private landowners. The forests appear to be used primarily as residential property, recreation, or domestic wood products (i.e., firewood).

Enbridge will minimize forest clearing where possible. Enbridge will minimize the potential for erosion and other effects that may be associated with clearing through the implementation of its EPP (refer to Appendix B). Following construction, forest land located within the new permanent easement will be restored and seeded as indicated in the Revegetation section of its EPP (refer to Appendix B). Enbridge maintains its permanent easement on a regular basis to prohibit the growth of woody vegetation over its pipelines for safety and pipeline integrity issues. Forest land located within temporary work areas will be allowed to revert to its preconstruction land use.

TABLE 3.6-1

Land Use Classifications Affected by Construction and Operation of the Project [a]

Land Use Type [b] Impacts [c]	MP 600.8 – 607.0	MP 607.0 – 611.2		MP 611.2 – 612.2	MP 612.2 – 612.5		MP 612.5 – 613.1	MP 613.1 – 614.0		MP 614.0 – 615.1
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
Total Length	6.1	4.2	3.5	1.0	0.3	0.2	0.6	0.9	0.9	1.1
Agricultural										
Length (miles)	0.1	0.0	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	0.0
Con (acres)	1.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Op (acres)	0.8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
% of Total Miles Crossed	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.0%
Forested										
Length (miles)	2.3	1.5	0.9	0.8	0.2	0.2	0.3	0.5	<0.1	0.6
Con (acres)	34.5	23.4	12.5	12.3	2.9	2.6	4.4	7.5	0.4	8.7
Op (acres)	15.2	13.0	5.3	3.8	1.6	1.1	2.3	4.2	0.3	3.1
% of Total Miles Crossed	37.7%	35.7%	25.7%	80.0%	66.7%	100.0%	50.0%	55.6%	4.4%	54.5%
Wetlands										
Length (miles)	2.9	2.5	2.4	<0.1	0.1	0.0	0.0	0.3	0.5	0.0
Con (acres)	43.2	37.1	37.0	0.7	1.5	0.0	0.0	4.4	6.4	<0.1
Op (acres)	15.8	21.3	14.4	0.3	0.6	0.0	0.0	2.6	4.0	<0.1
% of Total Miles Crossed	47.5%	59.5%	68.6%	5.0%	33.3%	0.0%	0.0%	33.3%	55.6%	0.0%
Open Land										
Length (miles)	<0.1	<0.1	<0.1	0.0	0.0	0.0	<0.1	0.1	<0.1	0.0
Con (acres)	0.8	0.3	0.3	0.0	0.0	0.0	<0.1	1.2	0.5	0.0
Op (acres)	0.4	0.2	0.2	0.0	0.0	0.0	<0.1	0.7	0.3	0.0
% of Total Miles Crossed	0.7%	0.5%	5.1%	0.0%	0.0%	0.0%	0.3%	11.1%	4.4%	0.0%
Shrubland										
Length (miles)	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Con (acres)	6.3	0.9	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Op (acres)	3.0	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% of Total Miles Crossed	6.6%	2.4%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Developed										
Length (miles)	0.5	0.1	0.1	0.2	0.0	0.0	0.2	0.0	0.3	0.5
Con (acres)	5.7	0.7	1.3	3.5	0.0	0.0	3.2	0.1	4.7	6.1
Op (acres)	3.4	0.7	0.5	1.1	0.0	0.0	1.3	0.0	2.9	2.7

TABLE 3.6-1

Land Use Classifications Affected by Construction and Operation of the Project [a]

Land Use Type [b] Impacts [c]	**MP 600.8 – 607.0**	**MP 607.0 – 611.2**		**MP 611.2 – 612.2**	**MP 612.2 – 612.5**		**MP 612.5 – 613.1**	**MP 613.1 – 614.0**		**MP 614.0 – 615.1**
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
% of Total Miles Crossed	8.2%	2.4%	2.9%	20.0%	0.0%	0.0%	33.3%	0.0%	33.3%	45.5%

[a] Construction calculations are based generally on the Projects' typical 110-foot-wide construction right-of-way and known additional temporary workspaces.

[b] Agricultural land includes cultivate crops and pasture/hay; Forested land includes deciduous forest, evergreen forest, and mixed forest; Wetlands includes emergent, scrub/shrub, and woody wetlands; Open land includes grassland/herbaceous; Shrubland includes land classified as shrub/scrub; Developed land includes developed land classified as high intensity, medium intensity, low intensity, and open space.

[c] Length = Crossing length of pipeline centerline across land use type.

Con = Impacts within the construction workspace.

Op = Impacts within the permanent right-of-way.

Source: NLCD2006 Classification System (Fry et al., 2011).

TABLE 3.6-2

Land Use Comparison of Project Route Options [a]

Land Use Type [b]	Unit [c]	Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H
Total Affected	Length Crossed (mi)	14.3	13.4	14.2	14.3	14.2	13.5	13.5	13.4
	Con (acres)	210.7	198.0	208.9	209.4	207.6	201.0	199.8	199.2
	Op (acres)	99.3	83.3	98.2	99.2	98.1	84.4	84.4	83.3
Agricultural	Length Crossed (mi)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Con (acres)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	Op (acres)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	% of Total Miles Crossed	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Forested	Length Crossed (mi)	6.2	5.1	6.2	5.8	5.8	5.5	5.1	5.5
	Con (acres)	93.6	75.4	93.3	86.5	86.3	82.7	75.6	82.5
	Op (acres)	43.3	31.1	42.8	39.4	38.9	35.5	31.6	35.1
	% of Total Miles Crossed	43.4%	38.1%	43.7%	40.6%	40.8%	40.7%	37.8%	41.0%
Wetlands	Length Crossed (mi)	5.8	5.8	5.7	6.0	5.9	5.7	5.9	5.6
	Con (acres)	87.0	87.5	85.5	89.0	87.5	87.0	89.0	85.5
	Op (acres)	40.5	34.4	39.9	41.9	41.3	33.7	35.1	33.0
	% of Total Miles Crossed	40.6%	43.3%	40.1%	42.0%	41.5%	42.2%	43.7%	41.8%
Open Land	Length Crossed (mi)	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.2
	Con (acres)	2.4	1.6	2.4	1.6	1.6	2.4	1.6	2.4
	Op (acres)	1.4	1.0	1.4	1.0	1.0	1.4	1.0	1.4
	% of Total Miles Crossed	1.4%	0.7%	1.4%	0.7%	0.7%	1.5%	0.7%	1.5%
Shrubland	Length Crossed (mi)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Con (acres)	7.2	7.8	7.2	7.2	7.2	7.8	7.8	7.8
	Op (acres)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
	% of Total Miles Crossed	3.5%	3.7%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%
Developed	Length Crossed (mi)	1.5	1.8	1.5	1.8	1.8	1.5	1.8	1.5
	Con (acres)	19.3	24.4	19.3	23.9	23.9	19.8	24.4	19.8
	Op (acres)	9.3	11.9	9.3	12.1	12.1	9.0	11.9	9.0
	% of Total Miles Crossed	10.5%	13.4%	10.6%	12.6%	12.7%	11.1%	13.3%	11.2%

[a] Construction calculations are based generally on the Projects typical 110-foot-wide construction right-of-way and known additional temporary workspaces.

[b] Agricultural land includes cultivate crops and pasture/hay; Forested land includes deciduous forest, evergreen forest, and mixed forest; Wetlands includes emergent, scrub/shrub, and woody wetlands; Open land includes grassland/herbaceous; Shrubland includes land classified as shrub/scrub; Developed land includes developed land classified as high intensity, medium intensity, low intensity, and open space.

[c] Length = Crossing length of pipeline centerline across land use type.
Con = Impacts within the construction workspace.
Op = Impacts within the permanent right-of-way.

Source: NLCD2006 Classification System (Fry et al., 2011).

3.6.1.1 Managed Forest Law

Wisconsin enacted the Managed Forest Law (MFL) in 1985 to allow private landowners to obtain a tax relief benefit by enrolling their forested land as MFL land (similar in-nature to the CRP administered by

the NRCS). The MFL is a free and voluntary enrollment, with very specific criteria required for enrollment. The Forest Crop Law (FCL) is the predecessor to the MFL program, which is a landowner incentive program that encourages long-term, sustainable management of private woodlands by reducing and deferring property taxes. Wisconsin enacted the FCL program in 1927 and closed enrollment on January 1, 1986. Enbridge identified eight properties enrolled in one of these programs. Table 3.6.1-1 identifies the tract number, legal description, enrollment program, area of impact, and impacts. Landowners will provided a cutting notification at least 30 days prior to clearing activities on the tracts identified below.

TABLE 3.6.1-1

Tracts Enrolled in the Managed Forest or Forest Crop Law Program

Tract No.	MP	Crossing Length (feet)	Legal Description
WI-DO-007.000	601.9	1,173.1	T48N, R15W, Sec. 32
WI-DO-010.000	602.6	114.4	T48N, R15W, Sec. 33
WI-DO-011.000	602.6	910.0	T48N, R15W, Sec. 33
WI-DO-017.000	603.1	333.5	T48N, R15W, Sec. 33
WI-DO-020.000	603.4	1,410.7	T48N, R15W, Sec. 34
WI-DO-023.000 [b]	604.2	N/A	T48N, R15W, Sec. 26
WI-DO-024.000	604.2	171.6	T48N, R15W, Sec. 26
WI-DO-025.000	604.2	1,224.3	T48N, R15W, Sec. 26

[a] Area to be permanently cleared following pipeline construction.
[b] Tract impacted temporarily by construction activities, but it not by the pipeline centerline.

