



Sandpiper Pipeline and Line 3 Replacement Projects

Wisconsin Department of Natural Resources Environmental Impact Report

May 2014

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List of Acronyms

AOC	Area of Concern
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
DNR	Wisconsin Department of Natural Resources
DOT	U.S. Department of Transportation
ECS	Ecological System
EI	environmental inspector
EIA	U.S. Energy Information Administration
Enbridge	Enbridge (U.S.) Inc. and Enbridge Energy, Limited Partnership
EO	Executive Order
EPP	Environmental Protection Plan
ERP	emergency response plan
ESA	Endangered Species Act
FCL	Forest Crop Law
FQI	Floristic Quality Index
GHGs	greenhouse gases
GLIFWC	Great Lakes Indian Fish and Wildlife Commission
GRP	Grassland Reserve Program
GWP	global warming potential
HCA	high consequence area
HDD	horizontal directional drilling
HUC	hydrologic unit code
ICP	Integrated Contingency Plans
IEA	International Energy Agency
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
MSDS	Material Safety Data Sheet
N_20	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERR	National Estuarine Research Reserve
NHI	Natural Heritage Inventory
NHPA	National Historic Preservation Act
NLCD2006	National Land Cover Database 2006
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
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
RAP	Remedial Action Plan
R2UB	Riverine Lower Perennial Unconsolidated Bottom
R4SB	Riverine Intermittent Streambed
RR	Remediation & Redevelopment Sites
SAMP	Special Area Management Plan
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
USLE	Universal Soil Loss Equation
VITF	Voigt Intertribal Task Force
VOC	volatile organic compound
WGNHS	Wisconsin Geological and Natural History Survey
WHS	Wisconsin Historical Society
WPDES	Wisconsin Pollutant Discharge Elimination System
WRP	Wetland Reserve Program
WWAP	Wisconsin's Wildlife Action Plan

SUMMARY

Enbridge (U.S.) Inc. and Enbridge Energy, Limited Partnership (collectively referred to as "Enbridge" or "Company"), 1409 Hammond Avenue 2nd Floor, Superior, Wisconsin 54880, is requesting authorization from the Wisconsin Department of Natural Resources (DNR) for waterway and wetland crossing permits, and air pollutant discharge permits for its Sandpiper Pipeline and Line 3 Replacement Projects (collectively referred to as "Project" or "Projects"). A stormwater permit and an endangered resources review are also required from the DNR.

This environmental impact report (EIR) addresses all environmental permits and approvals required from the DNR for the Wisconsin portion of the proposed Project. The EIR evaluates environmental effects from construction and operation of the Projects and Project alternatives.

Project Description

Enbridge owns and operates 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 on 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. The Line 3 replacement pipeline requires an aboveground densitometer. In addition, Enbridge will install the following inside the existing fenced property of the Superior Terminal:

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.

- 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.

Existing Environment

The Projects route crosses approximately 14 miles of Douglas County, Wisconsin in the Lake Superior drainage basin, which includes the Town of Superior, Village of Superior, and City of Superior. The total area of Douglas County is 853,509 acres, of which 194,771 acres are mapped as wetland on the Wisconsin Wetland Inventory (WWI). The northern third of the county is in the Lake Superior clay plain. The clay plain is rich in wetlands, in part due to the impermeable clay soils and relatively flat topography. Wetlands may be found even in higher elevations in the clay plain. Although wetlands are locally abundant, they are often of types that are nationally rare. In the area the proposed Projects cross and up to the Superior Terminal, shrub swamps and wet meadows are commonly interspersed with agricultural, residential, and industrial land uses. The clay plain is also characterized by deeply incised streams within steep ravines, formed through the erosive power of rapid water runoff from the surrounding landscape (DNR, 2009).

Surveys from the 1990s by the DNR Bureau of Natural Heritage Conservation evaluated priority wetland communities in the Lake Superior basin. One focus was the vicinity of the City of Superior, where shrub- and sedge-dominated wetlands are concentrated on the nearly level poorly drained red clay soils. Plant communities surveyed included alder thicket, shub-carr, northern sedge meadow, and emergent aquatic. Priority sites surveyed included the Pokegama-Carnegie wetlands, Red River Breaks, and Superior Airport/Hill Avenue Wetlands/South Superior Triangle. These sites are most notable for their concentrations of rare plants, some of which occur nowhere else in the drainage basin or state. The report summarizes threats to these communities as disruption of hydrology, increased development, invasive species, pollution, and suppression of natural disturbance regimes (DNR, 2009).

Douglas County's clay plain wetlands and the St. Louis River estuary draining to Lake Superior provide a major migration "funnel" for birds and mammals. Migrating birds concentrate in the St. Louis River estuary and surrounding areas as they avoid flying over the expanse of Lake Superior. Migratory stopovers just before birds reach breeding grounds may play a critical role in fledgling success. Studies of wetland use by migrating songbirds suggest that alder thickets are used disproportionally over other habitats for feeding and cover. Studies of important migratory stopover sites in other Great Lakes states suggest that areas within 0.5-mile of river mouths are critical areas for migratory stop over. The area south and west of Superior represents a "stronghold" of rare breeding habitat for boreal species (DNR, 2009).

The proposed Projects route crosses the drainage of the Pokegama River which flows into the St. Louis River estuary and crosses the Nemadji River watershed. The 12,000-acre St. Louis estuary supports an important complex of coastal wetlands on Lake Superior and was nominated in 2008 by the State of Wisconsin as a National Estuarine Research Reserve (NERR) under the National Oceanic and Atmospheric Administration (NOAA). The St. Louis River is the second largest tributary to Lake Superior. Lake Superior is the largest freshwater body in the world. The combination of ecosystems within the Lower St. Louis River area—estuarine wetland and aquatic habitats, baymouth bar complex, and surrounding upland forest—are very unusual in Lake Superior, the Upper Midwest, the Great Lakes region, and the world. Great Lakes wetland systems are unique from a global perspective, and the St. Louis River wetlands are the largest such complex on the Lake Superior shore, representing a significant source of productivity for the entire Lake Superior ecosystem. The estuary and its tributaries are unusual in having such a variety of habitat types supporting a large and diverse assemblage of native fish species (DNR, 2009).

Alternatives

Enbridge is working with the DNR to evaluate alternatives that reduce impacts on wetlands, waterways, and rare species.

Environmental Effects

The Projects will require installation of the pipelines across waterbodies, including tributaries to the Pokegama and Little Pokegama Rivers, one crossing of the Pokegama River, and numerous unnamed streams.

The Projects will temporarily impact wetlands and at least one of the collocated valve sites will fill approximately 0.09-acre of wetland.

Air quality impacts directly associated with construction of the Project include emissions from fossil-fueled construction equipment and fugitive dust. The Project will also result in an increase in the terminal throughput capacity which will result in increased withdrawal loss emissions from Superior Terminal storage tanks. However, the level of operational emissions from the Project are not expected to cause or contribute to a violation of any federal, state, or local air quality standards.

Other than inspections from vehicles and routine removal of brush and trees, there will be little disturbance to the corridor and long-term effects due to operation and maintenance of the pipelines. Enbridge has state-of-the-art safety, inspection, and leak detection systems in place that exceed federal standards, and that minimize the chance of a spill and enhance its ability to locate spills quickly. Further, Enbridge has comprehensive emergency response procedures in place to rapidly respond to and clean up spills in accordance with strict environmental regulations.

1.0 PROJECT PURPOSE AND NEED

Enbridge prepared this environmental impact report (EIR) in support of its applications to the Wisconsin Department of Natural Resources (DNR) 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 Sandpiper Pipeline and Line 3 Replacement Projects (collectively referred to as "Project" or "Projects") in Wisconsin. A brief description of each Project component is provided in Sections 1.2 and 1.3. 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 Projects; and a summary of the protection and restoration measures to be implemented to avoid and/or minimize environmental impacts.

1.1 SYSTEM

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.

To meet Enbridge's anticipated demand, 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 capacity provided by the Project will provide independent utility to Enbridge and its customers, who will use the pipeline for the transportation of crude oil to the existing Enbridge Terminal in Superior, Wisconsin where the crude oil can be subsequently delivered to refineries throughout the Midwestern U.S. and eastern Canada as well as to other regions in the United States through interconnected existing pipeline systems.

1.1.1 United States Crude Oil Market

The 2013 Index of United States Energy Security Risk Annual Report published by the Institute for 21st Century Energy, an affiliate of the United States Chamber of Commerce, commented that the "impacts of the unconventional oil and natural gas boom lowered United States energy security risks in 2012 by increasing supply security, reducing net imports, and putting downward pressure on energy costs and expenditures."[2] Adequate transportation infrastructure to move the oil to market is necessary in order to continue to realize the benefits of the unconventional oil boom in the United States. The Sandpiper Pipeline Project meets this national objective as it links the prolific producing regions of the Bakken and Three Forks formations to premium refineries and major marketing centers that may otherwise have to rely on unstable sources of crude oil supplies to meet their feedstock requirements.

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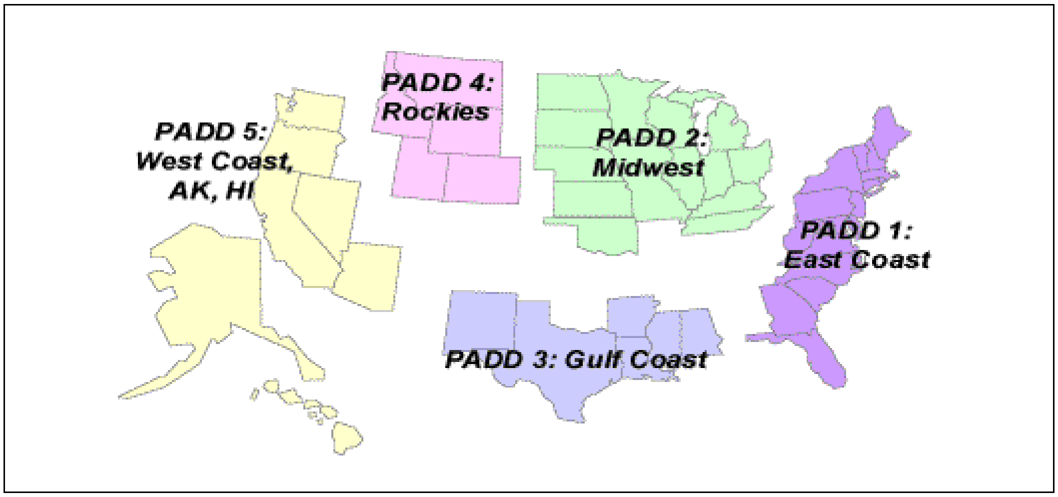
[2] 2013 Index of U.S. Energy Security Risk Annual Report at http://www.energyxxi.org/2013-us-index-of-energy-security-risk.

The transportation of crude oil to regional refineries by pipeline is an essential component of the supply chain that delivers refined petroleum products to Midwestern consumers. Pipelines deliver almost all of the crude oil processed by Midwestern refineries. Wisconsin's one refinery and Minnesota's two refineries, together with other Midwestern refineries that supply refined product to Wisconsin, fall within the Petroleum Administration for Defense District (PADD) 2 (refer to Figure 1.1-1).

FIGURE 1.1-1
Petroleum Administration for Defense Districts



Pipelines transported more than 434 million barrels of crude into PADD 2 from other PADDs in 2012.[3] The 2013 refinery design capacity in PADDs 1, 2, and 3 was 1.293 million, 3.7686 million, and 9.10265 million barrels per day (bpd), respectively.[4] The Sandpiper Pipeline is designed to meet these refineries demand for light crude supply from 2016/2017 to the indefinite future, as it can be easily expanded with additional pump stations from 375,000 to 640,000 bpd.

Moreover, the Midwest (PADD 2), like other PADDs, is increasing its reliance on North American crude oil as a safer and more reliable source. In 2012, the PADD 2 refining area imported 82.9 percent less crude oil from outside North America (primarily the Middle East) than in 2007.[5] The Sandpiper Pipeline Project will support the shift from non-North American crude oil by providing critical access that links rapidly increasing production in the Williston Basin to Wisconsin and Minnesota refineries. Other refinery and marketing centers in the Midwest and East Coast will also be connected to the Bakken supplies via the Enbridge Mainline System and other interconnecting third-party pipelines.

PADDs are very interdependent. Although the Midwest (PADD 2) is increasing its consumption of North American crude oil over non-North American sourced crude oil, refineries in the Midwest are unable to meet 100 percent of the demand for refined products in this region. Accordingly, the refineries in other PADD regions continue to supply the Midwest with the necessary refined petroleum products Americans in the Midwest demand.

[3] EIA energy data at http://www.eia.gov/.

[4] EIA energy data at http://www.eia.gov/.

[5] Id.

As a result, there is significant interdependence between PADD regions, with both crude oil and refined products transported between PADDs. The Midwest historically has been significantly net short refined product, meaning that it consumes more petroleum than it refines, with the shortfall met by refineries located on the Gulf Coast. The Midwestern supply-demand balance has become more even in recent years, but the Midwest continues to receive sizable volumes of refined product from the Gulf Coast.

According to the U.S. Energy Information Administration (EIA), the petroleum-using public in the Midwest consumed over 4.42 million bpd of refined petroleum products in 2012, which includes gasoline, diesel, jet fuel, asphalt, heating fuel, and petrochemical products. PADD 2's total 2013 refining capacity was 3.7686 million bpd, which represents a shortfall of approximately 650,000 bpd.[6]

1.1.2 Proposed System in Wisconsin

The Wisconsin portion of the Project consists of two approximately 14-mile-long pipelines that will be constructed between the Minnesota border and Enbridge's Superior Terminal. The proposed Sandpiper pipeline will move crude oil from the Bakken and Three Forks formations in the Williston Basin[7] of eastern Montana and western North Dakota to meet the increased demands of refineries and markets in the Midwest and on the East Coast of Canada to the U.S. Midwest. The Line 3 pipeline replacement originates in Edmonton, Alberta and transports crude oil originating in Alberta.

The Projects support Enbridge's pipeline system to satisfy rising demand for crude petroleum at a time when production of U.S. domestic crude oil is declining and demand is rising. The increase in transportation capacity will help provide a more secure, economical, and reliable supply of North American crude petroleum to the refineries supplying gasoline, jet fuel, diesel fuel and other petroleum products to businesses and consumers in Wisconsin, other Great Lakes states, and beyond.

1.2 SANDPIPER PIPELINE

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[8] of eastern Montana and western North Dakota to meet the increased demands of refineries and markets in the Midwest and on the East Coast. Shippers will use the pipeline to transport crude oil to Enbridge's 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 relative 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 on the East Coast;

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6 *Id.*

7 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.

8 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.

1.3 LINE 3 REPLACEMENT

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 pipe is a more current industry standard size and will be more energy efficient.

2.0 AUTHORITIES AND APPROVALS

2.1 CHAPTER 30 PERMIT

Enbridge is requesting permits and approvals for the Projects to include:

- 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); and
- Wetland Water Quality Certifications (Wis. Adm. Code Chapter NR 103, Section 401 Clean Water Act).

2.2 WETLAND WATER QUALITY CERTIFICATION

Enbridge is requesting Wetland Water Quality Certification for the following activities:

- Temporary matting in wetlands for construction and access (Section 404 Clean Water Act); and
- Trench and bore pit backfill in wetlands (Section 404 Clean Water Act).

2.3 STORMWATER PERMIT

Enbridge intends to request authorization to discharge construction stormwater under NR 151 and NR 216. A separate submittal of the Notice of Intent for stormwater coverage will be submitted to DNR for review. Enbridge intends to request authorization to discharge hydrostatic test waters under the Wisconsin Pollutant Discharge Elimination System (WPDES) permit program (Wis. Stat. §283).

2.4 AIR PERMIT

A Prevention of Significant Deterioration (PSD) Construction Permit will be required for the proposed actions at the Superior Terminal.

The modification of Enbridge's existing Title V Operating permit will be subject to the application of the best available control technology (BACT) standards and other requirements under Wis. Adm. Code Chapter NR 405, including the control technology review requirements specified in NR 405.08.

2.5 INCIDENTAL TAKE

Enbridge is coordinating with the DNR Bureau of Natural Heritage Conservation to fulfill its National Heritage Inventory (NHI) endangered resources review requirements, which may include requesting incidental take authorization.

2.6 WISCONSIN ENVIRONMENTAL POLICY ACT (WEPA)

In addition to the above listed permits required, the DNR is preparing an Environmental Impact Statement (EIS) under NR 150 (Wis. Adm. Code) to ensure that the DNR and the interested public have the information to be able to fully consider the short− and long−term effects of the Projects' actions on the quality of the human environment.

Furthermore, the DNR is responsible for consultation with the Voigt Intertribal Task Force (VITF) regarding tribal issues. The VITF, a part of the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), recommends policy regarding inland harvest seasons and resource management issues.

2.7 OTHER AGENCIES

2.7.1 Federal

The following federal permits and consultations are required for the Project:

- Section 404 Clean Water Act / National Environmental Policy Act (NEPA) review;
- Section 106 National Historic Preservation Act (NHPA) Consultation;
- Section 7 Endangered Species Act (ESA) Consultation; and
- Migratory Bird Treaty Act (MBTA) Consultation.

2.7.2 Local

Enbridge will submit a permit application for a City of Superior Grading/Filling Permit.

Construction across any paved roads, highways, or roadways will be subject to the requirements of the necessary state and local permits. Enbridge will obtain these permits prior to the start of construction.

2.8 REQUIRED PERMITS AND APPROVALS

The status of the required local, state, and federal permits for the Project work in Wisconsin are provided in Table 2.8-1.

TABLE 2.8-1

Agency Permits and 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	March 2014	December 2014	Application submitted
Wisconsin Department of Natural Resources	Chapter 30 Permit and NR 103 Water Quality Certification	February 2014	January 2015	Application submitted
	NR 150 Wisconsin Environmental Policy Act (WEPA) Determination	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	July 2014	March 2015	Pending submittal
	Hydrostatic Test Discharge Permit	August 2015	September 2015	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
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.

3.0 PROPOSED PROJECT DESCRIPTION

3.1 SYSTEM

3.1.1 Sandpiper

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 on the East Coast in response to the demand for a growing supply of Bakken crude oil. The Project in total is approximately 616 miles in length and will consist of a 373-mile-long, 24-inch-diameter crude oil pipeline and associated facilities 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 pipeline and associated facilities from Clearbrook, Minnesota to the Superior Terminal in Superior, Wisconsin (refer to Figure 3.1-1). The Sandpiper Pipeline Project will deliver an annual capacity of 250,000 bpd from the existing Beaver Lodge Station to Berthold, North Dakota, and an annual capacity of 225,000 bpd of crude oil from Berthold into

Clearbrook, Minnesota, and an annual capacity 375,000 bpd of crude oil from Clearbrook, Minnesota to Superior, Wisconsin.

The Sandpiper Pipeline Project's purpose is to transport the growing production of domestic crude oil from the Bakken and Three Forks formations in the Williston Basin[9] of eastern Montana and western North Dakota to meet the increased demands of refineries and markets in the Midwest and on the East Coast. Enbridge's shippers will use the pipeline to transport crude oil to Enbridge's terminal in Superior, Wisconsin. From there, the crude oil can be delivered to various other pipelines and refineries. Additionally, the Sandpiper Pipeline Project will have the ability to provide redundant service[10] at Clearbook to the existing Enbridge Line 81 deliveries in order to ensure reliable deliveries of 60,000 bpd annual capacity into the Minnesota Pipe Line Company system for delivery to Minnesota refineries. The Sandpiper Pipeline Project 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 or unfriendly.

3.1.2 Line 3

Enbridge evaluates the operation and condition of its existing Line 3 pipeline through its integrity management program, examining comprehensive and integrated integrity results, including internal inspection data, and projected future maintenance activities. As a result, Enbridge determined the replacement of the Wisconsin portion of Line 3 is necessary due to the increased need for maintenance activities on the pipeline in Wisconsin and the resulting impact on landowners and the environment. Therefore, Enbridge will co-construct the Line 3 replacement segment with the Sandpiper Project utilizing the same route to minimize impacts on landowners through multiple construction seasons which would be required if the Projects were constructed separately.

While ongoing integrity inspections, testing and maintenance achieves required safety standards[11], replacing this segment of Line 3 is a cost-effective option to meet the current capacity requirements of Enbridge's shippers. Moreover, the Project benefits the public by reducing ongoing impacts on landowners, local communities, and the environment by replacing a pipeline segment that would otherwise require extensive ongoing integrity assessment and maintenance under Enbridge's long-term integrity management program.

The long-term maintenance of Line 3 is in the public's interest, as it assures future reliable and safe deliveries of crude oil supplies to the Midwest refineries it serves.

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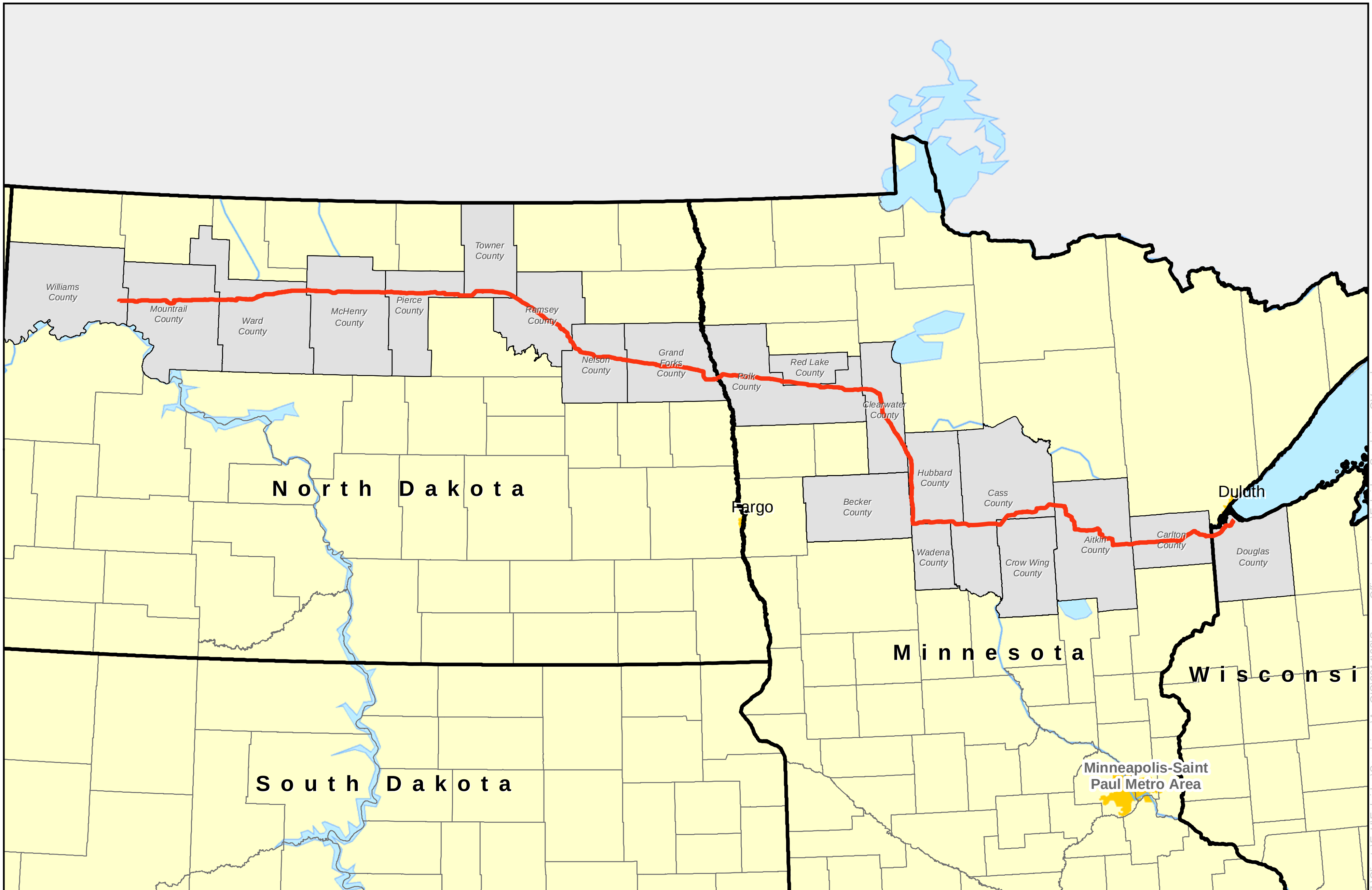
[9] The Bakken formation is currently the largest contributor to the total crude oil production in the Williston Basin, the oil industry refers to all of the crude oil production in the Williston Basin as "Bakken crude oil". The Williston Basin spans parts of western North Dakota, eastern Montana and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

[10] Redundant service is indicative of system design that allows for duplication of delivery if one component is unavailable.

[11] In accordance with various federal pipeline safety regulations and national consensus standards, pipelines are inspected, maintained, and repaired as necessary to maintain safe operations commensurate with the operating pressures of the pipeline. This process, known as "integrity management" includes periodic internal inspections with in-line inspection devices and, based on the results of those tools, anomalies are prioritized, monitored and/or excavated and repaired.



Sandpiper Pipeline

0 30 60 Miles

1 inch = 60 miles

N

Figure 3.1-1
Sandpiper Pipeline Project
Project Overview Map

ENBRIDGE

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\03\Survey_Office_Locations\Enbridge_Sandpiper_OV.mxd
Date: (4/1/2014)

3.1.3 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.

In Wisconsin, the existing Enbridge right-of-way that the Projects generally follow, currently contains six pipelines: Line 1, Line 2, Line 3, Line 4, Line 13, and Line 67 (refer to Figure 3.2-2). 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 DNR 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 DNR 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.

In total, Enbridge currently has three existing pipeline corridors within Douglas County. Each corridor is unique in its defined permanently maintained footprint. A description of each corridor is provided below:

- As discussed above, the corridor the Projects generally follow has six existing pipelines (Lines 1, 2, 3, 4, 13, and 67) within a 175-foot-wide permanently maintained easement.

- The next corridor to the east also has four pipelines (Lines 6A, 14, 13, and 61) but has a defined permanently maintained easement of 80 feet. Without acquisition of additional permanent easement, this corridor cannot accommodate any additional pipelines. The configuration of the existing pipelines will not allow for any overlap with the additional permanent easement.

- The third corridor and the one furthest to the east, contains one pipeline (Line 5) and has a defined permanent easement of 60 feet (40 feet left of the centerline of the pipeline and 20 feet to the right) and could accommodate additional pipelines without acquisition of new easements; however, it would not provide an interconnect with the pipeline coming from Minnesota.

These existing Enbridge pipeline corridors are shown in Figure 3.1-2.

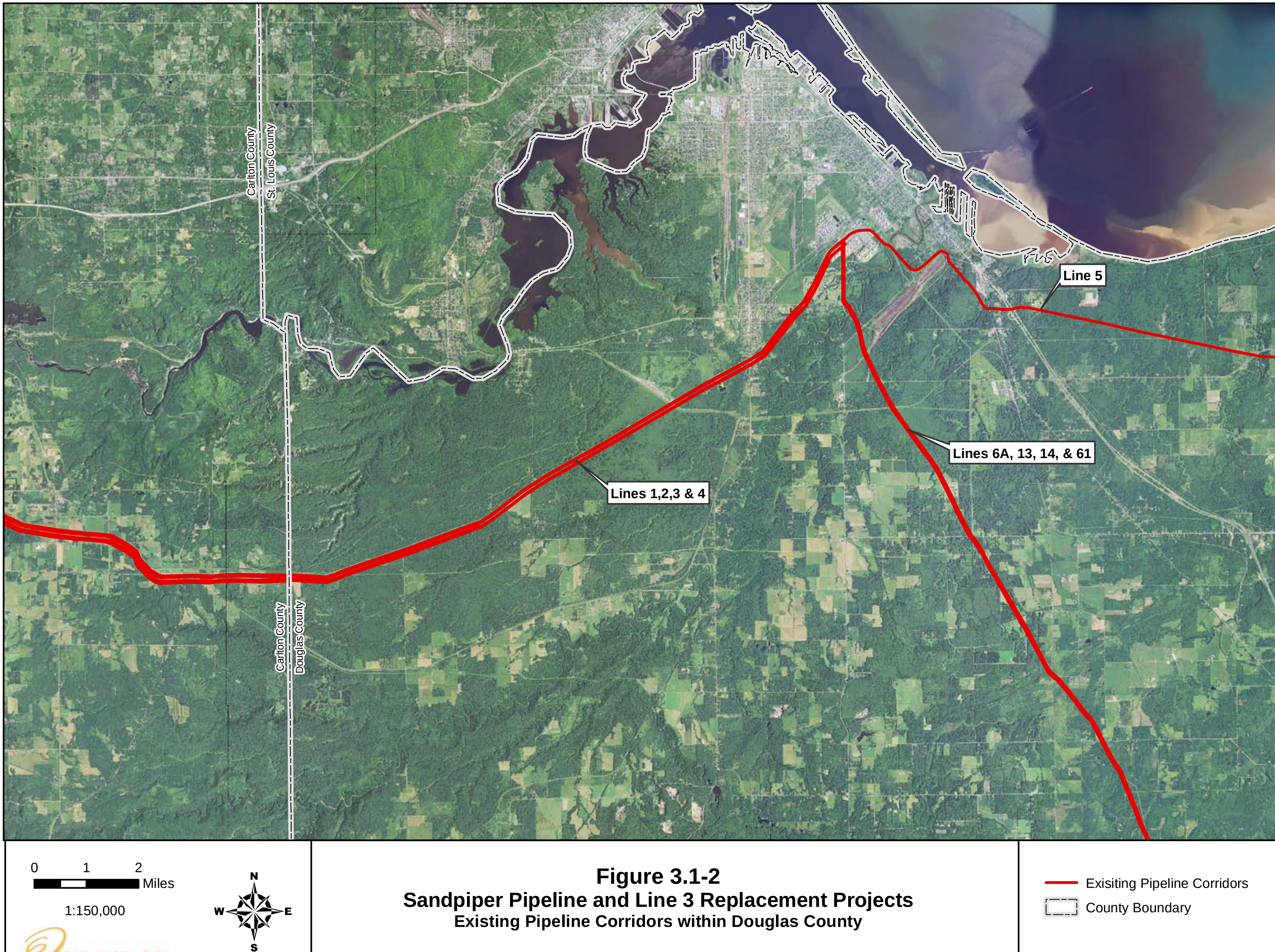


Figure 3.1-2
Sandpiper Pipeline and Line 3 Replacement Projects
Existing Pipeline Corridors within Douglas County

Exisiting Pipeline Corridors
County Boundary

ENBRIDGE

Date: (5/21/2014) Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\05\WI_EIR\SPP_WI_EIR_Fig_3.1-2.mxd

3.2 SANDPIPER AND LINE 3 PIPELINES

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;
- six to eight mainline valves (three to four 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 3.2-1 provides a general location map depicting the Projects route in Wisconsin. The route falls within the DNR 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

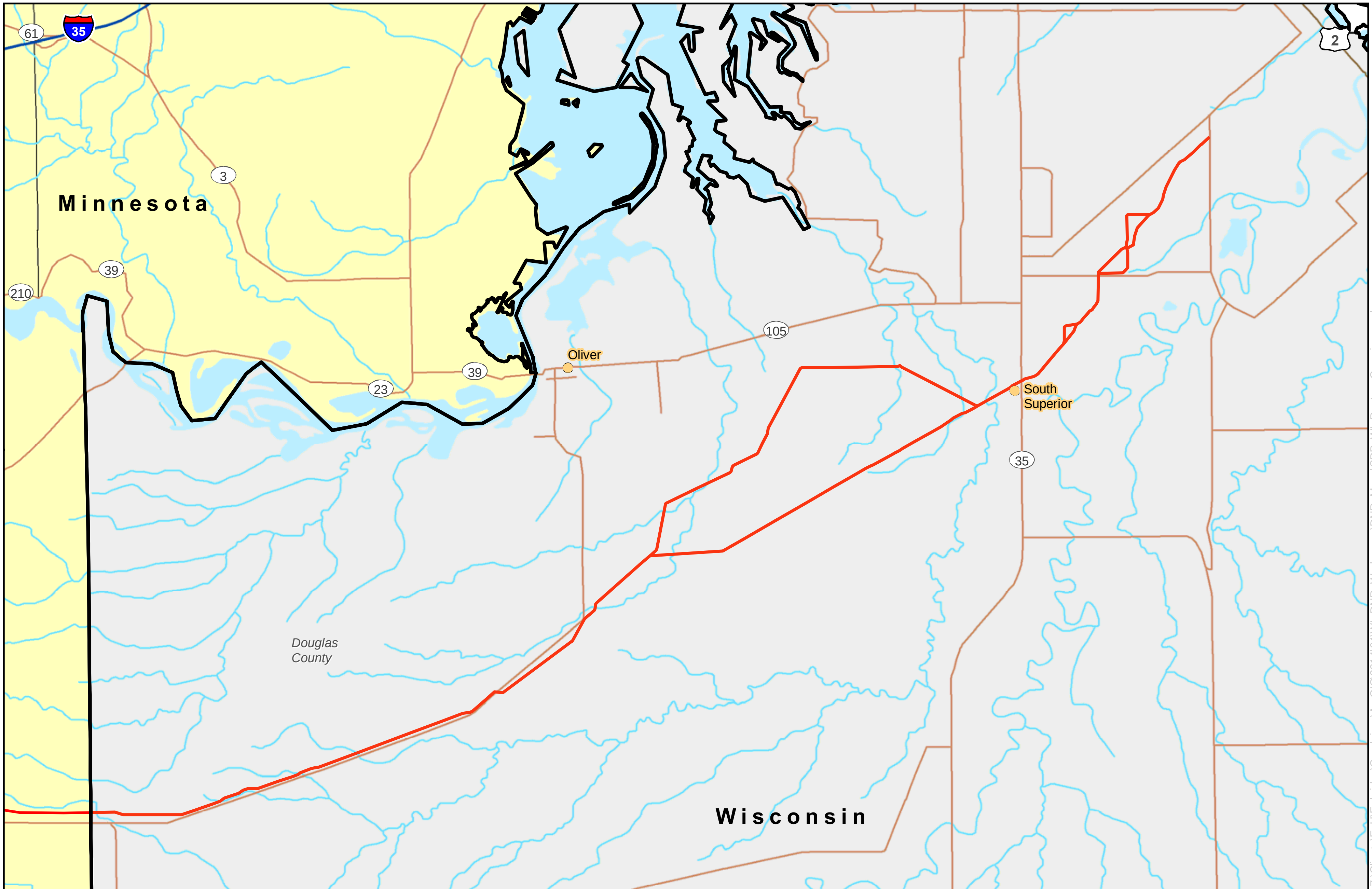
3.2.1 Route

The Project route crosses the western border of Wisconsin about 4 miles south of the St. Louis River and less than 1 mile north of the Pokegama River at MP 602.0, where Carlton County Road 4 turns into Douglas County Road W. Nearby linear corridors include those associated with the Burlington Northern (BN) railroad, a county highway, and other pipelines including those associated with Great Lakes Gas and Northern Natural Gas.

The route continues adjacent and to the north of the existing Enbridge corridor until MP 605.8, where it deviates from the existing Enbridge corridor to avoid a congested area due to other pipeline facilities and existing road infrastructure. At this location Enbridge is evaluating route alternatives (A1/A2) due to the proximity to existing residences and the Pokegama-Carnegie State Natural Area (SNA), between approximate MPs 605.8 and 612.4 (refer to Section 4.1.5.1).

Route Alternative A1/A2 remains parallel along the north side of the existing right-of-way until the crossing of County Road W/Irondale Road where it connects with another existing right-of-way at approximate MP 607.3. Route Alternative A2 continues straight west and joins with Enbridge's existing pipeline corridor, while Route Alternative A1 turns to the north following a greenfield route for less than 0.5-mile. From here, A1 parallels an abandoned railroad bed until it again turns north at MP 609.6. Route Alternative A1 generally follows an existing linear corridor to the northeast until turning east to follow a transmission line corridor prior to crossing S. Pokegama Road. It follows the transmission line corridor, turning southeast after crossing an unnamed tributary to the Little Pokegama River at MP 609.2 before reconnecting with Enbridge's existing corridor at MP 612.4.

The route crosses the Pokegama River at MP 612.5, and remains collocated to the north of the existing corridor until MP 613.4, where it briefly separates from the existing corridor as Route Alternative B1 due to outstanding legal issues with a landowner (refer to Section 4.1.5.2).



0 0.5 1
Miles

1 inch = 1.3 miles

N
W E
S

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Figure 3.2-1
Sandpiper Pipeline and Line 3 Replacement Projects
Route Overview Map

Route Overview Map

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\04\WI_DNR_Workspace\DNR_Maps\SPP_WI_Routes_Overview.mxd
Date: (4/29/2014)

The route traverses through developed residential areas within the Town of South Superior adjacent to Enbridge's existing corridor until MP 614. At this location, Enbridge prepared an evaluation of Route Alternatives C1 and C2 located between approximately MPs 614.0 and 615.1 due to an existing City of Superior stormwater pond and the Nemadji Golf Course (refer to Section 4.1.5.3).

The remainder of the Project route continues adjacent to and on the north side of Enbridge's existing corridor into the Superior Terminal.

3.2.2 Landowners

3.2.2.1 Public Outreach

Enbridge initiated outreach with landowners and local, county, state, and federal elected officials within the Project area. Enbridge sent all landowners of record 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 Projects cross, as well as potentially impacted 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.