Enbridge will continue to work with the potentially affected landowners to determine if any impacts to MFL lands will occur as a result of construction activities and will compensate them accordingly if their status is affected.

3.6.2 Agricultural Land

The agricultural land affected by the Project is predominately used for pasture and hay production, with small areas of cultivated crops. Enbridge reviewed information provided on the DATCP website and confirmed there are no certified organic farms in the vicinity of the Project area. Organic farmers are not required to register with the DATCP, and farms exempt from the requirement to certify and farms in transition to organic were not available. Enbridge will continue to work with affected landowners to identify organic farms and will plan construction activities accordingly.

3.6.3 Wetlands

Tables 3.6-1 and 3.6-2 provide information on wetlands based on the NLCD2006 Classification System; however, more detailed information regarding wetlands based on Enbridge's wetland delineations is provided in Section 3.4.3.

3.6.4 Open Land

Open land, including grasslands/herbaceous land use types, will be temporarily disturbed during grading, trenching, backfilling, and restoration. Enbridge will reseed and mulch open land in upland areas after final construction clean up in accordance with the EPP (refer to Appendix B).

3.6.5 Shrubland

Shrubland consists of land designated as shrub/scrub, which is dominated by shrubs and young or small trees. Similar to open land, construction will be temporarily disturb shrubland during grading, trenching, backfilling, and restoration. Enbridge will reseed and mulch shrubland in upland areas after final construction clean up in accordance with the EPP (refer to Appendix B); however, Enbridge's maintenance of its permanent easement will prohibit the growth of woody vegetation over its pipelines for safety and pipeline integrity issues.

3.6.6 Developed Land

Developed land affected by the Project includes developed open space and developed land classified as low, medium, and high intensity. Based on examination of aerial photographs, there are approximately 20 residences within 300 feet of the route; of these, 2 are within 25 feet of the route. Many of the residences and most of the residential land are in or near the incorporated areas discussed in Section 3.1.

3.6.7 Special Land Uses

3.6.7.1 Recreation Properties

Enbridge's existing easement bisects the Nemadji Golf Club in Superior, Wisconsin. The landowner expressed concerns regarding the potential impacts on the daily operation of the golf course during a limited operational season. Enbridge evaluated an alternative route that avoids the golf course (refer to Section 2.0).

The Project intersects with two snowmobile/winter ATV trails, one of which is crossed twice. Enbridge will post appropriate warning signs during construction activities and will restore trails to pre-construction conditions.

3.6.7.2 Visual Resources

Pipeline construction will affect visual resources along the parts of the route. This effect will be most pronounced in forested areas that are visible from residences or roads. The Project will not impact scenic or rustic roads, and the impact on motorists will be brief and limited to the time it takes to pass the right-of-way. Visual impacts include primarily the time it takes to install the pipeline and restore the right-of-way. The visual impact of construction will improve quickly after grass and other vegetation becomes established. Because of collocation with existing rights-of-way, long-term visual impacts will be minimal.

3.7 SOCIOECONOMIC RESOURCES

Construction and operation of the Project will result in both temporary and long-term socioeconomic impacts in Douglas County. During construction, there will be temporary increases in local population, demand for short-term housing, use of transportation systems, and expenditures in local economies for goods and services. Construction will also result in temporary impacts on agricultural production. Long-term impacts associated with the Project include payment of local property and/or ad valorem taxes and the creation of both permanent and temporary jobs for pipeline operation and maintenance activities.

This section provides a description of the existing socioeconomic conditions and an analysis of temporary and long-term impacts on Douglas County.

3.7.1 Existing Socioeconomic Conditions

Enbridge reviewed 2010 and 2012 U.S. Census Bureau data and estimates to gather information on existing socioeconomic conditions in Douglas County. Table 3.7.1-1 presents information on current population levels and density, per capita income, workforce, unemployment rates, and employment industries.

TABLE 3.7.1-1

Existing Socioeconomic Conditions in the Project Area

State/County	Population Estimate [a]	Population Density (people per sq. mile)[a]	Per Capita Income [a]	Civilian Labor Force [a]	Unemployment Rate (percent)[a]	2007-2011 Major Employment Industries [a]
Wisconsin	5,726,398	105	$27,192	3,079,790	4.9	Educational, health, and social services; Manufacturing; Retail trade
Douglas	43,785	33.9	$24,741	23,639	4.6	Educational, health, and social services; Retail trade; Arts, entertainment, recreation, and accommodation and food services.

[a] U.S. Census Bureau, http://quickfacts.census.gov, 2012 (estimated population); 2010 (population density); 2007-2011 (per capita income 2011 USD, major employment industries, and unemployment rate.)

Population density (an indicator of the extent of economic development) in Douglas County averages 33.9 people per square mile. The county-level population density is lower than the Wisconsin average of 105 people per square mile, reflecting the rural character of the Project route.

The population of Douglas County in 2012 was approximately 43,785, which marks an approximately one percent increase over the 2010 population.

Per capita income in 2011 was approximately $24,741, slightly below the state average of $27,192. Generally, per capita income is lower in rural counties with low population densities and high unemployment rates, and higher in urban counties with high population densities and low unemployment rates.

The unemployment rates in the Project area are slightly lower than the statewide average. Douglas County's unemployment rate is 4.6 percent, as compared to a statewide average of 4.9 percent.

Employment in the Project area is concentrated in the educational, health and social services, retail trade and arts, entertainment, recreation, and accommodation and food services industries.

In general, the pipeline route avoids population centers and residential areas with exception to the southern portion of the City of Superior (population 26,862).

3.7.2 General Construction and Operation Impacts and Mitigation

3.7.2.1 Construction Schedule and Workforce

Construction activities will occur over an approximate 14 month period, with an in-service date in the first quarter of 2016. In Wisconsin, construction activities are planned to commence in the first quarter of 2015. Enbridge, through its construction contractors and subcontractors, will attempt to hire local

workers where the local workforce possesses the required skills. Construction personnel hired from outside the Project area would augment the local workforce and consist of supervisors, environmental inspectors, and highly skilled mechanical, electrical, and instrumentation/control tradesmen. Non-local workers would relocate to the Project area for the duration of construction. Workers generally will be dispersed along the length of the construction route rather than concentrated at a single work site.

Local workers will commute from their residences to Project work sites on a daily basis. Non-local workers will reside in the vicinity of the Project for short periods and will not typically be accompanied by family members. As a result, incremental demand from non-local workers for public services will be small.

Local communities will benefit from income paid to construction workers, both local and non-local, throughout the construction period. Workers will spend a portion of their earnings locally, thereby providing significant revenues to local communities. Both local and non-local workers will use hospitality services such as restaurants, grocery stores, and gasoline stations. Non-local workers will require temporary housing in addition to hospitality services. Additionally, construction contractors and subcontractors may purchase materials from local vendors, and lease land and equipment for temporary field offices and material storage areas. Operation of the Project will likely require Enbridge to hire additional full-time permanent employees.

Local communities also will benefit from periodic employment created by pipeline operation and maintenance activities. Workers for these activities may be local or non-local. Similar to the construction period, communities will benefit from the monies spent by temporary workers on local hospitality services and temporary housing. Additionally, construction contractors or Enbridge employees may purchase materials from local vendors.

3.7.2.2 Housing

Short-term impacts on housing may result from workers seeking housing near the construction spreads. These impacts are not expected to be significant. Enbridge does not expect that construction crews will encounter difficulties finding temporary housing in the Project area. Local workers will commute from their residences. Non-local workers will use hotels, motels, and apartments or bring their own mobile housing units (such as travel trailers or campers) and stay at local campgrounds. Demands for temporary housing within local communities will be minimal because workers generally disperse along the length of the pipeline route. Enbridge does not expect rental rates to rise significantly as a result of the Project, as the construction timeline is relatively short and workers will be distributed across construction spreads.

3.7.2.3 Transportation

Short-term impacts on local transportation systems may result from construction of the pipeline across roads and railroads, movement of construction equipment and material to work areas, and daily commuting of the construction workforce to work sites. Enbridge does not expect these impacts to be significant.

Enbridge typically will construct the pipelines across paved roadways and railroads using road-boring equipment. This equipment installs the pipelines beneath the road without closing it, thereby avoiding disruptions to vehicular or rail traffic and physical impacts on road/railroad beds. Enbridge will install the pipeline across unpaved roadways by boring or by using the open-cut method. The latter method will temporarily disrupt road traffic as the pipe trench is excavated across the roadway. To minimize traffic delays at open-cut crossings, Enbridge will establish traffic detours before excavating the roadbed. If no

reasonable detours are feasible, Enbridge will maintain at least one traffic lane of the road w, except for brief periods when road closure is essential to install the pipeline. Enbridge will minimize the duration of open-cut crossings and in most cases complete these road crossings in one day or less. Enbridge will notify local residents prior to road closures. Additionally, Enbridge will attempt to avoid closing roads during peak traffic hours.

To maintain safe conditions, Enbridge will direct its construction contractors to adhere to local weight restrictions and limitations for its construction vehicles, and to remove soil that is left on the road surface by the crossing of construction equipment. In addition, when it is necessary for construction equipment to move across paved roads, the Contractor will use mats or other appropriate measures to prevent damage to the road surface.