3.2.2.2 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. 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 4.1.5). The woodlands crossed are used primarily as residential property or for recreation or domestic wood products. Also, the Project crosses 0.3-mile of DNR-managed land.

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.

3.2.3 Land Requirements

3.2.3.1 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 4.1.5.1). 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. 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 3.2-2, 3.2-3, and 3.2-4).

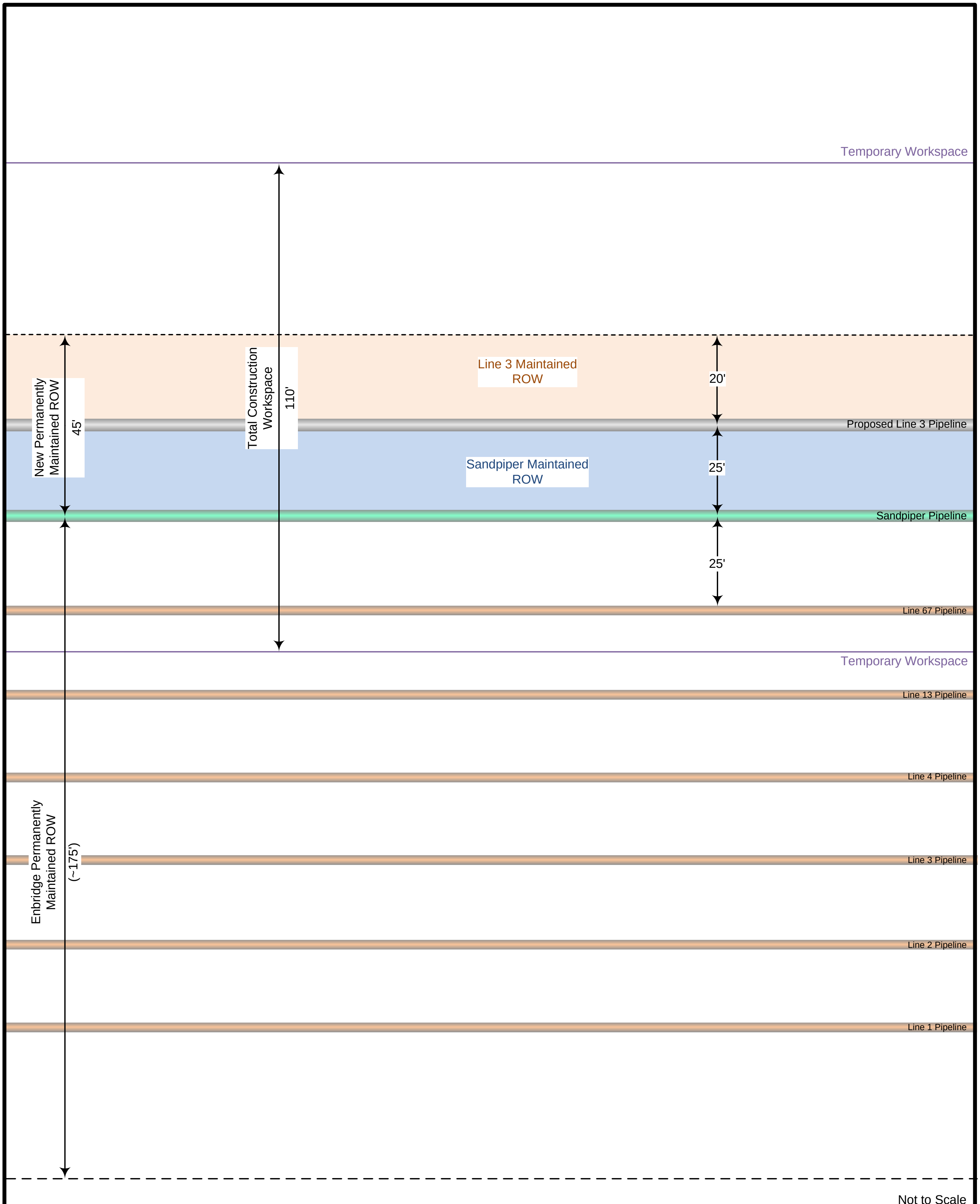

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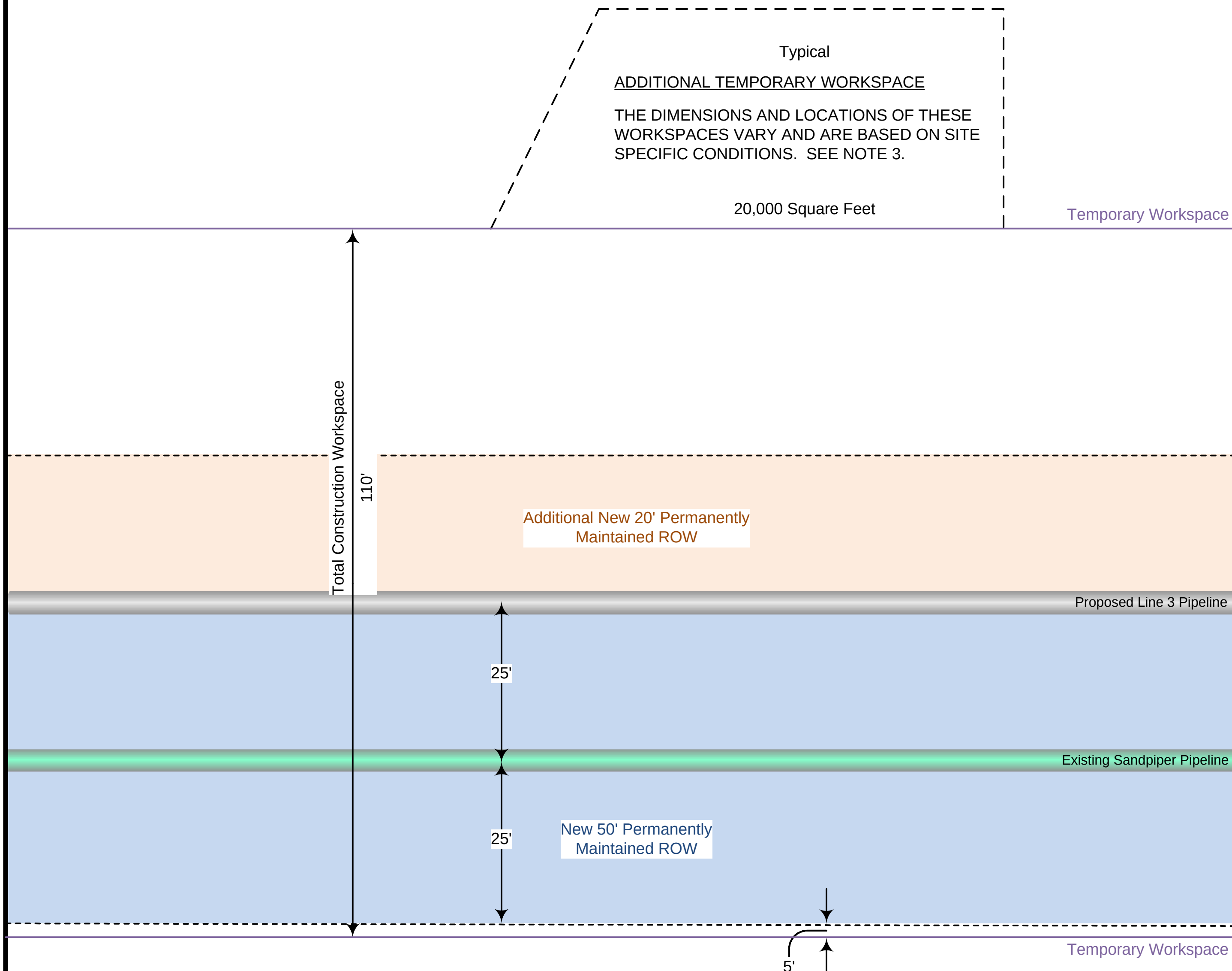
Figure 3.2-2

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 25-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

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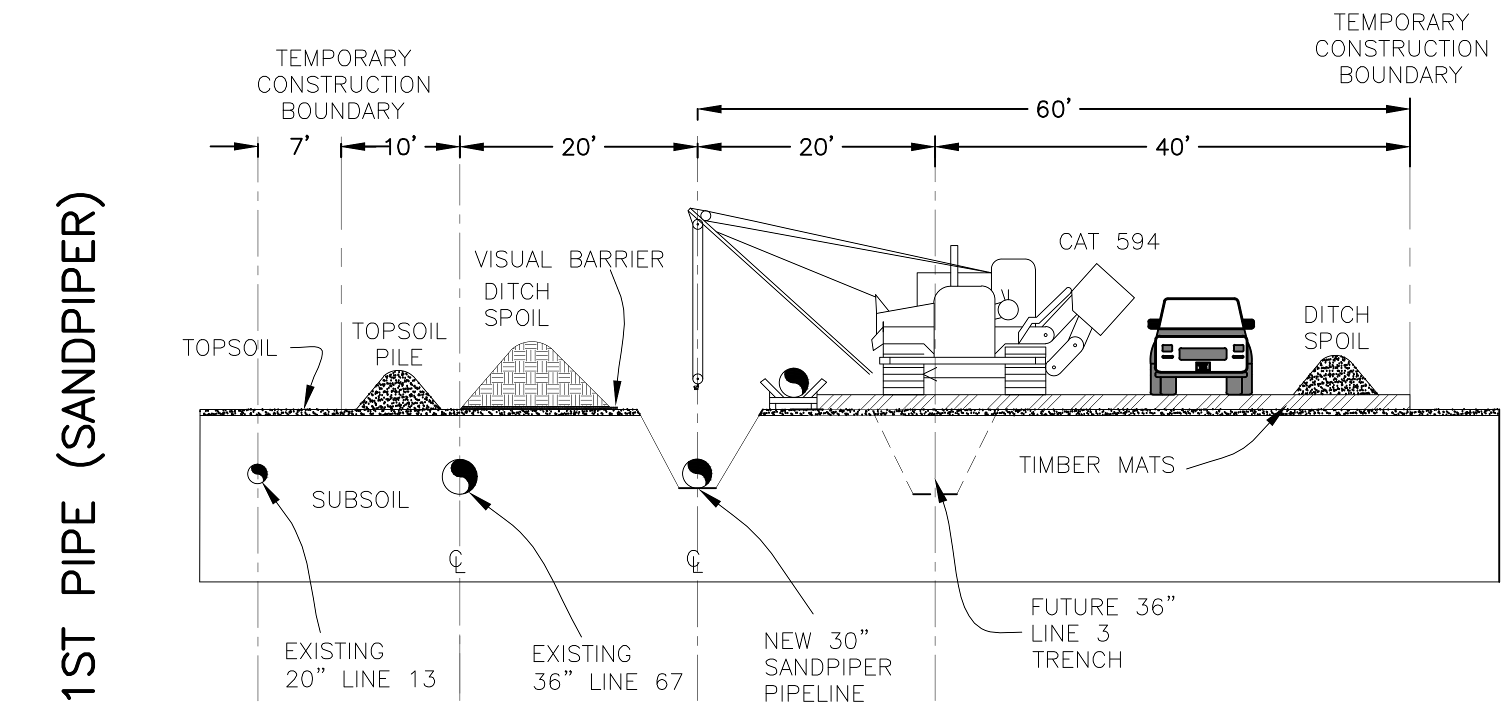
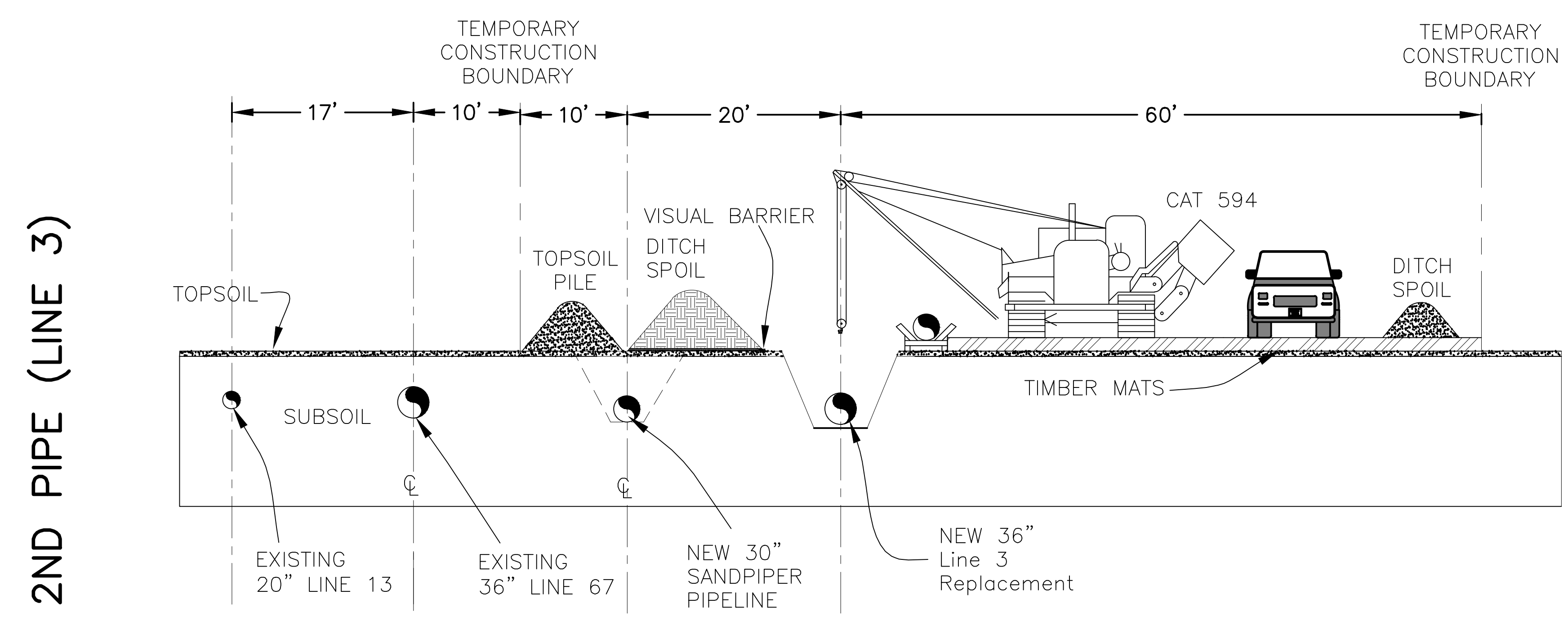
Figure 3.2-3
Line 3 Replacement and Sandpiper Pipeline Projects
Typical Greenfield Right-of-Way Configuration
(Wisconsin Only)





PRELIMINARY

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FIGURE 3.2-4
WISCONSIN TYPICAL CONSTRUCTION WORKSPACE
SANDPIPER AND LINE 3 MAINTENANCE CO-CONSTRUCTION

Date: 4/09/14
Drawn By: AJH

3.2.3.2 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 the typical construction right-of-way to stage equipment, stockpile spoil material, and conduct material fabrication and assembly. In some cases, due to site-specific conditions, ATWS may be sited within wetland boundaries (refer to Section 3.2.5). Table 3.2.3-1 below provides the typical dimensions used for ATWS.

TABLE 3.2.3-1

Typical Dimensions of Additional Temporary Workspaces

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

3.2.3.3 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 3.2.3-2.

TABLE 3.2.3-2

Proposed Access Roads

Access Road ID	Approximate Milepost (Intersects with Pipeline)	Public/Private Road
A-455	602.0	Public
A-456	602.3	Private
A-457	603.2	Private
A-458	603.5	Private
A-459	603.8	Private
A-460	604.2	Private
A-461	604.5	Private
A-462	604.8	Private
A-463	605.8	Private
A-464	605.9	Private
A-465	607.0	Private
A-466	607.5	Private
A-466.1	608.7	Private
A-466.2	609.4	Private
A-466.3	610.1	Private
A-467	611.8	Private
A-468	612.1	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 A).

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.

3.2.3.4 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.

3.2.3.5 Aboveground Facilities

Enbridge proposes to install six to eight mainline valves (three to four 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. The Sandpiper Project requires installation of custody transfer metering, a meter prover, pressure control valves, and a sampling facility.

3.2.4 Materials

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.

3.2.5 Construction Procedures

Figure 3.2-5 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 A) for more detailed construction and restoration information.

3.2.5.1 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.

3.2.5.2 Clearing and Grading

The Contractor will clear the right-of-way in accordance with permits and limit clearing 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 site, mulch, or otherwise handle in accordance with the Project permits.

Non-merchantable timber and slash will be disposed of by mowing, chipping, grinding, and/or hauling to an approved off-site disposal facility or used in stabilizing erodible slopes or construction entrances. In non-agricultural, non-wetland areas, chips may be uniformly broadcast (at less than 1 inch of thickness) across the construction right-of-way where they will ultimately be incorporated into the topsoil layer during grading activities, with landowner approval.

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. Burning will not be allowed within 100 feet of a wetland or waterbody without site specific approval from Enbridge.

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.

Topsoil generally has physical and chemical properties that are conducive to good plant growth. To prevent the mixing of topsoil with less productive subsoil during construction, the Contractor will segregate topsoil in selected areas where soil productivity is an important consideration. The Contractor will maintain a visible separation between the topsoil and subsoil piles to prevent mixing. 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, or permits. The Contractor will not use topsoil to construct trench breakers or to pad the pipe.

The Contractor will leave gaps in stockpiled topsoil and spoil piles at water conveyances (i.e., ditches, swales, and waterways) to maintain natural drainage. The Contractor will strip topsoil will to a maximum depth of 12 inches in cultivated lands, unless otherwise requested by the landowner. Additional space may be needed for spoil storage if more than 12 inches of topsoil are segregated. If less than 12 inches of topsoil are present, the Contractor will attempt to segregate to the depth that is present.