Enbridge anticipates deliveries of up to 55 truckloads of 80-foot-long pipe segments or "joints" per mile of pipeline over area roads from the storage yard to the construction route. Truck traffic associated with transporting this pipe as well as other construction-related travel associated with the Project may increase the workload of local authorities to assist with traffic control. In addition, local authorities may need to assist with short-term detours at pipeline road crossings or delays in traffic flow from large, slow-moving vehicles. Enbridge does not anticipate that these Project-related demands on local authorities will be significant.

The movement of construction personnel, equipment, and materials from contractor and pipe storage yards to the construction work area will result in additional short-term impacts on the local transportation system. Several construction-related trips will be made each day to and from the job site. Traffic will remain fairly consistent throughout the construction period, and will typically peak during early morning and evening hours. Enbridge anticipates that road congestion will increase during these peak hours but will not significantly disrupt the normal flow of traffic in the Project area.

Construction workers commuting to and from work sites on a daily basis could cause incremental road congestion; however, Enbridge does not anticipate notable rush hour increases due to the generally rural location of the Project. Furthermore, because pipeline construction is generally scheduled to take full advantage of daylight hours, most workers will commute during off-peak hours (i.e., early morning and evening). In addition, construction workers typically will leave their personal vehicles at contractor yards and participate in ride shares to work sites with other workers; this will help reduce road congestion in the vicinity of work sites. Enbridge is also considering busing contractors from yards and other central locations to minimize the number of personal vehicles accessing the right-of-way.

3.7.2.4 Agriculture and Timber Production

Construction of the Project will affect agricultural land, including hayfields and pasture (refer to section 3.6.2). Enbridge will compensate landowners for agriculture-related losses according to negotiated agreements. Enbridge does not anticipate long-term effects on crop yields because they will use construction and restoration techniques designed to protect or restore soil productivity (refer to Enbridge's APP in Appendix C).

Enbridge will salvage and sell merchantable timber if possible, unless otherwise agreed to by the landowner. If Enbridge or their contractor cannot find a commercial buyer, they may dispose of timber by mowing, chipping, grinding, and/or hauling offsite to an approved disposal facility. Enbridge will allow burning of non-merchantable wood only where the contractor acquires all applicable permits and approvals (e.g., agency and landowner) and in accordance with the EPP (refer to Appendix B) and all Federal, state, and local regulations.

3.7.2.5 Tax Revenues

Long-term economic benefits associated with operation of the pipeline include increased tax revenues at the state and county level in the form of property and/or ad valorem taxes.

3.7.2.6 Environmental Justice

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Federal Register 7629) requires that impacts on minority or low-income populations be taken into account when preparing environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by federal agencies. The Environmental Justice Guidance under National Environmental Policy Act (NEPA) prepared by the Council on Environmental Quality (1997) is commonly used in implementing EO 12898 for NEPA review. The purpose of the order is to avoid the disproportionate placement of any adverse environmental, economic, social, or health impacts from federal actions and policies on minority populations, low-income populations, and Indian tribes, and to allow all portions of the population an opportunity to participate in the development of, compliance with, and enforcement of federal laws, regulations, and policies affecting human health of the environment regardless of race, color, national origin, or income.

A description of the population types (i.e., races) residing within Douglas County based on U.S. Census Bureau data from 2012 is presented in Table 3.7.2-1. Douglas County has a higher proportion of American Indians, persons reporting to be of two or more races, and Whites than the State of Wisconsin's respective average percentages, while the County's African American and Asian populations are lower than the state's. The percentage of the population below the poverty level is higher in Douglas County than the statewide percentage.

TABLE 3.7.2-1

Demographic Conditions in the Project Area

State/County	Race as a Percentage of Total Population [a]							Persons of Hispanic or Latino Origin, percent (2012) [a]	Persons Below Poverty, percent (2007-2011) [b]
	White	Black or African American	Asian	American Indian and Alaska Native	Native Hawaiian and Other Pacific Islander	Persons Reporting Other Race/2 or More Races	Total		
WISCONSIN	88.2	6.5	2.5	1.1	0.0	1.7	100	6.2	12.0
Douglas	93.2	1.2	0.9	2.0	0.0	2.8	100	1.2	12.9

Note: (1) This table is based on U.S. Census Bureau figures that, due to rounding, may total slightly more or less than 100 percent. (2) People who identify their origin as Hispanic or Latino may be of any race. Thus, the percent Hispanic or Latino should not be added to the race as percentage of population categories.

[a] Source: U.S. Department of Commerce, Bureau of the Census: State and County Quick Facts; http://quickfacts.census.gov.

[b] Source: U.S. Department of Commerce, Bureau of the Census, Census 2005: State and County Quick Facts; http://quickfacts.census.gov.

3.8 CULTURAL RESOURCES

Archaeological and historic resources, also referred to as "cultural resources" are the material remains of human activity, and can include sites, buildings, objects, and landscapes. Cultural resources are finite and non-renewable; once destroyed they and the information they provide are lost. Federal laws and regulations, beginning with the National Historic Preservation Act (NHPA) of 1966, provide the standards for cultural resources identification, evaluation, and mitigation of impacts. If a cultural resource meets the criteria for listing on the National Register of Historic Places (NRHP), it is considered significant and termed a "historic property."

Enbridge conducted Phase I inventory surveys of the Project area to identify archaeological sites and historic standing structures, to evaluate these sites regarding NRHP eligibility, and to assess Project impacts to them. Avoidance of inventoried archaeological sites and historic structures is Enbridge's preferred method of treatment. In the event that engineering controls are unable to avoid impacts on a site, Enbridge will conduct site evaluations and seek resolution through mitigation for those sites that meet the criteria for listing on the NRHP.

3.8.1 Environmental Review of Impacts on Historic Sites

The Project requires permits from federal and state agencies, leading to review under historic preservation laws and regulations. At the state level, Wisconsin Statute 44.40 requires agencies to review projects for effects to historic resources that are included on a list of locally designated historic places maintained by the Wisconsin Historical Society (WHS). The Project is further subject to Wisconsin Statute 44.40 because the construction workspace crosses state land. Enbridge reviewed the WHS list of state sites, which did not identify any state historic places within one mile of the Project corridor. A review of the properties listed on the NRHP in Douglas County, Wisconsin did not identify any nationally listed historic properties within one mile of the Project corridor.

3.8.2 Previously Recorded Archaeological and Historic Sites

Enbridge reviewed existing site file data maintained by the State Historic Preservation Office (SHPO) at the WHS to identify previously recorded archaeological and historical resources within the Project corridor, and also to identify any cultural resources investigations that had been conducted within the same area. One previously recorded archaeological site within the survey corridor was on file in the WHS database. Site 47DG0116 was recorded during a Phase I survey of a portion of the Great Lakes Gas Transmission corridor in 1996 (Florin, 1996), and revisited in 2007 during the survey for the Alberta Clipper Project (Doperalski et al., 2008). This small and dilapidated dam was recommended as not eligible for listing on the NRHP because it lacked integrity to convey its original appearance and historic significance; the Wisconsin SHPO concurred with the "not eligible" recommendation.

3.8.3 Previously Conducted Investigations

Enbridge also reviewed the SHPO site files to determine what cultural resources investigations occurred within the Project survey corridor. The file search identified nine technical reports on file for inventory surveys conducted within the Project corridor (refer to Table 3.8.4-1). Enbridge designed the current survey to provide comprehensive, 100 percent coverage of the Project corridor, despite possible coverage by earlier inventory surveys. Field survey methods have been greatly improved by technology such as precision handheld GPS measuring units, and Geographical Information Systems which enhance predictive modeling. Enbridge will fully discuss these previous studies in the literature review section of the upcoming technical report for the Phase I inventory survey that it will submit to the SHPO for review.

TABLE 3.8.4-1

Reports documenting previously conducted Phase I reconnaissance surveys within the Project Area

Author	Publication Year	Report Title
Hudak, G. Joseph	1982	Archaeological Survey Of Proposed Railroad Relocation Sites In Douglas County, Wisconsin
Hudak, G. Joseph	1982	Archaeological Survey Of Proposed Railroad Relocation Sites In Douglas County, Wisconsin. Supplementary Report 1982
Hudak, G. Joseph and L.L. Emery	1979	An Archaeological Reconnaissance Of The Proposed Transmission Line #132 From Gary (Duluth) St. Louis County, Minnesota To Stinson (Superior) Douglas County, Wisconsin
Meinholz, Norm	1991	WisDOT Archaeological Survey Field Report: STH 35 From Tower Avenue To 3rd Street
Florin, Frank	1996	A Phase I Archaeological Survey of the Great Lakes Gas Transmission Limited Partnership Pipeline Corridor Between Mileposts 294.0-306.3, Douglas County, Wisconsin
Abel, Elizabeth	2001	Phase I Archaeological Reconnaissance Survey for the Wisconsin Portion of Lakehead Pipe Line Company's Proposed 36-Inch Looping Project from Clearbrook, Minnesota to Superior, Wisconsin, Douglas County, Wisconsin.
Nienow, Jeremy L., Kim Breaky	2002	Phase I Archaeological Survey of the City of Duluth/Great Lakes Interconnect Project, Douglas County, Wisconsin
Doperalski, Mark, Jeanne-Marie Mark, Miranda Van Vleet, Saleh Van Erem	2008	Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Pipeline Projects, Douglas County, Wisconsin. The 106 Group, St. Paul
Doperalski, Mark, Saleh Van Erem, Miranda Van Vleet, and Kristin Bastis	2008	Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Pipeline Projects, Douglas County, Wisconsin. Superior Terminal, Wisconsin. The 106 Group, St. Paul

3.8.4 Phase I Survey Approach

Enbridge completed a Phase I archaeological reconnaissance survey to comply with state and federal guidelines, and assist in planning for the Project. Professional archaeologists employed by Commonwealth Cultural Resources Group, Inc. (CCRG), a consulting firm based in Jackson, Michigan with an office in Milwaukee, Wisconsin, conducted the Phase I survey and prepared a report of their findings in accordance with the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716) and the *Guide to Public Archaeology in Wisconsin* (Dudzik et al., 2012). CCRG obtained Wisconsin Public Lands Field Archaeological Permits for work performed on non-federal public lands subject to requirements of Wisconsin Statute 44.47. CCRG's technical report documenting the survey and results will be submitted under separate cover to the WDNR.

Enbridge prepared a statistically-based GIS-based predictive model that is assisting the design of the field survey for the Project. The predictive model resulted in classifications into high, moderate, and low sensitivity potential for containing archaeological sites and historic structures that may be eligible for the NRHP. Enbridge will continue to utilize this information during archaeological site and historic structure studies throughout the Project and into construction.

Enbridge is also using the statistical model to study the geomorphology of the Project area as part of the Phase I inventory survey which includes a desktop analysis, followed by field verification of locations with the potential for containing deeply buried archaeological sites. If required, deep testing could involve deep shovel probes, auger probes, or mechanical trenching.

CCRG performed archaeological reconnaissance on 190 acres (68 percent) in the Project area in Wisconsin between August and November 2013. CCRG recorded archaeological site 47DG0180, revisited archaeological site 47DG0116, and recommended that both sites were not eligible for inclusion in the NRHP. Additional 88 (32 percent) of the Project workspace will be subject to Phase I survey in 2014. Enbridge will evaluate any archaeological or standing structure sites identified in the survey corridor in 2014, or will gather sufficient information to make a recommendation regarding NRHP eligibility.

3.8.5 Cultural Resource Impacts and Mitigation

The preferred method of treatment for identified cultural resources is avoidance. In the event that a historic property cannot be avoided, Enbridge will consult with the Wisconsin SHPO and other agencies depending on the jurisdiction of the location and the resource, to mitigate adverse effects and implement appropriate treatment plans.

In the event that an unrecorded cultural site is uncovered during construction, Enbridge developed an Unanticipated Discoveries Plan (refer to Appendix D) for use during all Project construction activities. The Unanticipated Discoveries Plan describes the actions to take in the event that a previously unrecorded cultural resources site is discovered during construction activities. The Plan directs the Construction Contractor and the Lead Environmental Inspector to stop activity and protect the find, then contact the appropriate expert or authority.

3.9 AIR QUALITY

Operation of equipment will temporarily generate air emissions during construction. This section addresses the construction and operating emissions from the Project, as well as projected impacts and compliance with regulatory requirements.

3.9.1 Existing Air Quality

Douglas County has a typically continental climate with some modification by proximity to Lake Superior. Temperatures range from negative 40°F in the winter to 90°F in the summer, with a long-term annual average of 39°F. Between 30 and 34 inches of precipitation are experienced annually, with an average of 30 thunderstorms occurring per year.

Federal and state regulations protect ambient air quality. Under the Clean Air Act (CAA) and its amendments, the USEPA established National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone, particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2), to protect human health (primary standards) and public welfare (secondary standards). Individual states may set air quality standards that are at least as stringent as the NAAQS. The state of Wisconsin adopted the NAAQS in Chapter NR 404 of the Wisconsin Administrative Code, effective December 1, 2011. Table 3.9.1-1 includes a summary of the NAAQS.

TABLE 3.9.1-1

National Ambient Air Quality Standards (NAAQS) 40 CFR 50 and WI Administrative Code NR 404.04

Pollutant	Averaging Period	Primary Standard [1]		Secondary Standard [2]		Note
		ppmv	µg/m³	ppmv	µg/m³	
CO	1-hour	35	40,000			[3]
	8-hour	9	10,000			[4]
Lead	quarter		1.5		1.5	[5]
	3-month		0.15		0.15	[6]
NO2	1-hour	0.1	188			[7]
	annual	0.053	100	0.053	100	[8]
O3	1-hour	0.12	235	0.12	235	[9] , [12]
	8-hour	0.08	157	0.08	157	[10], [12]
		0.075	147	0.075	147	[11], [12]
PM10	24-hour		150		150	[13]
	annual					[14]
PM2.5	24-hour		65		65	[15]
			35		35	[16]
			35		35	[17]
	annual		15		15	[18]
			15		15	[19]
			12		15	[20]
SO2	1-hour	0.075	196			[21]
	3-hour			0.5	1,300	[22], [23]
	24-hour		0.14			[24], [25]
	annual		0.03			[26], [27]

Notes:

[1] Primary standards are set to protect human health.

[2] Secondary standards are set to protect public welfare including animals, crops, visibility, and structures.

[3] Maximum 1 hour concentration not to be exceeded more than once per year. 36 FR 8186; April 30, 1971. Retained Primary, Identical secondary standard revoked, 50 FR 37501; September 13, 1985, Retained 59 FR 38906; August 1, 1994, and 76 FR 54294; August 31, 2011.

TABLE 3.9.1-1

National Ambient Air Quality Standards (NAAQS) 40 CFR 50 and WI Administrative Code NR 404.04

Pollutant	Averaging Period	Primary Standard [1]		Secondary Standard [2]		Note
		ppmv	µg/m³	ppmv	µg/m³	

[4] Maximum 8 hour concentration not to be exceeded more than once per year. 36 FR 8186; April 30, 1971. Retained Primary, Identical secondary standard revoked, 50 FR 37501; September 13, 1985, Retained 59 FR 38906; August 1, 1994, and 76 FR 54294; August 31, 2011.

[5] Maximum arithmetic mean averaged over a calendar quarter. 43 FR 4625; October 5, 1978.

[6] The standard is attained when the maximum arithmetic 3-month mean concentration for a 3-year period is less than or equal to the value of the standard. 73 FR 67052, November 12, 2008.

[7] The standard is attained when the 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentration is less than or equal to the value of the standard. 75 FR 6474, February 9, 2010.

[8] The standard is attained when annual arithmetic mean concentration in a calendar year is less than or equal to the value of the standard. 36 FR 8186; April 30, 1971. Retained 50 FR 25532, June 18, 1985, 61 FR 52852, October 8, 1996, and 75 FR 6474, February 9, 2010.

[9] Maximum 1 hour concentration not to be exceeded more than once per year. 44 FR 8202; February 8, 1979. Form changed to expected number of days per calendar year equal to or less than 1, 44 FR 8202; February 8, 1979. Retained 58 FR 13008; March 9, 1993.

[10] The standard is attained when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to the standard. 62 FR 38894; July 18, 1997.

[11] The standard is attained when the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to the standard. 73 FR 16511; March 27, 2008.

[12] The WDNR promulgated the 1−hour and the 8−hour ozone standards in response to actions by the USEPA. Since the USEPA did not repeal these standards when it promulgated the 2008 8−hour standard, and has retained them consistent with its statutory obligation under s. 285.21 (1) (a), Stats.

[13] The standard is attained when the expected number of days per calendar year exceeding the value of the standard is equal to or less than one. 52 FR 24634; July 1, 1987. Form changed, then vacated 62 FR 38652; July 18, 1997. Retained 71 FR 61224; October 16, 2006 and 78 FR 3277, January 15, 2013.

[14] Annual PM10 standard revoked by 71 FR 61144; October 17, 2006.

[15] The standard is attained when the 98th percentile 24-hour concentration is less than or equal to the value of the standard. 69 FR 45595; July 30, 2004.

[16] The standard is attained when the 98th percentile 24-hour concentration is less than or equal to the value of the standard. 71 FR 61224; October 17, 2006.

[17] The standard is attained when the 3-year average of the annual arithmetic mean concentrations is less than or equal to the value of the standard. 78 FR 3277; January 15, 2013.

[18] The standard is attained when annual arithmetic mean concentration in a calendar year is less than or equal to the value of the standard. 69 FR 45595; July 30, 2004.

[19] The standard is attained when annual arithmetic mean concentration is less than or equal to the value of the standard. 71 FR 61224; October 17, 2006.

[20] The standard is attained when the 3-year average of the annual 98th percentile 24-hour average mass concentration values is less than or equal to the value of the standard. 78 FR 3277; January 15, 2013.

[21] The standard is attained when the 3-year average of the annual (99th percentile) of the daily maximum 1-hour average concentrations is less than or equal to the value of the standard. 75 FR 35592; June 22, 2010.

[22] Second-highest successive non-overlapping 3 hour concentration not to be exceeded more than once per year. 61 FR 25580; May 22, 1996.

[23] NR 404.04(2)(b) states it is the maximum 3-hour average concentration, not to be exceeded more than

TABLE 3.9.1-1

National Ambient Air Quality Standards (NAAQS) 40 CFR 50 and WI Administrative Code NR 404.04

Pollutant	Averaging Period	Primary Standard [1]		Secondary Standard [2]		Note
		ppmv	µg/m³	ppmv	µg/m³	

once per year.

[24] The primary NAAQS of 140 ppb, or 366 µg/m3, established at 40 CFR 50.4 (and that was based on the second-highest successive, non-overlapping 24 hour concentration not to be exceeded more than once per year) was revoked effective August 23, 2010 (75 FR35520).