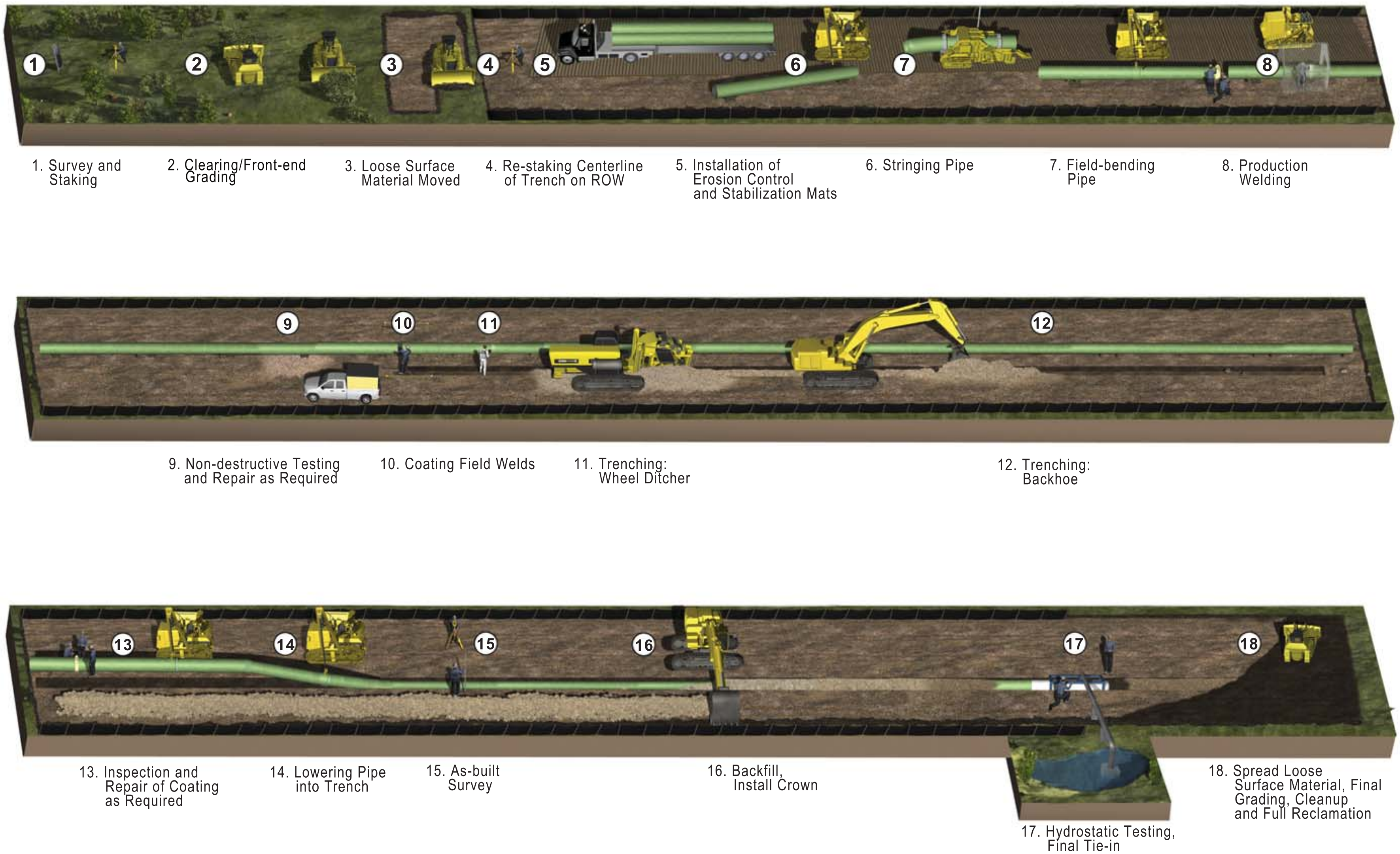


Figure 3.2-5
Sandpiper Pipeline Project
Typical Construction Sequence

Topsoil will not typically be segregated in forested areas, standing water wetlands, and nonagricultural open upland areas. However, in areas of steep side slopes adjacent to wetlands and waterbodies, including forested areas, where subsoil will be excavated to create a level workspace, the Contractor will segregate topsoil to the extent practicable and at the direction of Enbridge.

Additionally, an environmental inspector (EI) will perform audits of the topsoil/subsoil removal and segregation.

Refer to Section 1.10 of the EPP provided as Appendix A for a more detailed discussion of topsoil segregation.

3.2.5.3 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.

3.2.5.4 Trenching

In Wisconsin, the Sandpiper pipeline will be constructed first, followed by the Line 3 replacement pipeline. Enbridge will restrict the amount of open trench to approximately three days welding production per pipeline at any one time. This requirement is exclusive of any site-specific or “tie- in” crews that may be used to install pipelines at select crossings (roads, railroads, waterbodies, etc.) or valves.

All construction equipment and vehicles will be confined to the approved right-of-way and extra workspace. The Contractor will take precautions to adequately protect, repair, and/or replace damaged drainage systems (e.g., ditches, drainage tiles).

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 A]). Enbridge will coordinate with landowners to minimize disruption of access caused by the trench during construction.

At a minimum, Enbridge will 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. Proposed depth of cover over the pipelines is listed in Table 3.2.5-1.

TABLE 3.2.5-1

Planned Depth of Cover for Pipelines

Land Type Crossed	Planned Depth of Cover (inches)
Cultivated land (crop)	48
Rangeland (pasture)	48

TABLE 3.2.5-1

Planned Depth of Cover for Pipelines

Land Type Crossed	Planned Depth of Cover (inches)
Undeveloped section lines	Not applicable
Industrial, commercial, and residential	36
Rivers and streams	48
Drainage ditches at roadways and railroads	48
Jurisdictional county or township drainage ditches	48
Railroad (distance below rail)	60
Roadway (distance below road surface)	60
Wetlands	36
Woodlands	36

3.2.5.5 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 A]). Enbridge will obtain all applicable permits for these discharge activities.

The specifications for filter bags vary depending on the materials being used. The use of filter bags with either a straw bale structure and/or geotextile lined straw bale dewatering structure will increase the efficiency of filtration of the discharge. Due to the size of the clay particles, typically, the use of filter bags alone are not effective in capturing the finer sediments.

The Contractor will use a floating suction hose and elevated intake, or other similar measures, to keep the intake off the bottom of the trench and reduce the potential for capturing additional sediment in the trench water. The Contractor will direct water to well-vegetated upland areas and discharge at a rate to promote filtering and soaking into the ground surface. EIs will select dewatering operation discharge sites that drain away from waterbodies or wetlands. Geotextile bags will be sized appropriately for the discharge flow and suspended sediment particle size according to DNR Dewatering Standard 1061V.C. Also, as stated in Standard 1061VI.B., the size of straw bale dewatering structures, if used, will be dependent on the maximum water discharge rate. The Contractor may use multiple filtering mechanisms (e.g., geotextile bag within a straw bale dewatering structure).

3.2.5.6 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.

3.2.5.7 Line-up, Welding, and Weld Inspection

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

3.2.5.8 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.

3.2.5.9 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.

3.2.5.10 Stormwater and Erosion Control

Enbridge intends to request authorization to discharge construction stormwater under NR 151 and NR 216. Enbridge will submit a separate submittal of the Notice of Intent for stormwater coverage to the DNR for review.

Temporary erosion control measures are intended to slow the velocity of water off-site to minimize erosion, stop the movement of sediments off the construction right-of-way, and prevent the deposition of sediments into sensitive resources that may be on or adjacent to the right-of-way. The Contractor will install temporary erosion control measures after initial clearing and before disturbance of the soil at the base of sloped approaches to streams, wetlands, and roads, and will be replaced by permanent erosion controls as restoration is complete. Temporary erosion and sediment controls include but are not limited to slope breakers, sediment barriers, stormwater diversions, trench breakers, mulch and revegetation.

Enbridge will require the Contractor maintain erosion and sediment control structures as required in the Project construction documents and as required by all applicable permits. The Contractor will repair, replace, or supplement non-functional erosion and sediment control features with functional materials as soon as field conditions allow access, but no later than 24 hours after discovery.

Installation of temporary seeding, mulch, and erosion control mats may be necessary in certain locations if there are construction delays within a spread of at least 14 days. Enbridge may require the Contractor install temporary stabilization materials sooner based on site conditions, or other conditions that increase sediment transport potential. The Contractor will install the appropriate class of erosion control blanket on slopes greater than 5 percent that will be exposed over the winter and drain to surface waters, before snowfall to ensure maximum protection of exposed slopes prior to spring melt off and the frequent winter storms that occur in northern Wisconsin in March and April.

The Contractor will install temporary slope breakers to minimize concentrated or sheet flow runoff in disturbed areas in accordance with the Enbridge EPP unless otherwise specified in permit conditions. The Contractor may construct temporary slope breakers using earthen subsoil material, silt fence, hay bales, or rocked trenches (upland, non-agricultural lands only).

During construction, Enbridge may suspend certain activities in wet soil conditions, based on consideration of the following factors:

- Extent of surface ponding;
- Extent and depth of rutting and mixing of soil horizons;

- Areal extent and location of potential rutting and compaction (i.e., can traffic be rerouted around wet area); and
- Type of equipment and nature of the construction operations proposed for that day.

The Contractor will cease work in the applicable area until Enbridge determines that site conditions are such that work may continue.

Additional requirements for working in agricultural land during wet conditions are included in Enbridge's Agricultural Protection Plan (APP).

3.2.5.11 Hydrostatic Test and Water Appropriation

After backfilling is complete, the Contractor will hydrostatically test each pipeline to verify its integrity. 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 using the horizontal directional drilling (HDD) method.

Prior to hydrostatic testing the pipeline, the Contractor will prepare the pipe by removing accumulated construction debris, mill scale, dirt, and dust using a cleaning pig. The Contractor will collect the debris in a temporary receiver and dispose of off-site. Upon completion of the cleaning operation, the pipeline will be sealed with the test headers.

The Contractor will arrange test headers and pigs to allow for the installation of rinse water ahead of the fill pigs. Rinse water will be treated and disposed of in accordance with applicable permit conditions.

Following testing, the test section will be depressurized and the water will be discharged to a well-vegetated, upland area with an appropriate dewatering structure such as a geotextile filter bag and/or a hay bale structure that will be lined with geotextile fabric. Direct discharges to surface waters, if allowed by permit, will be directed into an energy dissipation device such as a splash pup.

At no time will the discharge rate exceed the applicable discharge rates specified in state-issued or other discharge permits. In the event no maximum discharge rate is identified, discharges will be monitored and adjusted as necessary to avoid scouring, erosion, or sediment transport from the discharge location.

To minimize the potential for introduction and/or spread of invasive species due to hydrostatic testing activities, Enbridge will discharge water to the same source location from which it was appropriated. If water is used to test multiple test sections, it will be relayed back to the source water through the pipeline for final discharge. Test water will not be discharged to a waterbody other than the appropriation source, unless coordinated and permitted through the applicable agencies. Enbridge identified the Pokegama River as a potential source and discharge location for the hydrostatic testing of the test segment in Wisconsin.

3.2.5.12 Cleanup and Right-of-Way Restoration

The Contractor will remove construction debris and restore the workspace upon completion and testing of the pipelines. Initial cleanup and rough grading activities may take place simultaneously. Cleanup involves removing construction debris (including litter generated by construction crews and excess rock). Rough and final grading includes restoring disturbed areas as near as practicable to preconstruction conditions, returning the topsoil where topsoil has been stripped, preparing a seedbed (where applicable) for permanent seeding, installing or repairing temporary erosion control measures, repairing/replacing fences, and installing permanent erosion controls.

The Contractor will install permanent berms (diversion dikes or slope breakers) on all slopes, according to the maximum spacing requirements specified in the EPP unless otherwise specified in permit conditions. The Contractor will construct compacted earth permanent berms with a 2 to 4 percent outslope. The Contractor will direct the outfall of berms toward appropriate energy-dissipating devices, and off the construction right-of-way if possible. Enbridge will inspect and repair permanent berms to maintain function and prevent erosion. The Contractor will place jute erosion control blankets on slopes over 30 percent or that are a continuous slope to a sensitive resource area (e.g., wetland or waterway).

3.2.5.13 Revegetation

The Contractor will reseed upland portions of the right-of-way in accordance with Section 7.0 (Revegetation and Monitoring) of the EPP (Appendix A). The Contractor will reseed of wetlands in conformance with the COE and the DNR specifications, and in accordance with the EPP, which Enbridge developed in conjunction with NRCS guidelines.

Enbridge's temporary revegetation measures are intended to quickly establish ground cover vegetation and minimize potential soil erosion. Enbridge developed a temporary seed mix was developed based on recommendations from the NRCS, and consists of equal amounts of oats (in summer) or winter wheat (in fall or spring), and annual ryegrass, annual alfalfa, or slender wheat grass. Unless specifically requested by landowners or land managing agencies, Enbridge does not intend to establish temporary vegetation in actively cultivated land, standing water wetlands, and/or other standing water areas.

Between April 1 and September 1, the Contractor will establish temporary revegetation in construction work areas where 14 days or more will elapse between: the installation of the first pipeline (Sandpiper) and the second line (Line 3 replacement); the completion of final grading at a site and the establishment of permanent vegetation; and/or, where there is a high risk of erosion due to site-specific soil conditions and topography. Enbridge may require the Contractor to conduct temporary seeding sooner than 14 days at site-specific locations near sensitive resource areas and/or areas prone to wind/water erosion.

The Contractor may use straw mulch to help stabilize areas during the establishment of temporary vegetation. Mulch will be free of noxious weeds as listed in applicable state laws and consistent with the EPP.

The Contractor will establish permanent vegetation in areas disturbed within the construction workspace, except in actively cultivated areas and standing water wetlands.

Enbridge developed a standard upland seed mix for restoring disturbed areas affected by the Projects (refer to Table 3.2.5-2). The mix includes species that will provide for effective erosion control and revegetation of the Project area. Enbridge will use this seed mix as the standard upland mix unless an alternate seed mix is specified by landowners or land managing agencies.

TABLE 3.2.5-2

Standard Upland Seed Mix

Seed Name	**Pure Live Seed (pounds per acre)**	**% of Seed**
Perennial Ryegrass (*Lolium perenne*)	2	17%
Canada Wild-rye *(Elymus canadensis)*	4	33%
Switchgrass (*Panicum virgatum*) (unimproved native variety)	4	33%
Timothy (*Phleum pratense*)	2	17%
Subtotal	12	100%
Associated Companion Crop Mix		
Oats (*Avena sativa*) for summer seeding; or Winter Wheat (*Triticum aestivum*) for seeding in late fall (dormant) or spring	16	80%
Annual Ryegrass *(Lolium italicum)* or Slender Wheat Grass (*Elymus trachycaulus)*	4	20%
Companion/Cover Crop Subtotal	20	100%
GRAND TOTAL (pounds)	**32**	**100%**

Enbridge also developed specialized seed mixes for residential areas, pasture land, wildlife areas, native vegetation areas, and roadway rights-of-way. These seed mixes will be available to landowners by request.

The Contractor will apply seed uniformly at specified rates across the prepared right-of-way by drilling, broadcasting, or hydroseeding. Enbridge will suspend seeding activities if conditions are such that equipment would cause rutting of the surface in the designated seeding areas. Enbridge will continue to monitor right-of-way conditions to resume seeding activities as site conditions improve and according to the general seeding timing restrictions. Seeding equipment will be capable of uniformly distributing the seed and sowing it at the required depth.

Enbridge consulted with NRCS representatives and reviewed county soil survey information to assess where soil amendments, specifically the application of fertilizer or lime, will be needed to promote successful revegetation. The Contractor will not add fertilizer or lime with native seed mixes. Soil amendments may be applied to agricultural, pasture, and/or residential lands if requested by landowners and/or land managing agencies. Enbridge will apply phosphate free fertilizers to areas within 100 feet of a waterway if soil amendments are required.

Upon final grading of the right-of-way and upon the restoration of wetland and waterways, seeding and restoration/stabilization will occur within 48 hours. Enbridge will use other methods of stabilization if temporary seeding is not appropriate due to seasonal conditions (e.g., mulch, erosion control matting).

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

3.2.5.14 Post-Construction Wetland Monitoring

Enbridge proposes a 10-year post-construction wetland monitoring plan. Post-construction wetland monitoring will begin immediately after restoration work is complete. This initial stage of monitoring will be carried out in order to ensure that erosion and sediment control and related site-restoration structures are properly maintained until affected areas have been stabilized with new vegetation.

Enbridge will monitor wetlands for stabilization, crowning, subsidence, restoration of hydrologic features (e.g., ponding or water impoundment), invasive species (e.g., type, density, and distribution as compared to preconstruction conditions), vegetative cover and species composition. The primary focus of this initial monitoring will be on the continued development of plant communities in affected areas and the restoration of topography to match pre-construction conditions within the tolerance specified in the permit.

Enbridge proposes to conduct monitoring efforts in August through September of each respective monitoring year for approximately 10 years. Enbridge will provide a formal report of the monitoring results to the DNR by December 31st of each monitoring year. Based on the current construction schedule Enbridge proposes to complete restoration efforts in 2015.

Year One Monitoring

Enbridge will initiate Year One monitoring following, and within three months of, the first full growing season after the completion of construction. Construction completion will be defined as completion of final grade and permanent seeding. Based on the proposed construction schedule, Enbridge will complete restoration in 2015 and will conduct Year One monitoring from August to September, 2016.

This monitoring effort will include all wetlands and waterbodies within the construction right-of-way. Each feature will be reviewed for:

- Proper stabilization as outlined in the EPP;
- Restoration of preconstruction elevations within the tolerance provided in the permit conditions;
- Presence of any on-site erosion;
- Plant community coverage and composition; and
- Invasive species population and density.

Enbridge will meet with the DNR and discuss the results of Year One monitoring for the purpose of identifying additional restoration needs and identifying wetlands to be monitored for Years Two and Three. Wetlands may be selected on the basis of their quality (Floristic Quality Index [FQI] or similar functional rating) and association with sensitive resources such as Area of Special Natural Resource Interest (ASNRI) waters. Approximately 50 percent of wetlands will be identified for monitoring in Years Two and Three.

Years Two and Three Monitoring

Years Two and Three monitoring will follow the same procedures as the previous year's monitoring; however, it will be limited to 50 percent of the original wetlands monitored in Year One. Enbridge will use the following criteria for determining wetlands for Year Two and additional monitoring:

- Wetland required additional stabilization, re-grading and/or seeding based on Year One observations;

- Post-construction elevations outside the tolerance provided in the permit conditions as compared to pre-construction elevations;

- Poor vegetative cover;

- Presence of invasive species not found in pre-construction surveys or with an increased density and/or distribution; and

- Wetland type: a minimum of 40 percent of the non-forested wetlands and 25 percent of all forested wetlands will be included in the wetlands monitored (for monitoring purposes, forested wetlands will include all wetlands with a forested component).

Following Year Three monitoring, Enbridge will evaluate the wetland monitoring data to identify wetlands for monitoring in Year Four. Wetland monitoring reports will be submitted to the DNR by December 31st of each year.

Years Four and Five

At a minimum, wetlands identified for monitoring in Years Four and Five will include approximately 40 percent of the non-forested wetlands and 25 percent of the forested wetlands. Monitoring efforts will include the same criteria identified above. Following Year Five monitoring, Enbridge will evaluate monitoring results to identify wetlands to be monitored from Years Six through Ten. At a minimum, these wetlands will include 25 percent of all forested wetlands (for monitoring purposes, forested wetlands will include all wetlands with a forested component).

Years Six through Ten

At a minimum, wetlands identified for monitoring in Years Six through Ten will include 25 percent of the forested wetlands (based on any wetland with a forested component). Monitoring efforts will include the same criteria identified above. Enbridge will submit monitoring reports on a yearly basis to the DNR by December 31st.