[25] NR 404.04(2)(a)2 states it is the maximum 24-hour average concentration, not to be exceeded more than once per year.

[26] The primary NAAQS of 30 ppb, or 78 µg/m3, established at 40 CFR 50.4 (and that was based on the standard being attained when the annual arithmetic mean concentration in a calendar year is less than or equal to the value of the standard) was revoked effective August 23, 2010 (75 FR35520).

[27] NR 404.04(2)(a)1 states it is the annual arithmetic mean.

The USEPA, state and local agencies established a network of ambient air quality monitoring stations to measure and track the background concentrations of criteria pollutants across the United States. The regulatory agencies then use this data to compare the air quality of an area to the NAAQS. To characterize the background air quality in the region surrounding the Project, Enbridge obtained data from representative air quality monitoring stations. Table 3.9.1-2 provides a summary of the regional ambient air quality monitoring data from the three-year period 2010 through 2012 for the Project area.

TABLE 3.9.1-2

Ambient Air Quality Concentrations

Pollutant	Averaging Period	Monitor [a]	Reading	Value	Year	Approximate Distance
CO	1-hour	A	second max	1.6 ppm	2012	6 miles north
	8-hour	A	second max	1 ppm	2012	6 miles north
NO_2	annual	No data available				
	1-hour	E	first max	102 ppb	2010	22 miles west
O_3	1-hour	B	second max	0.062 ppm	2012	9 miles north
	8-hour	B	3 year average of 4th max	0.050 ppm	2010-2012	9 miles north
$PM_{2.5}$	24-hour	B	3 year average of 98th%	60 µg/m³	2010-2012	9 miles north
	annual	B	3 year annual mean	5.8 µg/m³	2010-2012	9 miles north
PM_{10}	24-hour	C	3-year average of second max	53.5 µg/m³	2010-2012	9 miles north
SO_2	1-hour	No data available				
	3-hour					
	24-hour	F	first max	52 ppb	2010	7 miles north
	annual	No data available				
Pb	3 month	D	maximum	0.01 ppm	2012	10 miles north

[a] A: Monitor ID# 271370018. Located at 314 W. Superior St, Duluth, MN.
B: Monitor ID# 271377550. Located at 1202 E. University Circle, Duluth, MN.
C: Monitor ID # 271370032. Located at 37th Ave W and Oneota St, Duluth, MN.
D: Monitor ID# 271377555. Located at Industrial Road, Duluth, MN
E: Monitor ID# 270177416. Located at 175 University Rd, Cloquet MN
F: Monitor ID# 271370018. Located at 314 W. Superior St., Duluth, MN

On December 7, 2009, the USEPA expanded their definition of air pollution to include six well-mixed greenhouse gases (GHGs), finding that the presence of the following GHGs in at the atmosphere endangers public health and public welfare currently and in the future: CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHG emissions are estimated as carbon dioxide equivalents (CO_2-eq). CO_2-eq emissions are calculated by determining the GHG's global warming potential (GWP) of the gases relative to CO_2 based on the properties of a GHG's ability to absorb solar radiation, as well as its residence time in the atmosphere.

Direct GHG emissions will be associated with pipeline operation (e.g., vehicle operation and fugitive emissions), and indirect emissions will be associated with electrical generation to power the pump stations.

Air Quality Control Regions (AQCRs) are intra- and interstate regions, such as large metropolitan areas, where the improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. The USEPA designates each AQCR, or portion thereof, as attainment, unclassifiable, maintenance, or nonattainment for each pollutant. Designated attainment areas include those locations where an ambient air pollutant concentration is below the applicable ambient air quality standard. Areas where no data are available are unclassifiable, and treated as attainment areas for the purpose of permitting a stationary source of pollution. Nonattainment areas include locations where the ambient air concentration is greater than the applicable ambient air quality standard. Maintenance areas include locations previously designated nonattainment but since demonstrated compliance with the ambient air quality standard(s) for that pollutant.

Douglas County is unclassifiable for PM_{10}, $PM_{2.5}$, NO_2, CO, ozone, SO_2 and Pb.

3.9.2 Applicable Air Quality Rules

The CAA, as amended in 1977 and 1990, is the basic federal statute governing air pollution. In addition, state air quality rules are promulgated in Chapters 400 – 499 of the Wisconsin Administrative Code. The following state and federal air quality regulations will apply to the Project:

- Gasoline and diesel engines used for construction are subject to federal mobile source emission regulations found in 40 CFR 85.
- The Project will be subject to the Prevention of Significant Deterioration (PSD) permitting requirements in NR 405 including the control technology review requirements specified in NR 405.08.
- The pipeline receiving station equipment located at the Superior Terminal is subject to:
    - the general limitations for the control of organic compound emissions in NR 419.03;
    - the storage of petroleum liquids storage, recordkeeping and maintenance requirements as specified in NR 420.03 for the control of organic compound emissions from petroleum and gasoline sources:
    - the methods and procedures for determining compliance with emission limitations specified in NR 439.06; and

- the malfunction prevention and abatement plan requirements specified in NR 439.11.

3.9.3 General Construction and Operation Impacts and Mitigation

Construction and operation of the Project is not expected to have a significant impact on air quality. Construction of the pipeline and associated facilities could result in intermittent and short-term fugitive emissions. These emissions would include dust from soil disruption and combustion emissions from the construction equipment.

Operation of the pipeline receiving stations will result in fugitive volatile organic compound (VOC) emissions from the following equipment: sump tanks, pigging facilities and associated piping components, pumps, metering, prover and sample buildings necessary for pipeline operations. The Project will also result in an increase in the terminal throughput capacity which will result in increased withdrawal loss emissions from terminal storage tanks.

3.9.3.1 Construction Emissions

Construction of the Project would occur over a fourteen-month period, resulting in intermittent/short term/temporary impacts on air quality. During construction, pipes, valves, and fittings will be delivered by truck to the construction site.

Fugitive dust emissions would depend on the moisture content and texture of the soils that would be disturbed. However, Enbridge does not expect emissions from construction to cause or significantly contribute to a violation of an applicable ambient air quality standard because the construction equipment operates on an as-needed basis, primarily during daylight hours. The construction equipment engines must be built to meet the standards for mobile sources established by the USEPA regulations (Title 40 CFR Part 85). In addition, the USEPA requires that the maximum sulfur content of diesel fuel for highway vehicles is 15 parts per million.

Enbridge's EPP specifies that the Contractor take all reasonable steps to control dust near residential areas (refer to Appendix B). Control practices may include wetting soils on the right-of-way, limiting working hours in residential areas, and/or additional measures as appropriate based on site-specific conditions. The use of dust suppression techniques would minimize fugitive dust emissions during construction of the Project, thereby minimizing potential air quality impacts on nearby residential and commercial areas.

Conditions after completion of construction would transition to operational-phase emissions after commissioning and initial startup of the facility.

3.9.3.2 Operational Emissions

The Project involves operation of a pipeline with capacity to deliver 375,000 bpd Bakken crude oil to Superior, Wisconsin and pipeline receiving stations. The Project will be subject to PSD air quality permit approval by the WDNR which includes a Best Available Control Technology (BACT) emission control technology review. Enbridge does not expect the level of emissions from the Project to cause or contribute to a violation of any federal, state, or local air quality standards.

4.0 CUMULATIVE IMPACTS AND CONCLUSIONS

Cumulative impacts represent the incremental effects of a proposed action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a given period.

The purpose of this analysis is to identify and describe cumulative impacts that would potentially result from implementation of the Project. After identification of potential cumulative impacts, cumulative impacts analyses are also used to modify projects where impacts are avoidable, to determine if additional or more appropriate mitigation is necessary, and to include effective monitoring for any impacts of concern. This cumulative impacts analysis uses an approach consistent with the methodology set forth in relevant guidance (CEQ, 1997; 2005; USEPA, 1999). Under these guidelines, inclusion of other potential future actions includes identifying commonalities between the potential impacts that would result from the Project and the impacts likely associated with those other potential future projects. In order to avoid unnecessary discussions of insignificant impacts and projects and to adequately address and accomplish the purposes of this analysis, the cumulative impacts analysis for the Project Enbridge utilized the following guidelines:

- A project must impact a resource category potentially affected by the Project. For the most part, these projects are in the same region of influence or county directly affected by the construction of the Project. Enbridge generally did not assess the effects of more distant projects because their localized impacts and do not contribute significantly to the impacts of the Project.

- Enbridge based the distance into the future that other planned or proposed projects could potentially cumulatively impact the Project area on whether the impacts would be short-term, long-term, or permanent. Most of the impacts would occur during the construction of the Project, anticipated to take place in 2015-2016, with the facilities placed in service in 2016. Enbridge extended the temporal range for projects where the impacts are long-term or permanent.

- Enbridge identified the other projects in the area from field reconnaissance; internet research; and communications with federal, state, and local agencies. Enbridge quantified identified potential for cumulative impacts to the extent practicable; however, in some cases Enbridge could only qualitatively describe the impacts. This is particularly the case for projects that are in planning stages or are contingent on economic conditions, availability of financing, or the issuance of permits.

For the purposes of the cumulative impact analysis, Enbridge defines the region of influence the Lake Superior Major Basin located in Douglas County, Wisconsin (refer to section 3.3.1).

Table 4-1 includes current, proposed, or reasonably foreseeable future projects or activities that may cumulatively impact resources affected by the construction and operation of the Project.