3.2.5.15 Invasive Species Management

After disturbances of the soil, vegetation communities may be susceptible to infestations of noxious species. These species are most prevalent in areas of prior surface disturbance, such as agricultural areas, roadsides, existing utility corridors, and wildlife concentration areas. The prevention of the introduction or spread of noxious and invasive weeds is a high priority for nearby communities. Enbridge's EPP (Appendix A) addresses the control and spread of noxious and invasive species. Refer to Appendix A of the EPP for a list of invasive species within the Project area.

Enbridge believes it is not practicable to eradicate undesirable species where undesirable species exist presently adjacent along its right-of-way. Enbridge will minimize the potential for the establishment of undesirable species by minimizing the time duration between final grading and permanent seeding. Enbridge will also require the Contractor clean construction equipment before arriving on site to prevent the introduction of undesirable species to the Project area.

Enbridge will conduct field surveys along the entire Project route in both wetlands and upland areas to identify existing locations of noxious weeds and invasive species. Upon completion of the surveys, Enbridge will develop specific plans to prevent the spread of known infestations.

3.2.5.16 Fugitive dust

Fugitive dust emissions may occur as a result of blasting or vehicle traffic on paved and unpaved roads. The amount of dust generated is dependent on the moisture content and texture of the soils, wind velocity, frequency of precipitation, vehicle traffic, types of vehicles, and roadway characteristics. Enbridge anticipates dust emissions to be greater during dryer months and in fine-textured soils.

Enbridge will minimize dust generated from construction activities by utilizing control practices such as 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 will minimize fugitive dust emissions during construction of the Project, thereby minimizing potential air quality impacts on nearby residential and commercial areas.

3.2.5.17 Spill prevention and management

Enbridge requires its contractors to implement proper planning and preventative measures to minimize the likelihood of spills, and to quickly and successfully clean up a spill should one occur. Section 10.0 of Enbridge's EPP outlines minimum standards for handling and storing regulated substances and cleaning up spills (refer to Appendix A). Potential sources of construction-related spills include machinery and equipment failure, fuel handling, transfer accidents, and storage tank leaks. In the event of a spill, the Contractor will abide by all applicable federal, state and local regulations with respect to cleaning up the spill.

The Contractor will be responsible for implementing, at a minimum, the following planning and prevention measures. The Contractor will designate a Spill Coordinator, subject to approval by Enbridge.

The Contractor will maintain spill kits containing a sufficient quantity of absorbent and barrier materials to adequately contain and recover foreseeable spills near fuel storage areas and other locations as necessary to be readily available to control foreseeable spills.

Enbridge requires that the storage of petroleum products, refueling, lubricating, and maintenance operations take place in upland areas that are more than 100 feet from wetlands, streams, waterbodies (including drainage ditches), and water supply wells. Enbridge does not allow overnight parking of equipment within 100 feet of a wetland or waterbody unless the Contractor implements special containment provisions.

The Contractor will store and dispose of all contaminated soils, absorbent materials, and other waste in accordance with all applicable state and federal regulations. Enbridge will recycle waste, such as motor oil, where there is an established recycling program available. The Contractor will properly label any hazardous or contaminated material stored on Enbridge property or the right-of-way in accordance with state and U.S. Environmental Protection Agency (USEPA) labeling requirements.

3.2.5.18 Construction - Waterbodies

Enbridge will avoid and minimize impacts on waterbodies by implementing the measures described in its EPP (refer to Appendix A). Enbridge's EPP outlines construction-related environmental policies, procedures, and mitigation measures Enbridge developed for its pipeline construction projects based on their experience during construction. It is intended to meet or exceed applicable federal, state, and local environmental protection and erosion control specifications, technical standards and practices.

The Contractor will leave a 20-foot buffer (from the ordinary high water mark [OHWM]) of undisturbed herbaceous vegetation on all stream banks during initial clearing, except where grading is needed for bridge installation, or where restricted by applicable regulations and/or permit conditions. Woody vegetation within this buffer may be cut and removed during clearing, leaving the stumps and root structure intact. Non-woody vegetation and the soil profile will be left intact until the Contractor is ready to begin trenching the stream crossing. The Contractor will properly install and maintain sediment control measures at the 20-foot buffer line adjacent to streams immediately after clearing and prior to initial ground disturbance.

ATWS includes work areas outside the boundary of the typical construction right-of-way. These spaces are typically used to assemble pipe segments and for temporary spoil storage. Enbridge designed ATWS as follows:

- ATWS will be located at least 50 feet away from the OHWM if topographic or other physical conditions such as stream channel meanders allow; and
- If safe work practices or site conditions do not allow for a 50-foot setback, ATWS will be located no closer than 20 feet from the OHWM, subject to site-specific approval.

Project activities within waterbodies will include the installation of temporary bridge crossings for the purpose of moving construction equipment across the feature and the installation of the pipelines. The Contractor will design equipment bridges to withstand the maximum foreseeable flow of the stream, will not restrict flow or pool water while the bridge is in place, and will construct with clean materials. The Contractor will install equipment bridges during clearing activities and will not remove them until restoration activities are complete.

In-stream trenching and backfilling will typically be completed within 24 hours or less on minor waterbodies (less than 10 feet wide) and 48 hours or less on intermediate (between 10 and 100 feet wide) or as directed by applicable permits. The Project will not impact waterbodies greater than 100 feet in width in Wisconsin.

Open Cut/Wet Trench Method

The open cut/wet trench method will be used to cross streams and rivers without discernible flow at the time of construction. Prior to grading within the 20-foot vegetative buffer left on the stream bank, the Contractor will install the appropriate erosion and sediment control measures (ECDs). The Contractor will install spoil containment structures back from the stream bank so that spoil does not migrate into the stream.

Dry Crossing Method

A dry crossing procedure (flume or dam and pump) is the method of choice for crossing relatively sensitive waterbodies when guided bores or HDDs are impracticable.

Risks associated with dry crossing methods include flooding, disturbance to riparian habitat, longer in-stream construction times increasing the risk of flooding during precipitation events, and disturbance resulting from bank grading, dam construction, and bank reclamation. These methods are more dependent on equipment integrity and proper installation, planning, and design.

Dry crossing method risks can be mitigated by:

- Developing plans including erosion, turbidity, and water flow controls and management based on stream characteristics such as substrate type, morphology, and discharge volumes and rates;

- Ensuring that sufficient materials are on hand to keep dams and flanges sealed;

- Ensuring that adequate backup pumps, hoses and other necessary equipment to maintain dams are available to handle additional flows associated with pump failures and precipitation events; and

- Ensuring that steep slopes and stream banks are stabilized and protected during construction, clean-up, and restoration.

Flume Method

The flume method is typically best suited for crossing sensitive, relatively narrow streams that have straight channels and are relatively free of large rocks and bedrock at the point of crossing. The flume method involves the placement of flume pipe(s) in the stream bed to convey stream flow across the construction area without introducing sediment to the water. The Contractor will install a flume(s) of sufficient diameter to transport the maximum flows anticipated to be generated from the watershed at the crossing location.

The Contractor will incorporate upstream and downstream ends of the flume(s) into dams made of sand bags and plastic sheeting (or equivalent). They will construct the upstream dam first to funnel stream flow into the flume(s). The downstream dam will prevent backwash of water into the trench and construction work area. The Contractor will continuously monitor the dams for a proper seal. They will make adjustments to the dams as necessary to prevent large volumes of water from seeping around the dams and into the trench and construction work area.

Dam and Pump Method

The dam and pump method is a dry crossing method that is typically best suited for low flow streams and is a preferred alternative to fluming when crossing meandering channels. The dam and pump method involves damming of the stream with sandbags, inflatable dams, and/or steel plates upstream and downstream of the proposed trench and pumping water around the construction area before excavation activities begin. Pumping of the stream across the right-of-way will commence simultaneously with dam construction to prevent interruption of downstream flow. The Contractor will pump stream flow across the construction area through a hose and discharge it to an energy dissipation device, such as plywood boards, to prevent scouring of the stream bed.

The Contractor will place the pumps on the upstream side of the crossing within impermeable, sided structures which will act as containment units for the pumps and fuel containers. They will not place pumps directly in the stream or on the streambed. The Contractor will size pumps to have a capacity greater than the anticipated stream flow. The Contractor will staff the pumping operation 24 hours a day and will adjust as necessary to maintain an even flow of water across the work area and near normal water levels upstream and downstream from the crossing. The Contractor will have a backup pump of equal or greater capacity will be on-site at all times in the event that the primary pump fails.

Restoration at Waterbody Crossings

The Contractor will restore the in-stream trench such that the stream bottom is as near as practicable to its pre-construction condition, with no impediments to normal water flow. The Contractor will restore the stream banks as near as practicable to pre-construction conditions unless that slope is determined to be unstable. Once the Contractor reshapes the banks, they will install best management practices (BMPs) within 24 hours of backfilling the crossing. The Contractor will install temporary slope breakers on all sloped approaches to streams in accordance with the spacing requirements outlined in the EPP (refer to Appendix A).

The Contractor will install trench breakers at the stream banks, as needed, where slopes are adjacent to the waterbodies to prevent subsurface water flow and erosion along the trench line. Trench breakers typically consist of burlap sandbags filled with rock-free subsoil or sand and placed from the bottom of the trench to near the top, completely surrounding the pipe. The Contractor will initiate permanent stabilization within 24 hours unless site and weather conditions delay permanent installation.

The Contractor will stabilize stream banks with erosion control materials such as jute matting. If there is a potential for significant bank erosion, the Contractor may stabilize disturbed stream banks with rock riprap or other bank protection, with DNR approval.

The Contractor will install a temporary seed mix (e.g., annual rye or annual oats) and mulch and/or erosion control blankets within a 50-foot buffer on either side of the stream and sediment control devices upslope of the temporary seeding area.

The travel lane portion of the construction right-of-way and the temporary bridge will remain in place until pipeline construction activities (including final clean-up) are complete. The Contractor will install permanent slope breakers across the full width of the right-of-way during final clean-up. The Contractor will remove temporary bridges during the final clean-up and restoration phase of construction after installation of the pipelines and right-of-way access is no longer required. Enbridge will remove temporary sediment control devices across the construction right-of-way only after a vegetative cover has been achieved, in accordance with permit conditions.

3.2.5.19 Construction - Wetlands

Enbridge proposes to use conventional construction methods in wetlands. Conventional construction methods are similar to those implemented in uplands. Construction is conducted in a sequential manner and consists of clearing, stringing, trenching, dewatering, installation, backfilling, final cleanup, and revegetation activities.

Clearing the construction right-of-way in wetlands will proceed in a manner similar to clearing in uplands. Typically, the Contractor will use low-ground-pressure equipment, limiting disturbance to the wetland. When clearing in wetlands, the following restrictions apply:

- Clearing of extra workspaces in forested wetlands will be minimized as much as practicable and in accordance with applicable permits;
- Vegetation and trees within wetlands will be cut off at ground level, leaving existing root systems intact;

- Hydro-axe debris, or similar, can be left in the wetland if spread evenly over the right-of-way to a depth not to exceed 1 inch in thickness and in a manner, as determined by the EI, that will allow for normal revegetation; and

- Staging areas, additional spoil storage areas, and other ATWS areas will be located in upland areas at least 50 feet away from wetland boundaries, where safe work practices or site conditions permit. Where site conditions do not permit a 50-foot setback, these areas will be located as far away from the wetland as is practicable.

Enbridge will minimize impacts in wetlands by implementing the mitigative measures specified in its EPP, including:

- Use of construction mats, as needed, to facilitate equipment access and pipeline installation;

- Installation of temporary erosion control devices after clearing activities across the entire construction right-of-way upslope of the wetland boundary;

- Segregating up to one foot of topsoil over the trench line in unsaturated wetlands;

- Maintaining surface water flow (if present) during construction to the extent practicable;

- Restoration to preconstruction conditions; and

- Maintaining wetland hydrology using trench breakers when necessary, and sufficiently compacting the pipeline trench.

Restoration in Wetlands

The Contractor will restore wetlands as near as practicable to pre-construction conditions and must make a reasonable attempt to return the subsoil to its pre-construction density. During backfilling of wetland areas, the Contractor will replace subsoil material removed from the trench during construction so that the material is not mounded above the adjacent ground surface (undisturbed trench wall). The Contractor will remove subsoil that exceeds the elevation of the ground adjacent to the trench from the wetland and dispose in an upland area or at an approved disposal site. After the trench has been backfilled with subsoil, the Contractor will spread the previously segregated topsoil over the trench area and mound no more than 6 inches as specified in the applicable permits.

Cleanup and rough grading activities may take place simultaneously. Cleanup typically involves removing construction debris and replacing fences removed during construction. Rough grading will include restoring original conditions within the disturbed areas (i.e., ditchline, spoil storage areas, and equipment travel lane) and installing or repairing temporary ECDs. Cleanup and rough grading (including installation of temporary ECDs) will begin as soon as practical after the trench is backfilled, weather permitting. The Contractor will remove all timber mats, construction debris, and larger woody vegetative debris during cleanup of wetlands.

The Contractor will seed wetlands without standing water with the Minnesota Board of Soil and Water Conservation Mixture W2 (BWSR Native Sedge/Wet Meadow) or W3 (BWSR Native Wet Prairie) to provide temporary cover (refer to Tables 3.2.5-3 and 3.2.5-4). The Contractor will not apply fertilizer or lime in wetlands.

TABLE 3.2.5-3

Native Sedge/Wet Meadow Mixture (W2)

Common Name	**Botanical Name**	**Indicator Status**	**Seeds/oz.**	**Seeds/ft^2**	**% of Mix**
Brome, fringed	*Bromus ciliata*	*FACW*	10,000	1.5	8.1
Blue-joint grass	*Calamagrostis canadensis*	*OBL*	280,000	8.2	1.6
Wild-rye, Virginia	*Elymus virginicus*	*FACW-*	4,200	3.2	42.3
Manna grass, reed	*Glyceria grandis*	*OBL*	80,000	4.7	3.2
Manna grass, fowl	*Glyceria striata*	*OBL*	160,000	4.7	1.6
Bluegrass, fowl	*Poa palustris*	*FACW+*	118,000	16.7	7.1
Sedge, bottlebrush	*Carex comosa*	*OBL*	30,000	2.2	4.3
Sedge, pointed- broom	*Carex scoparia*	*FACW*	84,000	1.5	1.0
Sedge, tussock	*Carex stricta*	*OBL*	53,000	0.8	0.8
Sedge, Common fox	*Carex stipata*	*OBL*	34,000	2.0	3.2
Sedge, fox	*Carex vulpinoidea*	*OBL*	100,000	5.9	3.2
Rush, slender	*Juncus tenuis*	*FAC*	1,000,000	11.0	0.2
Torry's Rush	*Juncus toryi*	*OBL*	1,600,000	5.9	0.6
Bulrush, green	*Scirpus atrovirens*	*OBL*	460,000	16.9	2.0
Wool grass	*Scirpus cyperinus*	*OBL*	1,700,000	6.2	0.2
Milkweed, marsh	*Asclepias incarnata*	*OBL*	4,800	0.4	5.0
Aster, swamp	*Aster puniceus*	*OBL*	80,000	5.9	4.0
Aster, flat-topped	*Aster umbellatus*	*FACW*	67,000	1.5	1.2
Joe-pye weed	*Eupatorium maculatum*	*OBL*	95,000	0.7	0.4
Boneset	*Eupatorium perfoliatum*	*FACW+*	160,000	1.2	0.4
Goldenrod, grass- leaved	*Euthamia graminifolia*	*FACW-*	350,000	1.0	0.2
Sneezeweed	*Helenium autumnale*	*FACW+*	130,000	0.8	0.3
Sunflower, serrated	*Helianthus grosseserratus*	*FACW-*	15,000	0.2	0.6
Lobelia, great-blue	*Lobelia siphilitica*	*FACW+*	500,000	2.9	0.3
Monkey flower	*Mimulus ringens*	*OBL*	2,300,000	6.8	0.2
Mint, mountain	*Pycnanthemum virginianum*	*FACW+*	220,000	1.3	0.3
Meadow-rue, purple	*Thalicturm dasycarpum*	*FACW*	11,000	0.1	0.4
Vervain, blue	*Verbena hastata*	*FACW+*	93,000	2.2	1.3
Alexanders, Golden	*Zizea aurea*	*FACW*	11,000	1.0	5.0

Recommended Rate: 5.0 (PLS lbs/acre)

SUMMARY

Mix Seeds Per Square Foot	**Mix Seeds Per Square Yard**	**Mix Seeds Per Acre**
121	1,093	5,290,320
% by wt. Grasses	**% by wt. Graminoids**	**% by wt. Forbs**
64.0	15.0	21.0
% by Seed Count Grasses	**% by Seed Count Graminoids**	**% by Seed Count Forbs**
32.1	43.2	24.7

TABLE 3.2.5-4

Native Wet Prairie Mixture (W3)

Common Name	Botanical Name	Indicator Status	Seeds/oz.	Seeds/ft^2	% of Mix
Bluestem, big	*Andropogon gerardi*	*FAC-*	10,000	3.7	15.3
Brome, fringed	*Bromus ciliata*	*FACW*	10,000	1.8	7.7
Blue-joint grass	*Calamagrostis canadensis*	*OBL*	280,000	6.2	0.9
Wild-rye, Virginia	*Elymus virginicus*	*FACW-*	4,200	2.0	19.9
Manna grass, reed	*Glyceria grandis*	*OBL*	80,000	2.9	1.5
Manna grass, fowl	*Glyceria striata*	*OBL*	160,000	3.5	0.9
Switchgrass	*Panicum virgatum*	*FAC+*	14,000	3.1	9.2
Bluegrass, fowl	*Poa palustris*	*FACW+*	118,000	9.6	3.0
Indian grass	*Sorghastrum nutans*	*FACU+*	12,000	2.0	6.7
Cord grass, prairie	*Spartina pecinata*	*FACW+*	6,600	1.1	6.9
Sedge, tussock	*Carex stricta*	*OBL*	53,000	0.7	0.5
Sedge, fox	*Carex vulpinoidea*	*OBL*	100,000	3.7	1.5
Bulrush, green	*Scirpus atrovirens*	*OBL*	460,000	7.7	0.7
Wool grass	*Scirpus cyperinus*	*OBL*	1,700,000	18.7	0.5
Anemone, Canada	*Anemone canadensis*	*FACW*	8,000	0.09	0.5
Milkweed, marsh	*Asclepias incarnata*	*OBL*	4,800	0.1	1.4
Aster, swamp	*Aster puniceus*	*OBL*	80,000	2.4	1.2
Aster, flat-topped	*Aster umbellatus*	*FACW*	67,000	1.5	0.9
Tic-trefoil, showy	*Desmodium canadense*	*FAC-*	5,500	0.8	6.1
Joe-pye weed	*Eupatorium maculatum*	*OBL*	95,000	1.7	0.8
Boneset	*Eupatorium perfoliatum*	*FACW+*	160,000	2.4	0.6
Goldenrod, grass- leaved	*Euthamia graminifolia*	*FACW-*	350,000	2.0	0.3
Sneezeweed	*Helenium autumnale*	*FACW+*	130,000	2.39	0.8
Sunflower, serrated	*Helianthus grosseserratus*	*FACW-*	15,000	0.3	0.7
Blazingstar, tall	*Liatris pycnostachya*	*FAC-*	11,000	0.1	0.5
Lobelia, great-blue	*Lobelia siphilitica*	*FACW+*	500,000	1.4	0.1
Monkey flower	*Mimulus ringens*	*OBL*	2,300,000	6.4	0.1
Mint, mountain	*Pycnanthemum virginianum*	*FACW+*	220,000	1.2	0.3
Vervain, blue	*Verbena hastate*	*FACW+*	93,000	1.0	0.5
Ironweed	*Veronia fasciculate*	*FACW*	24,000	0.1	0.3
Culver's root	*Veronicastrum virginicum*	*FAC*	800,000	8.8	0.5
Alexander's, golden	*Zizea aurea*	*FAC+*	11,000	2.4	9.2
Recommended Rate: 5.0 (PLS lbs/acre)					

SUMMARY

Mix Seeds Per Square Foot	Mix Seeds Per Square Yard	Mix Seeds Per Acre
102	884	4,436,283
% by wt. Grasses	**% by wt. Graminoids**	**% by wt. Forbs**
72.0	3.0	24.0
% by Seed Count Grasses	**% by Seed Count Graminoids**	**% by Seed Count Forbs**
35.0	30.0	35.0

Enbridge may use certified weed-free straw mulch within unsaturated wetlands to promote seed germination and prevent establishment of invasive species at a rate of no more than 2 tons per acre.

Wetland Mitigation

Enbridge will provide compensatory mitigation for wetland impacts in accordance with DNR and COE requirements. Refer to Section 6.4.2 for a description of the proposed wetland mitigation.

3.2.6 Project Schedule

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

3.2.7 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 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. Enbridge will install cathodic protection 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.

3.2.7.1 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).

3.2.7.2 Valve Placement

The placement of valves on the Sandpiper and Line 3 Replacement pipelines will help mitigate the risk of discharge. 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.

3.2.7.3 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 49 CFR Part 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 60 minutes or less. Enbridge can 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.

3.2.7.4 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 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 the 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 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 will 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.
- Creating a website containing safety information for emergency response organizations, including emergency response action plans, emergency contact numbers, and other resources.

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 Material Safety Data Sheet (MSDS) information to local responders on an annual basis in accordance with PHMSA requirements.

4.0 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 Project objectives;
- Technical and economic feasibility; and
- Significant socioeconomic and environmental advantage over the 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.

4.1 COMPARISON OF ROUTE ALTERNATIVES

4.1.1 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 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 Section 4.1.4).

4.1.2 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.

4.1.2.1 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 4.1.4.

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.

4.1.3 Project Combination Alternative - One Pipeline Scenario

Enbridge evaluated the option of constructing one pipeline to serve the commercial and operational requirements of its shippers from the Bakken and Western Canada. This was done during initial studies regarding Line 3's maintenance program. For several reasons, Enbridge concluded that Sandpiper as a stand-alone project presented a more adequate and efficient choice.

First, the Sandpiper Project was able to proceed more quickly than Line 3. As a result, Sandpiper was in a position to launch its open season and obtain commercial contracts to support the Project prior to Enbridge completing its evaluation of Line 3's maintenance program. Thus, the determination to completely replace Line 3 had yet to be made while Sandpiper had already completed its design analysis. Shortly thereafter, Sandpiper initiated its regulatory processes in North Dakota and Minnesota. The significant difference in in-service dates of Sandpiper (first quarter of 2016) versus Line 3 (second half of 2017) further separates the two projects.

Second, as a stand-alone project, Sandpiper enables Enbridge to meet the Bakken shippers need for additional pipeline capacity by 2016. Delaying Sandpiper's in-service date will only exacerbate the level of apportionment on the existing North Dakota pipeline system. Ultimately, shippers would be forced to increase their use of rail to transport their crude petroleum to refining markets or place their volumes in storage until pipeline capacity becomes available. Further complicating matters are the commercial contracts supporting Sandpiper; thus, a delay in the in-service date of Sandpiper would negatively impact Enbridge, its anchor shipper, North Dakota producers and downstream refineries.

Third, by transporting Bakken crude oil in a dedicated line from Clearbrook to Superior, Enbridge will be able to avoid the reduction in value of the Bakken crude that can occur when it is transported in the same pipeline as heavier crude oils. Preserving the Bakken crude oil value will provide a direct economic benefit to Sandpiper shippers and refiners.

Fourth, injections of Bakken crude petroleum at Clearbrook would increase pressure cycling upstream between Hardisty and Clearbrook. Additional tanks and terminals would then be required at Clearbrook, Minnesota.

For these reasons, Enbridge continues to proceed with the Sandpiper Pipeline as a stand-alone project that serves the needs of the Bakken shippers and refiners that utilize light crude as their primary feedstock.

4.1.4 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. The 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.

4.1.4.1 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 4.1.4-1 provides details on the total rail requirements to meet the objectives of the Project.

TABLE 4.1.4-1

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.

4.1.4.2 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 4.1.4-2 provides details on the total truck requirements to meet objectives of the Project.

TABLE 4.1.4-2

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 would 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 would 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.

4.1.4.3 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.

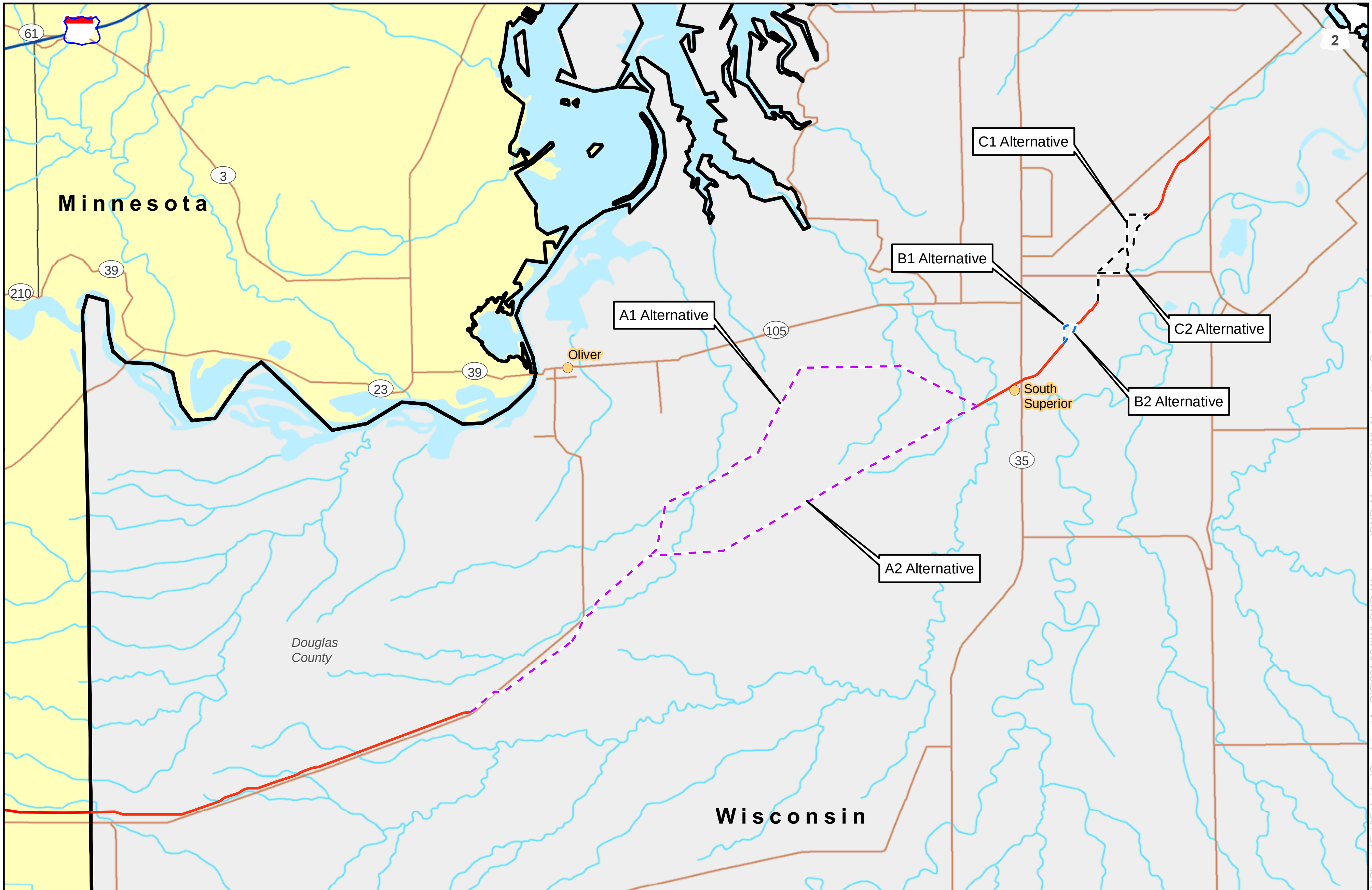
4.1.5 Route Alternatives – Sandpiper Pipeline and Line 3 Replacement Projects

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 will 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. Enbridge conducted an extensive macro-level alternatives analysis for these projects, which can be reviewed in the DNR's environmental assessment (EA) of the projects (DNR, 2009). 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 4.1-1).



0 0.5 1
Miles

1 inch = 1.3 miles

N W E S

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Figure 4.1-1
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\04\WI_DNR_Workspace\DNR_Maps\SPP_WI_Alternatives_Overview.mxd
Date: (5/2/2014)

The analysis uses actual field survey and delineation data that 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 DNR 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 Special Area Management Plan (SAMP), and Priority Wetlands as identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, PUBL-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 4.1.5.1 through 4.1.5.4 provide a brief overview of each alternative. Section 6.0 provides an additional environmental analysis of each alternative.

4.1.5.1 Route Alternatives A1 and A2

Due to the proximity to existing residences and the Pokegama-Carnegie SNA, Enbridge prepared an evaluation of Route Alternatives A1 and A2 between approximate MPs 605.8 and 612.4 (refer to Figure 4.1-2). Table 4.1.5-1 provides a comparison of the prominent land use features of these alternatives.

TABLE 4.1.5-1

Environmental Features Comparison –Route Alternatives A1 and A2

Environmental Features	Unit	Route Alternative A1	Route Alternative A2
Length	miles	6.5	5.8
Collocated with Enbridge Existing Right-of-Way	miles	0.0	2.8
Greenfield Route [a]	miles	0.6	0.2
Wetland Crossing Length [b, c]	miles	4.1	4.3
Wetland Impact - Construction [b, d]			
PEM	acres	10.7	14.9
PSS	acres	33.7	35.8
PFO	acres	13.3	7.1
Wetland Impact - Operation [b, e]			
PEM	acres	0.0	0.0
PSS	acres	19.1	16.7
PFO	acres	7.4	3.1
Rare Plant Occurrences [b]	number	160	249
Hydric Soils	acres	59.8	50.2
Highly Wind Erodible Soils	acres	0.0	0.0
Agricultural Land [f]	acres	<0.1	<0.1
Upland Herbaceous [f]	acres	1.1	1.2
Upland Forest [f]	acres	31.9	21.6
Prime Farmland Soils	acres	0.0	0.0
Intermittent Waterbodies Crossed [b]	number	0	0
Ephemeral Waterbodies Crossed [b]	number	9	1
Perennial Waterbodies Crossed [b]	number	5	1
Lake Superior National Estuarine Research Reserve Properties	number	0	0
Priority Wetlands [g]	miles	0.0	1.4
Priority Navigable Waterways Crossed	number	0	0
Areas of Special Natural Resource Interest	miles	0.0	1.4
Wild Rice Production Area Drainages [h]	miles	0.0	0.0
DNR Managed Lands	miles	0.0	0.0
State, County or Municipal Forest Land	miles	1.8	2.8
Railroads Crossed	number	1	1
Roads Crossed	number	4	3
Residences within 300 feet	number	0	1

TABLE 4.1.5-1

Environmental Features Comparison –Route Alternatives A1 and A2

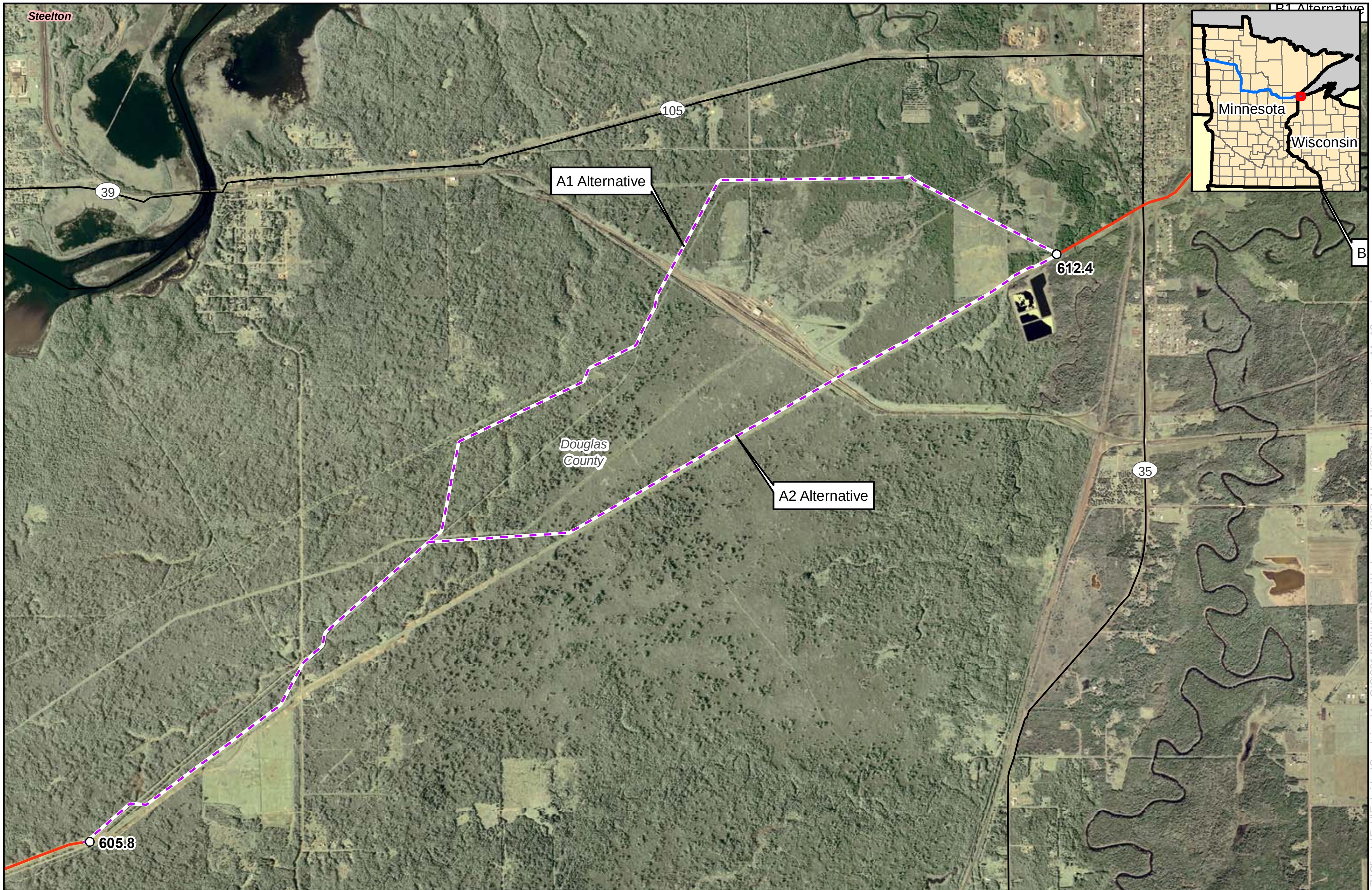
Environmental Features	Unit	Route Alternative A1	Route Alternative A2

[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] NLCD2006 Classification System (Fry et al., 2011)
[g] Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.
[h] Identified by the DNR and Great Lakes Indian Fish and Wildlife Commission.

In an attempt to avoid construction-related impacts on the wetlands and rare plants found within the Pokegama-Carnegie SNA, Enbridge installed Lines 67 and 13 (commonly referred to as the Alberta Clipper and Southern Lights Diluent Pipeline Projects) in 2009 and 2010 via HDD. 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 of equal or greater diameter compared to Lines 67 and 13 (36 and 20 inches, respectively) and will encounter 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 HDD to avoid temporary construction impacts on wetlands and rare plants.

4.1.5.2 Route Alternatives B1 and B2

Enbridge prepared an evaluation of Route Alternatives B1 and B2 between MPs 613.4 and 613.7 (refer to Figure 4.1-3) 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 crossing additional greenfield land crossed. Table 4.1.5-2 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 4.1-2
Sandpiper Pipeline and Line 3 Replacement Projects
Route Alternatives A1 and A2

ENBRIDGE

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\04\WI_DNR_Workspace\DNR_Maps\SPP_WI_Alternatives_A1_A2.mxd
Date: (4/30/2014)

Milepost

Proposed Project Route

B1/B2 Route Alternative

0 0.05 0.1 Miles

N

Figure 4.1-3

Sandpiper Pipeline and Line 3 Replacement Projects

Route Alternatives B1 and B2

ENBRIDGE

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\04\WI_DNR_Workspace\DNR_Maps\SPP_WI_Alternatives_B1_B2.mxd

Date: (5/2/2014)

TABLE 4.1.5-2

Environmental Features Comparison –Route Alternatives B1 and B2

Environmental Features	Unit	Route Alternative B1	Route Alternative B2
Length	miles	0.3	0.2
Collocated with Enbridge 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	1.4	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 [f]	acres	0.0	0.0
Upland Herbaceous [f]	acres	0.0	0.0
Upland Forest [f]	acres	2.7	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 [g]	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 [h]	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] NLCD2006 Classification System (Fry et al., 2011).

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

[h] Identified by the DNR and Great Lakes Indian Fish and Wildlife Commission.

4.1.5.3 Route Alternatives C1 and C2

Enbridge prepared an evaluation of Route Alternatives C1 and C2 located at approximately MPs 614.0 to 615.1 (refer to Figure 4.1-4) due to the City of Superior stormwater ponds and 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 4.1.5-3 provides a comparison of the prominent land use features of these alternatives.