TABLE 4-1

Current, Proposed, and Future Projects in the General Project Area

Project Name	Project Proponent	Project Description	Type	Project Timeline
US 2/ US 53 Interchange Project	Wisconsin Department of Transportation	Reconstruction of 5 miles of US Highway 2 in Douglas County, WI	Road Construction	Construction beginning 1st quarter 2014 and completed in 4th quarter 2014
West Central Freeway Projects	Wisconsin Department of Transportation	Projects planned for the reconstruction of 117 miles of roadway in Northwest Wisconsin	Road Construction	Not Available
US 2 Belknap Street Project	Wisconsin Department of Transportation	1.4 miles of Roadway and storm drain replacement	Road Construction	Preliminary Planning in 2nd quarter 2012 to construction complete in 2nd quarter 2018
61 Southern Access Project	Enbridge Energy	Increase capacity of existing pipeline (Line 61) as well as the addition of 9 new pump stations and upgrading of three existing stations	Oil Pipeline	2006 - 2008
Badger Coulee 345kV Transmission Line Project	American Transmission Company and Xcel Energy	Construction of approximately 160-180 miles of 345 kV Transmission line in Northwestern Wisconsin	Transmission	Applications completed 4th quarter 2013 to Project in-service in 1st quarter 2018
Natural Gas to Monroe County Wisconsin	Wisconsin Power and Light	Natural gas pipeline construction in Monroe County, WI	Natural Gas Pipeline	Construction beginning 2nd quarter 2013
Forester Electrical Engineering Evansville Project	Forester Electrical Engineering Company	2.7 miles of 12.45 kV with new transformer installation	Transmission	Preliminary Planning 3rd quarter 2013 construction complete 4th quarter 2014
Natural Gas Extension for Town of Salem and Town and Village of Maiden Rock Pierce County	Xcel Energy	Installation of 11 miles of 6-inch of natural gas pipe. All project segments are to be installed within electrical right-of-way or public property.	Natural Gas Pipeline	4th quarter 2011 construction
Dyckesville-Sawyer Rebuild Project	American Transmission Company	Replacement of 24.7 miles of 69 kV transmission lines in Door County, WI	Transmission	Application completed 1st quarter 2014 to in-service in 2nd quarter 2016
Paris-Albers Rebuild Project	American Transmission Company	Replacement of 12.5 miles of 138 kV transmission line in Kenosha County, WI	Transmission	Application completed 1st quarter 2014 to in-service in 2nd quarter 2015
K115-138kV Conversion Project	American Transmission Company	Convert existing 69 kV transmission line to 138 kV in Winnebago, Oconto, Outagamie, Calumet, Shawano, Brown, Kewaunee and Manitowoc Counties	Transmission	Project in-service in 1st quarter 2016

4.1 CONCLUSIONS

The Wisconsin portion of the projects includes construction and operation of approximately 14 miles of new 30- and 36-inch-diamter, underground crude oil pipelines from the Minnesota/Wisconsin border to Enbridge's terminal in Superior, Wisconsin, and associated aboveground infrastructure. Enbridge proposes to generally use a 110-foot-wide construction right-of-way, which will allow for temporary storage of topsoil and spoil as well as accommodate safe operation of construction equipment. The construction corridor is generally comprised of existing permanently maintained rights-of-way and temporary workspaces. ATWS areas may be required where the proposed route crosses features such as waterbodies, wetlands, roads, railroads, and existing pipelines and utilities.

During construction, Enbridge will implement the measures in the EPP, which contains elements of industry and company-wide Best Management Practices for mitigation measures; addresses construction spill prevention, containment, and control; drilling mud releases; noxious and invasive weeds; and restoration/revegetation measures. In addition, Enbridge will implement standardized erosion control and restoration measures to minimize potentially adverse environmental effects resulting from right-of-way preparation, construction, and maintenance of the pipeline.

4.1.1 Alternatives Considered

Several types of alternatives were analyzed to determine whether they would be reasonable and environmentally preferable to the proposed route. The No Action Alternative, system alternatives, and alternative energy sources and transport modes were considered. In addition, route alternatives were considered for three segments of the proposed pipeline route.

While the No Action Alternative would eliminate the environmental impacts directly associated with the proposed projects, it would not meet the proposed purpose and need for the projects, or provide the United States with its energy needs and security. Further, other companies would likely construct similar projects to meet the demand for shipping capacity out of the Bakken formation. Therefore, Enbridge believes the No Action Alternative is not a reasonable alternative.

System alternatives that were assessed include existing and proposed crude oil pipelines, and the use of alternative energy sources, transport modes, and energy conservation.

Alternative pipeline systems to the Line 3 Replacement Project are not considered feasible because any potential system would have to also provide transportation for the crude oil in the existing Line 3 pipeline. Several pipelines are proposed to increase capacity for growing Bakken crude production; however, while these systems would provide additional capacity for Bakken crude oil, in order for the purpose and need of the Sandpiper Project to be met, additional pipeline systems would be required to connect the alternative systems to the Superior Terminal. As such, Enbridge does not consider the new pipeline system alternatives are feasible or environmentally preferable.

The use of alternative energy sources and energy conservation are not considered feasible alternatives to the proposed projects because these measures would not satisfy the need for the proposed projects. Alternative transport modes could include trucking or the use of railroads to transport the crude oil associated with the proposed projects. However, safety and environmental risks, logistical requirements, and high costs eliminate both the trucking and rail options as viable alternatives.

Enbridge analyzed three route alternatives that deviated from the existing Enbridge corridors. Enbridge plans to incorporate Route Alternatives A1, B1, and C1 into its proposed Project (refer to Figure 2.2.5). However, Enbridge will continue to work with the federal and state permitting agencies to refine the route, if necessary.

4.1.2 Soils

The Projects traverses a variety of soil types and conditions. Construction activities associated with the Projects, such as clearing, grading, trenching, and backfilling, could adversely affect soil resources by causing erosion, compaction, and loss of soil productivity and fertility by mixing of topsoil and subsurface soil horizons and changing drainage patterns. However, Enbridge will implement the mitigation measures contained in its EPP and APP to control erosion, enhance successful revegetation, and minimize any potential adverse impacts on soil resources.

The Projects will not affect prime farmland soils. Enbridge will minimize potential impacts on farmland of statewide importance during construction, including potential mixing of topsoil and subsoil, soil compaction, and rutting, by implementing the measures in its APP, including topsoil segregation, compaction alleviation, removal of excess rock, and restoration of agricultural drainage systems and existing erosion control structures. As such, impacts on farmland of statewide importance will be temporary and will not result in a permanent decrease in soil productivity.

To reduce disturbance of topsoil and prevent topsoil subsoil mixing during construction in cropland, hay fields, pasture, residential areas, and other areas as requested by the landowner, Enbridge will remove and segregate topsoil to a maximum depth of 12 to 18 inches, unless otherwise requested by the landowner. In the event the topsoil depth is less than 12 inches, Enbridge will make every attempt to segregate it to the depth that is present. Segregated topsoil and subsoil will be stockpiled separately, and replaced in the proper order during backfilling.

No permanent impacts on soils would occur from construction and operation of the Projects.

4.1.3 Groundwater

Construction of the Projects is not expected to have long-term impacts on groundwater resources. Construction activities such as trenching, backfilling, and dewatering that encounter shallow surficial aquifers may result in minor short-term fluctuations in groundwater levels within the aquifer; however, the groundwater levels will typically recover quickly following construction.

4.1.4 Surface Water

The Projects crosses waterbodies within the St. Louis River and Lower Nemadji River Watershed. Pipeline construction across waterbodies could result in short-term or long-term impacts. Installation of a pipeline across a stream or river can temporarily displace stream bottom sediments and increase erosion of soils adjacent to the waterbody. The magnitude and duration of these effects depends on the soils and topography of the site, and the proposed crossing method. Construction could also change the stream bottom profile, resulting in increased siltation or erosion at the site or further downstream. Enbridge would avoid and minimize impacts on waterbodies by implementing measures described in its EPP. Enbridge would also limit the duration of construction within waterbodies and limit equipment operation within waterbodies to the area necessary to complete the crossing. Disturbed areas at crossings would be restored and stabilized as soon as practical after pipeline installation.

Enbridge would minimize the potential impact of spills of hazardous materials by implementing the measures described in the Spill Prevention, Containment, and Control section of its EPP.

Operation and maintenance of the Projects would not be expected to result in long-term effects on water quality. Enbridge will implement an ongoing inspection program to monitor the integrity of the pipeline system and for accidental leaks from the pipeline system during operations. Monitoring activities include regular inspection of the cathodic protection system, which addresses the possible corrosion potential for a steel pipe installed below the ground surface. In addition, Enbridge will use computerized inspection tools that travel through the inside of the pipeline to check pipe integrity. Enbridge also performs regular aerial flyovers to inspect the pipeline right-of-way. As required by federal law, Enbridge will maintain an Emergency Response Plan to address pre-planning, equipment staging, notifications, and leak containment procedures to be implemented in the event of a pipeline leak.

4.1.5 Wetlands

Construction of the Projects will temporarily affect wetlands. The primary impacts of pipeline construction on wetlands will be the temporary removal of wetland vegetation. In addition, construction also will temporarily diminish the recreational and aesthetic value of the wetlands crossed during and immediately following construction. Construction impacts in emergent wetlands will be relatively brief, because herbaceous vegetation will regenerate within one or two seasons. Impacts from construction in forested and shrub-dominated wetlands will last longer due to the longer recovery period of these vegetation types. Clearing of wetland vegetation also will also temporarily remove or alter wetland wildlife habitat.