TABLE 4.1.5-3

Environmental Features Comparison –Route Alternatives C1 and C2

Environmental Features	Unit	Route Alternative C1	Route Alternative C2
Length	miles	1.2	1.2
Collocated with Enbridge Existing Right-of-Way	miles	0.0	0.4
Greenfield Route [a]	miles	0.4	0.0
Wetland Crossing Length [b, c]	miles	0.9	0.4
Wetland Impact - Construction [b, d]			
PEM	acres	3.5	2.9
PSS	acres	8.0	2.4
PFO	acres	2.1	1.5
Wetland Impact - Operation [b, e]			
PEM	acres	0.0	0.0
PSS	acres	4.3	1.4
PFO	acres	1.2	0.8
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 [f]	acres	<0.1	<0.1
Upland Herbaceous Land [f]	acres	1.2	0.5
Upland Forest [f]	acres	10.4	3.2
Prime Farmland Soils	acres	0.0	0.0
Intermittent Waterbodies Crossed [b]	number	7	0
Ephemeral Waterbodies Crossed [b]	number	0	0
Perennial Waterbodies Crossed [b]	number	1	1
Lake Superior National Estuarine Research Reserve Properties	number	0	0
Priority Wetlands [g]	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 [h]	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	1	1
Residences within 300 feet	number	0	0

TABLE 4.1.5-3

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] NLCD2006 Classification System (Fry et al., 2011).
[g] Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.
[h] Identified by the DNR and Great Lakes Indian Fish and Wildlife Commission.

4.1.5.4 Route Option Summary

Enbridge defined eight total route variation options, illustrated on Figure 4.1-5, based on the alternatives discussed above. Table 4.1.5-4 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 4.1.5-4

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	14.1	13.3	14.0	14.1	14.1	13.4	13.4	13.3
Adjacent to Existing Rights-of-Way	Miles	12.8	13.1	12.9	13.2	13.4	12.5	13.0	12.7
Wetlands [a, b]	Acres	35.9	24.9	35.0	32.5	31.6	29.2	25.7	28.3
Rare Plants Occurrences [c]	Number	244	297	244	208	208	333	297	333
Prime Farmland Soils [c]	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waterbodies [a]	Number	35	16	35	28	28	23	16	23
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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
State, County or Municipal Forest Land	Miles	1.8	2.8	1.8	1.8	1.8	2.8	2.8	2.8
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	11	10	11	11	11	10	10	10

[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 4.1-4

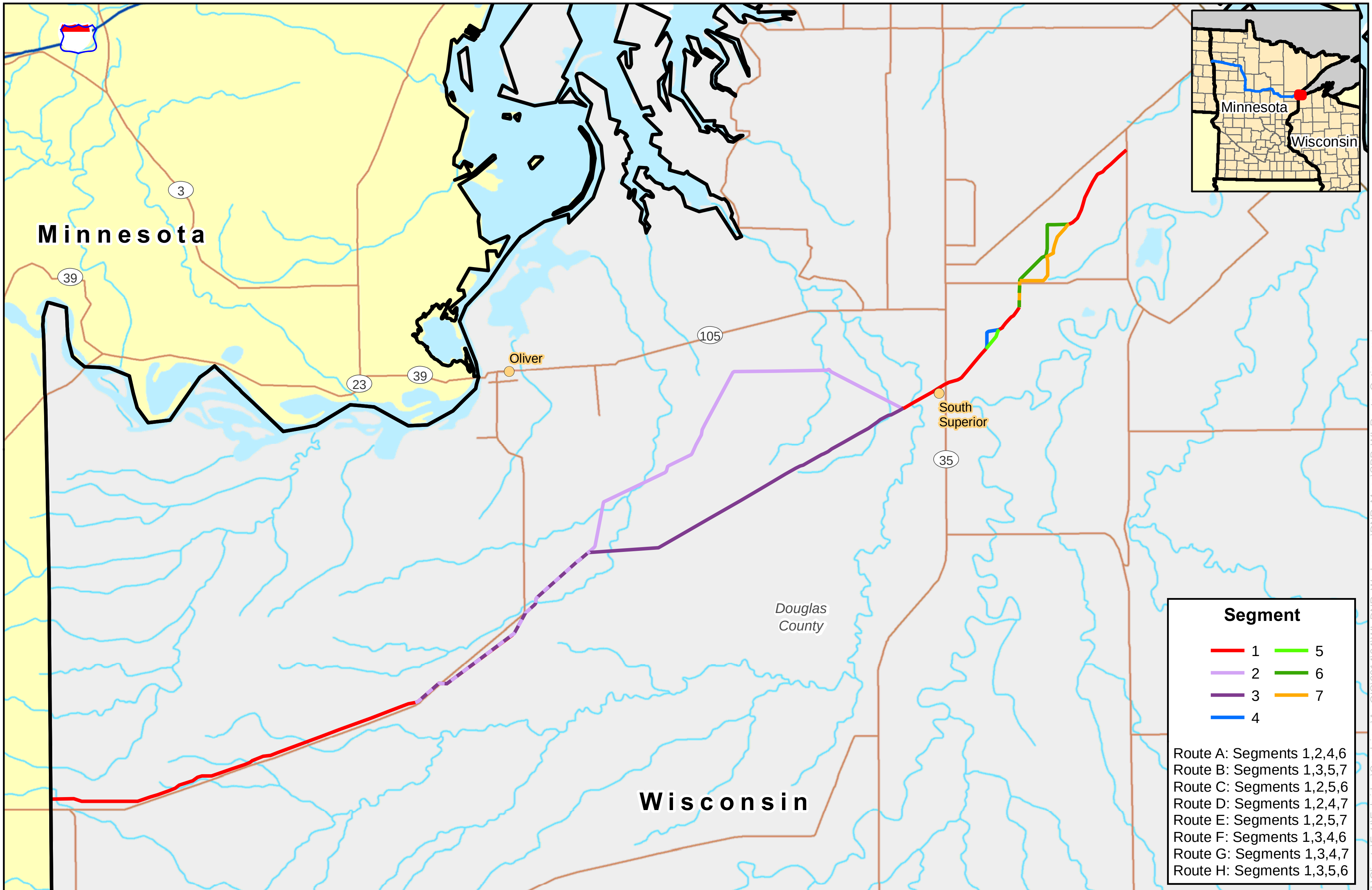
Sandpiper Pipeline and Line 3 Replacement Projects

Route Alternatives C1 and C2

ENBRIDGE

Source: Z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\04\WI_DNR_Workspace\DNR_Maps\SPP_WI_Alternatives_C1_C2.mxd

Date: (5/2/2014)



0 0.5 1 Miles
1 inch = 1.3 miles

N W E S

Figure 4.1-5
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\04\WI_DNR_Workspace\DNR_Maps\SPP_WI_Route_Options.mxd
Date: (5/2/2014)

5.0 EXISTING ENVIRONMENT

5.1 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 5.1-1 includes a summary of the NAAQS.

TABLE 5.1-1

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,

TABLE 5.1-1

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	

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.

[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 DNR 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 retains 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

TABLE 5.1-1

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	

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 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.

5.2 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).

5.2.1 Identification of Soil Conditions

5.2.1.1 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.

5.3 GEOLOGY AND GROUNDWATER

5.3.1 Geology and Physiography

The U.S. Geological Survey (USGS) defines 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.

5.3.2 Groundwater

Groundwater is an important source of water for private, public, commercial, and industrial uses in rural northern Wisconsin. As discussed in Section 5.2, 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.

5.4 SURFACE WATERS AND WETLANDS[12]

5.4.1 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 River (Hydrologic Unit Code [HUC] 8 – 04010201) and Beartrap-Nemadji Rivers (HUC 8 – 04010301) Watersheds. Rivers and coulees close to the escarpments to the north and south as well as their nearby tributaries have incised narrow, v-shaped valleys through the clayey sediments that are up to 150 feet deep. Areas further away from the major rivers become progressively less and less incised, culminating in an ephemeral to intermittent meandering drainage network on the somewhat poorly drained to very poorly drained elevated portion of the lake plain through which the Project traverses. The pipelines will cross the Pokegama River at MP 612.5, approximately 3.4 miles from the Project terminus at the Superior Terminal.

Areas further away from the major rivers become progressively less and less incised, culminating in an ephemeral to intermittent meandering drainage network on the somewhat poorly drained to very poorly drained elevated portion of the lake plain through which the Project traverses. 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. Sediment movement into the rivers and streams is an issue on the red clay plain. There are no natural lakes found in the ecological subsection. Drainages are indistinct and integrated drainage is dependent to a large degree on rainstorm and/or snowmelt intensity. More intense runoff events will fill receiving depressions until they progressively overflow and ultimately drain to more integrated drainageways.

Many streams in the Lake Superior 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 streambanks and roadsides. The power from high and rapidly changing flows carves at streambanks and leads to slumping of sand and clay into the stream. Streams in the Lake Superior clay plain are often turbid with suspended clay particles which remain in suspension and often forms plumes into Lake Superior. The Nemadji River is particularly noted for carrying clay plumes into Lake Superior. Sand deposited in streams covers fish spawning habitat and can be carried as bed load to downstream locations. The Nemadji River is responsible for sand deposition in Superior Bay/Superior entry, necessitating periodic navigation dredging. Maintenance of forest cover and wetlands within the watershed help to ameliorate rapid runoff from the watershed and reduce stream flashiness that leads to streambank erosion and subsequent aquatic habitat degradation.

The Projects cross the drainage of the Pokegama River which flows into the St. Louis River estuary, and crosses the Beartrap-Nemadji River watershed. The 12,000 acre St. Louis estuary supports an important complex of coastal wetlands on Lake Superior and was nominated in 2008 by the State of Wisconsin as a National Estuarine Research Reserve (NERR) under the National Oceanic and Atmospheric Administration (NOAA).

The Lower St. Louis estuary is also the Duluth-Superior Harbor supporting a busy port and many industrial and commercial uses. The upper estuary, particularly in Wisconsin, supports extensive wetlands and undeveloped shoreline. It is this section of the upper estuary into which the Pokegama

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[12] Much of the text in this section originated from the DNR's Environmental Assessment prepared for Enbridge's recent Alberta Clipper Project. DNR. 2009. Enbridge Alberta Clipper Petroleum Pipeline and Related Projects. Environmental Assessment. May 2009. Department of Natural Resources, Madison, WI.

River enters. In the early 1990s, the State of Wisconsin, with encouragement from Douglas County and local citizens, purchased over 5,000 acres of shoreline and adjacent land on the upper St. Louis River estuary. This property is known as the Red River – St. Louis River Stream Bank Protection area. The purpose was to protect this shoreline, which is highly susceptible to erosion, and thereby protect the St. Louis River spawning areas.

The St. Louis River is the second largest tributary to Lake Superior and supports a significant fishery. The upper estuary and river below the Fond du Lac dam provides spawning habitat for most of the walleye in the western arm of Lake Superior. Lake sturgeon restoration efforts in the St. Louis estuary began in the 1980s and once this population reaches maturity, the upper estuary will also serve as sturgeon spawning habitat.

Data on the watersheds crossed by the proposed pipelines are given in Tables 5.4.1-1 and 5.4.1-2.

TABLE 5.4.1-1

Watershed Boundaries Crossed by the Projects

Major Basin	Watershed	Hydrologic Unit Code (HUC) 8	Milepost In	Milepost Out	Crossing Length (miles)
Lake Superior	St. Louis River	4010201	602.0	612.9	10.9
	Beartrap - Nemadji Rivers	4010301	612.9	616.1	3.2

TABLE 5.4.1-2

Watersheds, Geopolitical, and Ecosystem Boundaries Crossed by the Projects [a]

Watershed Name (HUC 8)	DNR ECS	County	Area in Watershed (thousand of acres)	Percent of Watershed Area	Milepost Increment	Crossing Length (miles) (percent of state route)
Beartrap-Nemadji	Lake Superior Coastal Plan	Ashland	85.1	13.8	N/A	N/A
		Bayfield	318.3	51.8	N/A	N/A
		<u>Douglas</u>	211.2	34.4	612.9 - 616.1	3.2 (22.8)
		Subtotal	**614.6**	**100.0**		
St. Louis	Lake Superior Coastal Plan	<u>Douglas</u>	44.8	100.0	612.9 - 616.1	10.9 (77.2)
		Subtotal	**44.8**	**100.0**		
		Total Wisconsin	**659.4**	**100.0**		14.1 (100.0)

[a] Data was determined using GIS. Ecological Classification Subsection boundaries from the Ecological Landscapes Wisconsin DNR (Wisconsin Wildlife Action Plan, 2006), respectively. The Projects are collocated within the same construction corridor, will be constructed together, and are thus combined in this analysis. The entire 14.1 miles of the route in Wisconsin is contained within the Superior Coastal Plain as described in Wisconsin's Wildlife Action Plan.

[b] Counties that are underlined are crossed by the Project route.

Table 5.4.1-3 lists pre and post settlement land cover data for the Beartrap-Nemadji watershed.

TABLE 5.4.1-3

Comparison of Pre-Settlement vs. Baseline Environmental Conditions for the Projects within the Beartrap-Nemadji Watershed [a, b]

	Pre-settlement		Baseline		
Land Use	**Pre-Settlement Acreage (thousands)**	**Relative Percentage for ECS**	**Wiscland Land Use or WWI acreage (thousands)**	**Relative Percentage for Watershed**	**Percentage Change**
Forest	594.2	96.7	420.7	68.0	-32.5
Shrubland	4.1	0.7	13.8	2.2	1.6
Prairie/Grassland	2.4	0.4	161.3	26.1	25.7
Open water	0.5	0.1	3.2	0.5	0.4
Emergent Wetland	3.1	0.5	2.7	0.4	-0.1
Forested / Shrub Wetland	10.3	1.7	0.0	0.0	
Agricultural	0.0	0.0	7.0	1.1	1.1
Developed	0.0	0.0	4.5	0.7	0.7
Barren (unknown)	0.1	<0.1	5.5	0.9	0.9
Subtotal	614.6	100.0	618.8	100.0	
Wiscland Emergent Wetland			*38.3*		
Wiscland Forested Wetland			*23.7*		

a Pre-settlement land cover distribution determined using the Wisconsin Native Vegetation Map.

b Land Use determined using Wiscland digital data set, Wisconsin Department of Natural Resources, Madison.

c Wiscland acreage was modified to substitute WWI acreage for Wiscland forested and emergent wetland acreage estimates. WWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS. Wiscland wetland data are provided in italics for comparison. WWI data indicate similar total wetland acreage; however, the acreage of emergent and forested wetlands are reversed when compared to Wiscland. The difference is likely due to the inclusion of wetlands with a PSS component into the forested wetland category. The difference between Wiscland and WWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

Table 5.4.1-4 lists pre and post settlement land cover data for the St. Louis watershed.

TABLE 5.4.1-4

Comparison of Pre-Settlement vs. Baseline Environmental Conditions for the Projects within the St. Louis Watershed [a, b]

	Pre-settlement		Baseline		
Land Use	**Pre-Settlement Acreage (thousands)**	**Relative Percentage for ECS**	**Wiscland Land Use or WWI acreage (thousands)**	**Relative Percentage for Watershed**	**Percentage Change**
Forest	42.5	94.9	12.9	28.4	-71.1
Shrubland	0.0	0.0	5.0	10.9	10.9
Prairie/Grassland	0.0	0.0	18.6	40.9	40.9
Open water	1.6	3.6	1.5	3.3	-0.2
Emergent Wetland	0.0	0.0	0.6	1.3	1.3
Forested / Shrub Wetland	0.4	0.9	0.0	0.0	3.6
Agricultural	0.0	0.0	0.1	0.2	0.2
Developed	0.0	0.0	6.8	14.9	14.9
Barren (unknown)	0.4	0.7	0.0	0.0	-0.7

TABLE 5.4.1-4

Comparison of Pre-Settlement vs. Baseline Environmental Conditions for the Projects within the St. Louis Watershed [a, b]

	Pre-settlement		Baseline		
Land Use	**Pre-Settlement Acreage (thousands)**	**Relative Percentage for ECS**	**Wiscland Land Use or WWI acreage (thousands)**	**Relative Percentage for Watershed**	**Percentage Change**
Subtotal	44.8	100.0	45.3	100.0	
Wiscland Emergent Wetland			*12.6*		
Wiscland Forested Wetland			*2.0*		

[a] Pre-settlement land cover distribution determined using the Wisconsin Native Vegetation Map.

[b] Land Use determined using Wiscland digital data set, Wisconsin Department of Natural Resources, Madison.

[c] Wiscland acreage was modified to substitute WWI acreage for Wiscland forested and emergent wetland acreage estimates. WWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS. Wiscland wetland data are provided in italics for comparison. WWI data indicate similar total wetland acreage; however, the acreage of emergent and forested wetlands are reversed when compared to Wiscland. The difference is likely due to the inclusion of wetlands with a PSS component into the forested wetland category. The difference between Wiscland and WWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

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. 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 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 (DNR, 2010).

The combination of ecosystems within the Lower St. Louis River area—estuarine wetland and aquatic habitats, baymouth bar complex, and surrounding upland forest—are very unusual in Lake Superior, the Upper Midwest, the Great Lakes region, and the world. Great Lakes wetland systems are unique from a global perspective, and the St. Louis River wetlands are the largest such complex on the Lake Superior shore, representing a significant source of productivity for the entire Lake Superior ecosystem. The estuary and its tributaries are unusual in having such a variety of habitat types supporting a large and diverse assemblage of native fish species.

The baymouth bars are unusual in the Great Lakes—aside from Minnesota and Wisconsin Points, the only similar examples are Point Pelee and Long Point in Ontario and Long Island- Chequamegon Point in Wisconsin. The plant communities supported by these baymouth bars are endemic to the Great Lakes. The freshwater estuary and baymouth bar systems are virtually absent elsewhere in the interior of North America. In spite of human impacts, the Lower St. Louis River ecosystem is both regionally and globally significant.

In the 1980s, environmental quality conditions prompted the designation of the Lower St. Louis River System as one of 43 Great Lakes Areas of Concern (IJC, 1989). To address the impairments of beneficial uses in the St. Louis River Area of Concern (AOC), a Stage One Remedial Action Plan (RAP) was developed (MPCA and WDNR, 1992). This was followed by a Stage Two RAP, which recommended development of a Habitat Plan because it was recognized that although habitat is still being lost, many valuable areas remain (MPCA and WDNR, 1995; DNR, 2009). Since then significant work has been done to restore the AOC, prompting the development of a "Roadmap to Delisting (RAP Update)" in 2013. However, despite the progress, legacy sediment contamination and lost wetland habitat remain significant stressors to ecosystem health (MPCA, 2013). Therefore, cooperative action among various stakeholders, decision-makers, and resource managers in both Minnesota and Wisconsin is needed to protect the remaining habitat and restore degraded area.