Enbridge will implement the measures in its EPP to minimize impacts on wetlands. In addition, Enbridge is proposing to mitigate for wetland impacts through a project-specific consolidated wetland mitigation site located in the Nemadji River watershed.

4.1.6 Vegetation

Clearing of herbaceous vegetation during construction will result in a short-term impact on vegetation. Enbridge's revegetation measures, as well as rapid colonization by annual and perennial herbaceous species in the disturbed areas, will restore most vegetative cover within the first growing season. Clearing of woody shrubs and trees will be the primary long-term impact on vegetation associated with the Project. Enbridge will allow woody shrubs and trees to recolonize the temporary construction right-of-way and extra workspaces as described in the EPP. However, recolonization of disturbed areas by woody shrubs and trees will be slower than herbaceous species.

The Projects will result in clearing of forest land during construction. Enbridge will maintain this forest land clear of trees for operational purposes, including facilitating aerial inspections, preserving pipeline integrity, and providing access for maintenance or emergency work in compliance with federal regulations.

Enbridge will minimize impacts on vegetation adjacent to the Project area through adherence to soil erosion control specifications and by confining clearing activities to the approved right-of-way and extra workspaces. To prevent damage to adjacent trees, Enbridge will fell trees toward the cleared right-of-way. Upon completion of construction, Enbridge will revegetate disturbed areas in accordance with the EPP, unless otherwise directed by landowners or land managing agencies. Timely restoration of the construction right-of-way and reseeding with an appropriate seed mix will minimize the duration of vegetative disturbance.

Following construction, Enbridge will employ best management practices to control the spread of noxious weeds and invasive plants as described in the EPP.

4.1.7 Wildlife

Temporary impacts on mammals, birds, reptiles, or amphibians will occur during construction due to clearing of vegetation and disturbance in the right-of-way. However, Enbridge does not expect the construction and operation of the Project to have a significant impact on wildlife species.

Clearing the construction right-of-way will remove vegetative cover and will cause temporary displacement of wildlife species along the route. The construction right-of-way and extra workspaces will remain relatively clear of vegetation until mechanical restoration occurs.

Enbridge will utilize herbaceous seed mixes on disturbed areas following the completion of pipeline construction. Enbridge expects that pre-existing vegetation habitats will quickly become reestablished and that the wildlife species that use these habitats will also return relatively soon after construction. In addition, following construction Enbridge will employ best management practices included in its EPP to limit the introduction or spread of invasive plant species.

Forested areas outside of the permanently maintained right-of-way will be allowed to revegetate naturally with tree and shrub species common to the area, resulting in medium-term impacts on wildlife that use forests due to the conversion of previously forested habitat to herbaceous-dominated habitat on the temporary construction right-of-way. Over time, natural growth and succession will restore the temporary portion of the construction right-of-way and extra workspaces to a forested community, with wildlife typical of forest habitats returning.

The Project will involve the permanent removal of forested habitat along the right-of-way, which convert to non-forest habitat during operation of the pipelines. Enbridge will minimize long-term impacts on wildlife species inhabiting undisturbed forests in areas where the Project parallels existing, maintained rights-of-way. Enbridge anticipates that the incremental loss of this forested habitat along the existing cleared right-of-way will not have a significant effect on wildlife species.

4.1.8 Fisheries

The Pokegama River is considered an important spawning area for walleye (*Stizostedion vitreum*), northern pike (*Esox lucius*), longnose suckers (*Catostomus catostomus*), white suckers (*Catostomus commersoni*), burbot (*Lota lota*), and other fish species. According to the NHI review, two fish species of special concern, American eel (*Anguilla rostrata*) and lake sturgeon (*Acipenser fulvescens*), are known to occur within 1 mile of the survey corridor. These species are also SGCN, though the American eel has a low association score for the Superior Coastal Plain. The lake sturgeon has a high association score for the Superior Coastal Plain, but it prefers large rivers and lakes, which do not occur in the Project area.

Construction activities across streams may temporarily impact movement of fish upstream and downstream of crossing sites. The physical disturbance of the streambed may temporarily displace adult fish and may dislodge other aquatic organisms, and result in some mortality of less mobile organisms within the trenching area. During trenching, Enbridge will also remove aquatic plants, woody debris, and boulders that provide in-stream fish habitat. Noise disturbances upstream and downstream of the sites will deter fish that may otherwise inhabit the area. These disturbances will be temporary and are not expected to significantly affect fisheries resources.

Sediment loads may temporarily increase downstream during open-cut stream crossings, which may temporarily affect the more sensitive fish eggs, fish fry, and invertebrates inhabiting the downstream area. However, the suspended sediment levels will quickly attenuate both over time and distance and will not adversely affect resident fish populations or permanently alter existing habitat (McKinnon and Hnytka, 1988). Enbridge will install pipeline at stream crossings as quickly as possible to allow suspended sediment levels to return to pre-construction levels upon completion of in-stream work.

Enbridge will remove most streambank vegetation across the right-of-way during construction. After construction, Enbridge will maintain an area over the pipeline in an herbaceous state, and trees that are located near the pipeline will be cut and removed from the right-of-way to facilitate routine aerial inspections. Changes in the light and temperature characteristics of some streams may affect the behavioral patterns of fish, including spawning and feeding activities, at the pipeline crossing locations.

The maintained streambanks, however, are not wide enough to have a significant impact on general temperature and light conditions of the effected streams.

To minimize the potential for adverse impacts on the fisheries at river and stream crossings, Enbridge will implement erosion and sediment control measures specified in the EPP and limit the duration of construction in these waterbodies.

4.1.9 Special Status Species

Enbridge initiated informal consultation on the Sandpiper Pipeline Project in early 2013 with the Midwest Region Ecological Services Field Office (Region 3) of the USFWS. The initial consultation letter included a list of federally endangered, threatened, and candidate species that may occur in the Project area in Wisconsin. The letter also requested discussions with USFWS to ensure that Enbridge considered recommendations regarding the ESA, MBTA, and BGEPA during Project planning.

The COE initiated Section 7 informal consultation in late 2013. Informal consultations with COE, USFWS, and Enbridge will continue in 2014.

Enbridge conducted a targeted botanical field surveys in 2013 for eight species identified by the WDNR: arrow-leaved sweet-coltsfoot; floating marsh-marigold; marsh grass-of-Parnassus; clustered bur reed; seaside crowfoot; slender spike-rush; small yellow water crowfoot; and tea-leaved willow. Each of the species was observed, except floating marsh-marigold, as well as Vasey's rush (a species of special concern in Wisconsin), at one or more sites. Because survey access was not available for all sites during the early season window, upon further consultation with the WDNR Enbridge may re-evaluate the need for early season flora surveys at the targeted locations in 2014.

Enbridge conducted a habitat assessment for the upland sandpiper and wood turtle in 2013. For the upland sandpiper, Enbridge identified 36 sites with potentially suitable habitat along the Project route, and surveyed 33 of the sites where landowner permission was available. Five of the 36 sites were ranked as high quality habitat, 3 as moderate quality habitat, and 28 as low quality habitat. No individuals of federally listed or state-listed bird species (including state special-concern species) were observed during the field habitat assessments in 2013.

For the wood turtle, Enbridge used data from 2013 field surveys of waterbodies along the Project route to identify potentially suitable habitat for wood turtles. Three surveyed waterbodies (and associated riparian areas) along the Project route met the criteria of potentially suitable habitat for the wood turtle; however, no individual wood turtles were observed during the waterbody field surveys. Enbridge will work with the WDNR to identify proper avoidance and/or mitigation measures for construction activities at the three waterbodies with potentially suitable wood turtle habitat.

4.1.10 Land Use and Public Lands

Construction of the Project will affect between 13.4 and 14.3 acres, depending on the final route selection. The majority of land uses affected by the Project would be forested land and wetlands.

Enbridge will minimize forest clearing where possible, and will minimize the potential for erosion and other effects that may be associated with clearing through the implementation of its EPP (refer to Appendix B). Following construction, Enbridge will restore and seed forest land located within the new permanent easement as indicated in the Revegetation section of the EPP (refer to Appendix B). Enbridge maintains its permanent easement on a regular basis to prohibit the growth of woody vegetation over its

pipelines for safety and pipeline integrity issues. Forest land located within temporary work areas will be allowed to revert to its preconstruction land use. Enbridge will continue to work with potentially affected landowners to determine if any impacts on MFL lands will occur from construction of the projects, and will compensate landowners accordingly if their status in the program is affected.

Enbridge's existing easement crosses the Nemadji Golf Club in Superior, Wisconsin. During construction, impacts on recreational users of trails would be temporary and limited to the duration of active construction. Enbridge will post appropriate warning signs during construction, and trails will be restored to original condition following construction.

Long-term visual impacts are expected to be minimal because the proposed projects will be collocated with existing rights-of-way.

4.1.11 Socioeconomics

Construction and operation of the projects is not expected to result in significant socioeconomic impacts. The Project area would see an incremental demand on public services from non-local workers who temporarily relocate to the area during the construction period. Local communities will benefit from income paid to local and non-local workers through spending of a portion of their earnings locally. In addition, construction contractors and subcontractors may purchase materials from local vendors. Long-term economic benefits associated with operation of the pipeline include increased tax revenues at the state and county level in the form of property and/or ad valorem taxes.

The influx of non-local workers would result in a short-term impact on housing near the Project area during construction. However, because of the relatively short construction timeline, no significant impacts on the availability of housing are expected.

Short-term impacts on local transportation systems may result from construction of the pipeline across roads and railroads, movement of construction equipment and material to work areas, and daily commuting of the construction workforce to work sites. To maintain safe conditions, Enbridge will direct its construction contractors to adhere to local weight restrictions and limitations for its construction vehicles, and to remove soil that is left on the road surface by the crossing of construction equipment. In addition, when it is necessary for construction equipment to move across paved roads, the Contractor will use mats or other appropriate measures to prevent damage to the road surface.

Truck traffic associated with transporting pipe to the construction work area as well as other construction-related travel associated with the Project may increase the workload of local authorities to assist with traffic control. In addition, local authorities may need to assist with short-term detours at pipeline road crossings or delays in traffic flow from large, slow-moving vehicles. Enbridge does not anticipate that these Project-related demands on local authorities will be significant.

Several construction-related trips by personnel, equipment, and materials will be made each day to and from the job site. Traffic will remain fairly consistent throughout the construction period, and will typically peak during early morning and evening hours. Enbridge anticipates that road congestion will increase during these peak hours but will not significantly disrupt the normal flow of traffic in the Project area.

There is no evidence that the proposed Project would result in disproportionate effects on minority or low-income communities.

4.1.12 Cultural Resources

Enbridge conducted Phase I inventory surveys of the Project area to identify archaeological sites and historic standing structures, to evaluate these sites regarding NRHP eligibility, and to assess impacts.

Enbridge completed a Phase I archaeological reconnaissance survey of the majority of the Project area in 2013. Two archaeological sites were recorded during surveys, and both were recommended as not eligible for listing in the NRHP. Enbridge will submit the technical report documenting the survey and results under separate cover to the WDNR. Enbridge will complete additional surveys in 2014 and evaluate any archaeological or standing structure sites identified, and gather sufficient information to make a recommendation regarding NRHP eligibility.

Enbridge's preferred method of treatment for identified cultural resources is avoidance. In the event that a historic property cannot be avoided, Enbridge will consult with the Wisconsin SHPO and other agencies depending on the jurisdiction of the location and the resource, to mitigate adverse effects and implement appropriate treatment plans.

In the event that an unrecorded cultural site is uncovered during construction, Enbridge developed an Unanticipated Discoveries Plan (refer to Appendix D) for use during all project construction activities. The Unanticipated Discoveries Plan describes the actions to take in the event that a previously unrecorded cultural resources site is discovered during construction activities.

4.1.13 Air Quality and Noise

Air quality impacts associated with construction of the Project would include emissions from fossil-fueled construction equipment and fugitive dust. Such air quality impacts would generally be temporary and localized, and are not expected to cause or contribute to a violation of applicable air quality standards. Operation of the Project would not result in long-term impacts on air quality.

4.1.14 Cumulative Effects

Three types of projects (past, present, and reasonably foreseeable projects) could contribute to a cumulative impact when considered with the Project (refer to Table 4-1). Enbridge considered the region of influence for the cumulative impact analysis to be northern Wisconsin, although some resource areas had wider areas of analysis.

In summary, the Project area has been significantly impacted by past human actions, including agricultural activities and urban and road development. Regarding the resources discussed above, Enbridge determined that the impacts of the Project when considered in conjunction with past, present, and reasonably foreseeable actions would not be significant.

5.0 REFERENCES

Clayton, L. 1984. Pleistocene Geology of the Superior Region, Wisconsin. Wisconsin Geological and Natural History Survey. Information Circular Number 46. 40 p.

Cowardin LM, Carter V, Golet FC, LaRoe ET. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish & Wildlife Service Pub. FWS/OBS-79/31, Washington, DC.

DATCP. 2014. Wisconsin Department of Agriculture, Trade and Consumer Protection online interactive map for accessing historic (1936 - 1989) well construction reports. http://datcpgis.wi.gov/WellLogs. Accessed February 2014.

Eggers, Steve D., and Donald M. Reed. 1997. Wetland plants and communities of Minnesota and Wisconsin. U.S. Army Corps of Engineers, St. Paul District. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/plants/mnplant/index.htm (Version 03SEP1998).

Epstein, E.J., E.J. Judziewicz, and E.A. Spencer. 2002. Wisconsin Natural Community Abstracts. Bureau of Endangered Resources, Department of Natural Resources, Madison, WI.

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J.. 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, *PE&RS*, Vol. 77(9):858-864.

Hlina, P.S. and D.S. Anderson. 2011. Wetland assessment and inventory of the Pokegama Carnegie Wetland State Natural Area, Douglas County, Wisconsin. The Michigan Botanist 50:2-25.

Lacki, M.J. and J.H. Schwierjohann. 2001. Day-roost characteristics of northern bats in mixed mesophytic forest. Journal of Wildlife Management 65(3):482-488.

Mather, D. 2009. A New Twist in Megafauna History. Minnesota Conservation Volunteer, March – April 2009. Accessed December 2013 online at http://www.dnr.state.mn.us/volunteer/marapr09/megafauna_history.html.

Mudrey, M.G., Jr., B.A. Brown, and J.K. Greenberg. 1982. Bedrock Geologic Map of Wisconsin. Wisconsin Geological and Natural History Survey.

National Atlas of the United States. 2013a. Online Map Maker. U.S Department of the Interior. http://nationalatlas.gov/mapmaker. Accessed December 2013.

National Atlas of the United States. 2013b. U.S Department of the Interior. http://nationalatlas.gov. Accessed December 2013.

Reid, S.M. and P.G. Anderson. 1999. Effects of sediment released during open-cut pipeline water crossings. Canadian Water Resources Journal 24(3):235-251.

Sloan, Robert E. 2005. Minnesota Fossils and Fossiliferous Rocks. University of Minnesota, Minneapolis, 218 pp.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed February 2014.

SLRCAC (St. Louis River Citizens Action Committee). 2002. Lower St. Louis River Habitat Plan. St. Louis River Alliance, Duluth, MN.

Timpone, J.C., J.G. Boyles, K.L. Murray, D. P. Aubrey, and L.W. Robbins. 2010. Overlap in roosting habits of Indiana bats (*Myotis sodalis*) and northern bats (*Myotis septentrionalis*). The American Midland Naturalist 163:115-123.

U.S. Army Corps of Engineers. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station, U.S. Army Corps of Engineers. Wetlands Research Program Technical Report Y-87-1.

USEPA. 2014. Designated Sole Source Aquifers in EPA Region V. Available online at: http://www.epa.gov/safewater/sourcewater/pubs/qrg_ssamap_reg5.pdf. Accessed February 2014.

USFWS. 2011. Endangered and threatened wildlife and plants; 90-day finding on a petition to list the eastern small-footed bat and the northern long-eared bat as threatened or endangered. Federal Register 76(125):38095-38106.

USFWS. 2013. Endangered and threatened wildlife and plants; 12-month finding on a petition to list the eastern small-footed bat and the northern long-eared bat as endangered or threatened species; Listing the northern long-eared bat as an endangered species; Proposed Rule. Federal Register 78 (191): 61046-61080.

USGS. 2004. Geologic Provinces of the United States: Records of an Active Earth. Available online at: http://geomaps.wr.usgs.gov/parks/province/. Accessed December 2013.

WDNR. 1997. Wildlife and Your Land. PUBL-WM-216. Bureau of Wildlife Management, Department of Natural Resources, Madison, WI.

WDNR. 2005. Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need. Department of Natural Resources, Madison, WI.

WDNR. 2008. Wisconsin's Wildlife Action Plan (2005-2015) Implementation: Priority Conservation Actions and Conservation Opportunity Areas. Prepared by Wisconsin Department of Natural Resources with assistance from Conservation Partners, Madison, WI.

WDNR. 2012. Ecological Landscapes of Wisconsin. Department of Natural Resources, Madison, WI.

WDNR. 2013a. Northern Long-eared Bat (*Myotis septentrionalis*) Species Guidance. Pp. 1-10. Available at: http://dnr.wi.gov/topic/EndangeredResources/Animals.asp?mode=detail&SpecCode=AMACC01150. Accessed August 2013.

WDNR. 2013b. Wisconsin Wood Turtle Species Guidance. PUB-ER-684. Bureau of Natural Heritage Conservation, Department of Natural Resources, Madison, WI.

WDNR. 2014a. Wisconsin Department of Natural Resources Wisconsin DNR Drinking Water Data Website. http://prodoasext.dnr.wi.gov/inter1/pws2$.startup. Last revised February 2, 2014.

WDNR. 2014b. Wisconsin Department of Natural Resources Wisconsin Wells Constructed Since 1987 for Private Home Owners. DNR Drinking Water System. http://prodoasext.dnr.wi.gov/inter1/watr$.startup. Last revised February 2, 2014.

WDNR. 2014c. Wisconsin Department of Natural Resources Wisconsin DNR CLEAN—Remediation & Redevelopment Sites (RR) Map database. http://dnr.wi.gov/topic/Brownfields/rrsm.html. Accessed February 2014.

WDNR. 2014d. Wisconsin Kirtland's Warbler Species Guidance. Bureau of Natural Heritage Conservation, Wisconsin Department of Natural Resources, Madison, Wisconsin. PUB-ER-687.

WGNHS. 1983. Map: Thickness of Unconsolidated Material in Wisconsin. Wisconsin Geological and Natural History Survey.