5.4.2 Wetlands

The Project route crosses approximately 14 miles of Douglas County, Wisconsin in the Lake Superior drainage basin. The total area of Douglas County is 853,509 acres, of which 194,771 acres are mapped as wetland on the Wisconsin Wetland Inventory (WWI). The northern third of the county is in the Lake Superior clay plain. The clay plain is rich in wetlands, in part due to the impermeable clay soils and relatively flat topography. Wetlands may be found even in higher elevations in the clay plain. Although wetlands are locally abundant, they are often of types that are nationally rare. In the area proposed to be crossed by the Project and up to the Superior Terminal, shrub swamps and wet meadows are commonly interspersed with agricultural, residential, and industrial land uses. The clay plain is also characterized by deeply incised streams within steep ravines, formed through the erosive power of rapid water runoff from the surrounding landscape (DNR, 2009).

Wetlands in the area of the proposed 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. Sediment movement into the rivers and streams continues even after significant efforts by the state and federal government to control it. There are no natural lakes found in the subsection. Drainages are indistinct and integrated drainage is dependent to a large degree on rainstorm and/or snowmelt intensity. More intense runoff events will fill receiving depressions until they progressively overflow and ultimately drain to more integrated drainageways (DNR, 2009).

Most of the wetlands in the western portion of the Project in Wisconsin are riparian to intermittent drainageways. Extensive shrub-carr wetlands are more dominant to the east from the Pokegama Carnegie wetland complex ASNRI into the Enbridge's Superior Terminal.

Wetlands within the existing right-of-way are maintained in an herbaceous state (emergent wetland (PEM)) by periodic brushing. Alder thicket, the common shrub-carr (PSS) wetland within and outside of the proposed construction right-of-way, is dominated by tall shrubs, especially speckled alder. Shrub associates include red-osier dogwood, willows, and several minor shrub components. Widely scattered small, ephemeral pools support a variety of emergent hydrophytes. Among the characteristic herbaceous species in these emergent wetlands are sedges, Canada bluejoint grass, orange jewelweed, asters, boneset, rough bedstraw, marsh fern, arrow-leaved tearthumb, and sensitive fern. The forested wetlands in this segment are primarily (1) black ash (*Fraxinus nigra*) dominated depressions within the hardwood uplands along the route, or (2) discrete aspen groves within shrub-carr, (3) and isolated hardwoods and conifers in better drained areas adjacent to incised drainageways. Black ash also occurs as a fringe or minor component to larger wetland complexes or as isolated stunted specimens within some wetlands.

The majority of the wetland systems are fed by surface runoff. Most depressions are ponded very early in the year and immediately after heavy precipitation events. The area is characterized by 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.

Wetlands provide an important flood protection function. In the Lake Superior clay plain, many of the wetlands are topography-dependent and highly interspersed on the landscape. Wetlands hold water on the landscape, which slows the rate of water runoff to the streams. This wetland function is particularly important in the Lake Superior clay plain watersheds where water runs off the impermeable clay soils very quickly. Wetland loss causes increased runoff from the landscape, which in turn increases flooding and streambank erosion. For streams in the clay plain, the streambank erosion caused by excess water runoff leads to habitat degradation from sedimentation. Additional wetland loss within the watershed would be expected to exacerbate erosion impacts to streams (DNR, 2009).

5.5 VEGETATION, WILDLIFE, AND FISHERIES

5.5.1 Vegetation

5.5.1.1 Existing Vegetation Resources

As described in Section 6.6.1, 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 (DNR, 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*). 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.

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 (DNR, 2005). Important land uses in the Superior Coastal Plain today include forestry, tourism, and agriculture, including specialty crops such as apples and cherries (DNR, 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 (DNR, 2012).

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 DNR designated a portion of the Pokegama-Carnegie wetland complex as an SNA. As an SNA, the Pokegama-Carnegie wetland complex is also considered an ASNRI.

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.

5.5.2 Wildlife

5.5.2.1 Existing Wildlife Resources

Based on the habitat descriptions and geographic distributions from DNR (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 DNR (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 DNR (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*).

5.5.2.2 Sensitive Wildlife Species and Habitats

Douglas County's wetlands have medium to high floristic diversity and support a number of state threatened, endangered, and special concern plant species. Invasive species are increasingly more prevalent in wetlands, due to both direct disturbance and impacts from surrounding development. Increasing presence of invasive species will result in reduced floral diversity.

Surveys from the 1990s by DNR's Bureau of Natural Heritage Conservation evaluated priority wetland communities in the Lake Superior basin. One focus was the vicinity of the city of Superior, where shrub- and sedge- dominated wetlands are concentrated on the nearly level poorly drained red clay soils. Plant communities surveyed included alder thicket, shub-carr, northern sedge meadow, and emergent aquatic. Priority sites surveyed were Pokegama-Carnegie wetlands, Red River Breaks, and Superior Airport/Hill Avenue Wetlands/South Superior Triangle. These sites are most notable for their concentrations of rare plants, some of which occur nowhere else in the drainage basin or state (Epstein et al. 1997). The report summarizes threats to these communities as disruption of hydrology, increased development, invasive species, pollution, and suppression of natural disturbance regimes (DNR, 2009).

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 (DNR, 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 (DNR, 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 5.5.2-1 lists the SGCN associated with this COA.

TABLE 5.5.2-1

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) (DNR, 2005).

[b] This species was listed in DNR (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.

5.5.3 Fisheries

5.5.3.1 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 5.5.3-1 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 5.5.3-1

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
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

TABLE 5.5.3-1

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

on Appendix 6 of SLRCAC (2002).

5.5.4 Threatened and Endangered Species

5.5.4.1 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 5.5.4-1). Designated critical habitat for the piping plover also occurs in Douglas County.

TABLE 5.5.4-1

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

5.5.4.2 State Threatened and Endangered Resources

In May 2013, Enbridge prepared a preliminary DNR 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 DNR requested field surveys for the eight plant species listed in Table 5.5.4-2 and habitat assessments for the two wildlife species listed in Table 5.5.4-3.

TABLE 5.5.4-2

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

TABLE 5.5.4-2

Plant Species Targeted for Field Surveys in the Project Area

Common Name	Scientific Name	State Status
tea-leaved willow	*Salix planifolia*	threatened

TABLE 5.5.4-3

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

5.6 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; and
- Shrubland consists of areas classified as shrub/scrub.

5.7 SOCIOECONOMIC RESOURCES

5.7.1 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 5.7.1-1 presents information on current population levels and density, per capita income, workforce, unemployment rates, and employment industries.

TABLE 5.7.1-1

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]

TABLE 5.7.1-1

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).

5.7.1.1 Environmental Justice

Executive Order (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 5.7.2-1. 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 5.7.2-1

Demographic Conditions in the Project Area

	Race as a Percentage of Total Population [a]								
State/County	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	Persons of Hispanic or Latino Origin, percent (2012) [a]	Persons Below Poverty, percent (2007-2011) [b]
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.

5.8 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.

5.8.1 Environmental Review of 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.

6.0 ENVIRONMENTAL EFFECTS

6.1 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.

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 6.1-1 provides a summary of the regional ambient air quality monitoring data from the three-year period 2010 through 2012 for the Project area.

TABLE 6.1-1

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/m^3	2010-2012	9 miles north
	annual	B	3 year annual mean	5.8 µg/m^3	2010-2012	9 miles north
PM_{10}	24-hour	C	3-year average of second max	53.5 µg/m^3	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.

6.1.1 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 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.

6.1.2 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.

6.1.2.1 Construction Emissions

Construction of the Project will 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 will 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 A). 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.

6.1.2.2 Operational Emissions

The Projects will be subject to PSD air quality permit approval by the DNR which includes a 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.

6.2 SOILS

6.2.1 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 6.2.1-1, 6.2.1-2 and 6.2.1-3 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 6.2.1-1

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]	**211.5**	**198.8**	**209.7**	**210.2**	**208.4**	**201.9**	**200.6**	**200.1**
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]	142.9 (68%)	122.3 (62%)	140.3 (67%)	145.2 (69%)	142.6 (68%)	122.6 (61%)	124.9 (62%)	120.0 (60%)
Compaction Prone	35.6 (17%)	49.7 (25%)	36.4 (17%)	32.0 (15%)	32.8 (16%)	52.5 (26%)	48.9 (24%)	53.3 (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	32.2 (15%)	24.6 (12%)	32.2 (15%)	32.2 (15%)	32.2 (15%)	24.6 (12%)	24.6 (12%)	24.6 (12%)
Droughty	68.6 (32%)	75.1 (38%)	69.4 (33%)	65.0 (31%)	65.8 (32%)	77.9 (39%)	74.3 (37%)	78.7 (39%)
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 6.2.1-2

Soil Characteristics Crossed [a]

	MP 602.0 – 605.8	**MP 605.8 – 612.4**		**MP 612.4 – 613.4**	**MP 613.4 – 613.7**		**MP 613.7 – 614.0**	**MP 614.0 – 615.1**		**MP 615.1 – 616.1**
		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
Farmland of Statewide Importance [c]	38.8	65.3	45	10.6	3.5	0.9	3.3	9	11.3	12.4
Compaction Prone	1.7	17.4	34.3	1.4	0.9	1.7	0.8	7.8	4.2	5.6
Highly Wind Erodible	0	0	0	0	0	0	0	0	0	0
Highly Water Erodible	14.5	13	5.4	3.8	0	0	0	0	0	0.9
Droughty	16.2	30.4	39.7	6	0.9	1.7	0.8	7.8	4.2	6.5
Stony/Rocky	0	0	0	0	0	0	0	0	0	0
Shallow	0	0	0	0	0	0	0	0	0	0

TABLE 6.2.1-2

Soil Characteristics Crossed [a]

	MP 602.0 – 605.8	MP 605.8 – 612.4		MP 612.4 – 613.4	MP 613.4 – 613.7		MP 613.7 – 614.0	MP 614.0 – 615.1		MP 615.1 – 616.1
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
Bedrock										
TOTAL ACREAGE	**71.2**	**126.1**	**124.4**	**21.8**	**5.3**	**4.3**	**4.9**	**24.6**	**19.7**	**25.4**

[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 6.2.1-3

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	211.5	211.5	0.0	0.0	0.0	179.3	0.0	5.2	24.6	2.4
Route B	198.8	198.8	0.0	0.0	0.0	174.2	0.0	6.0	18.5	0.1
Route C	209.7	209.7	0.0	0.0	0.0	177.5	0.0	5.2	24.6	2.4
Route D	210.2	210.2	0.0	0.0	0.0	178.0	0.0	5.2	24.6	2.4
Route E	208.4	208.4	0.0	0.0	0.0	176.2	0.0	5.2	24.6	2.4
Route F	201.9	201.9	0.0	0.0	0.0	177.3	0.0	6.0	18.5	0.1
Route G	200.6	200.6	0.0	0.0	0.0	176.0	0.0	6.0	18.5	0.1
Route H	200.1	200.1	0.0	0.0	0.0	175.5	0.0	6.0	18.5	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.

6.2.2 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).

6.2.2.1 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 6.2.1-1 and 6.2.1-2 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 B), 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 6.2.1-3, 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 A). 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.

6.2.2.2 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 6.2.1-1 and 6.2.1-2 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.

6.2.2.3 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 6.2.1-1 and 6.2.1-2 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 A) 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.

6.2.2.4 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 6.2.1-1 and 6.2.1-2 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.

6.2.2.5 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.

6.3 GEOLOGY AND GROUNDWATER

As stated previously, the area the 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.

6.3.1 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.

6.3.2 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 C) that will be implemented in the event of an unanticipated paleontological find.

6.3.3 Public Water Supply Wells

The DNR maintains a database that contains basic information for public wells within the state of Wisconsin (DNR, 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.

6.3.4 Private Water Supply Wells

The DNR maintains two databases that contain information on private water wells. DATCP (2014) contains records of wells constructed from 1936 to 1989, and DNR (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 DNR (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.

6.3.5 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).

6.3.6 Contaminated Groundwater

Enbridge accessed the DNR CLEAN—Remediation & Redevelopment Sites (RR) database (DNR, 2014c) to identify contaminated sites within 0.5-mile 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 DNR funding assistance. Enbridge removed closed sites with completed cleanup from consideration. Enbridge identified a total of 13 open sites, 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.

6.3.7 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.

6.3.7.1 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.

6.3.7.2 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 A) 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 (refer to Section 3.2.7).

6.4 SURFACE WATERS AND WETLANDS

6.4.1 Surface Waters

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 6.4.1-1 identifies the number of waterbodies crossed along each route option.

TABLE 6.4.1-1

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	35	16	35	28	28	23	16	23
Perennial	11	7	11	11	11	7	7	7
Intermittent	12	5	12	5	5	12	5	12
Ephemeral	12	4	12	12	12	4	4	4
ASNRI-Designated	14	4	14	14	14	4	4	4

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 6.4.1-2 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 A).

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 HDD. 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 HDD to avoid temporary construction impacts on the Pokegama River.

TABLE 6.4.1-2

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]
St. Louis River Watershed (HUC 8)								
04010201000307	602.0	Unnamed	P	-		DC	OC	Span
DO007aWB	603.1	Unnamed	E	-		OC	OC	Span
DO007bWB	603.1	Unnamed	E	-		OC	OC	Span
DO007bWB	603.2	Unnamed	E	-		OC	OC	Span
DO008aWB	603.5	Unnamed	E	-		OC	OC	Span
DO020aWB	604.7	Unnamed	P	-		DC	OC	Span
DO025aWB	605.6	Unnamed	I	-		OC	OC	Span
DO034_500bWB	607.3	Little Pokegama River	E	A1/A2	X	OC	OC	Span
DO034_500aWB	607.4	Little Pokegama River	P	A1/A2	X	DC	OC	Span
DO041_001bWB	608.6	Unnamed	E	A1	X	OC	OC	Span
DO041_500aWB	608.6	Unnamed	P	A1	X	DC	OC	Span
DO041_506aWB	608.7	Unnamed	E	A1		OC	OC	Span
DO041_506cWB	608.8	Little Pokegama River	E	A1	X	OC	OC	Span
DO041_506cWB	608.8	Little Pokegama River	E	A1	X	OC	OC	Span
DO041_200aWB	608.9	Little Pokegama River	E	A1	X	OC	OC	Span
DO041_200cWB	608.9	Little Pokegama River	E	A1	X	OC	OC	Span
DO041_200bWB	609.1	Little Pokegama River	P	A1	X	DC	OC	Span
DO041_508bWB	609.1	Little Pokegama River	E	A1		OC	OC	Span
DO041_200bWB	609.2	Little Pokegama River	P	A1	X	DC	OC	Span
DO041_534aWB	611.4	Unnamed Tributary: Pokegama River	E	A1	X	OC	OC	Span
DO041_534_200aWB	611.5	Unnamed Tributary: Pokegama River	P	A1	X	DC	OC	Span
DO057aWB	612.5	Pokegama River	P	-	X	DC	OC	Span
DO065_900RDcWB	612.9	Unnamed	I	-		OC	OC	Span
Beartrap-Nemadji Watershed (HUC 8)								
DO074aWB	613.3	Unnamed	I	-		OC	OC	Span
DO075aWB	613.3	Unnamed	E	-		OC	OC	Span
DO094_001aWB	614.1	Unnamed	P	C1/C2		DC	OC	Span
DO100_510aWB	614.3	Unnamed	I	C1		OC	OC	Span
DO106_200bWB	614.4	Unnamed Ditch	I	C1		OC	OC	Span
DO106aWB	614.4	Unnamed Ditch	I	C1		OC	OC	Span
DO106_200aWB	614.4	Unnamed Ditch	I	C1		OC	OC	Span
DO106bWB	614.5	Unnamed Ditch	I	C1		OC	OC	Span
DO106bWB	614.6	Unnamed Ditch	I	C1		OC	OC	Span
DO106bWB	614.6	Unnamed Ditch	I	C1		OC	OC	Span
DO110_001aWB	615.2	Unnamed Ditch	I	-		OC	OC	Span
04010201001150	N/A	Little Pokegama River	P	A2	X	DC	OC	Span
DO055aWB	N/A	Unnamed	P	A2	X	DC	OC	Span
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.

TABLE 6.4.1-2

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]

[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 DNR 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 DNR 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 6.4.1-1, the Project crosses either 13 or 5 ASNRI-designated waterbodies if Route Alternative A1 or A2, respectively, is selected.

6.4.1.1 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 A).

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.

6.4.2 Wetlands

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 DNR 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 6.4.2-1 compares the wetland impacts along the route alternatives.

TABLE 6.4.2-1

Wetlands Impacts

Wetland Type [a] Wetland Impacts	MP 602.0 – 605.8	MP 605.8 – 612.4		MP 612.4 – 613.4	MP 613.4 – 613.7		MP 613.7 – 614.0	MP 614.0 – 615.1		MP 615.1 – 616.1
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
PEM										
Crossing Length (miles) [b]	1.4	1.2	1.9	0.5	0.1	0.1	0.3	0.3	0.2	0.8
Construction Impacts (acres) [c]	17.1	10.7	14.9	4.4	1.0	0.8	2.4	3.5	2.9	6.7
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 (miles) [b]	<0.1	2.1	2.0	<0.1	0.1	0.1	0.0	0.5	0.1	0.0
Construction Impacts (acres) [c]	1.5	33.7	35.8	0.8	2.7	1.8	0.3	8.0	2.4	1.7
Permanent Conversion (acres) [d]	0.0	19.1	16.7	0.1	1.4	0.9	0.0	4.3	1.4	0.2
PFO										
Crossing Length (miles) [b]	0.2	0.9	0.4	0.1	0.1	0.0	0.0	<0.1	<0.1	0.0
Construction Impacts (acres) [c]	3.7	13.3	7.1	1.7	0.7	0.0	0.2	2.1	1.5	1.0
Permanent Conversion (acres) [d]	1.2	7.4	3.1	0.3	0.5	0.0	0.0	1.2	0.8	0.2
PUB										
Crossing Length (miles) [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	0.8
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.

6.4.2.1 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 A).

Table 6.4.2-2 compares the wetland impacts for each route option.

TABLE 6.4.2-2

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	8.0	8.4	8.0	7.9	8.6	8.1	8.5
	Temp. Impact (acres)[b]	118.2	109.6	116.4	111.3	109.5	118.3	111.4	116.5
	Perm. Impacts (acres)[c]	35.9	24.9	35.0	32.5	31.6	29.2	25.7	28.3
Palustrine Emergent (PEM)	Length Crossed (mi) [a]	4.4	5.1	4.4	4.3	4.3	5.2	5.1	5.2
	Temp. Impact (acres)[b]	45.8	49.2	45.6	45.2	45.0	50.0	49.4	49.8
	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]	2.8	2.3	2.8	2.4	2.4	2.6	2.3	2.6
	Temp. Impact (acres)[b]	48.8	44.3	47.9	43.1	42.2	50.9	45.2	49.9
	Perm. Impacts (acres)[c]	25.1	19.3	24.7	22.2	21.8	22.7	19.8	22.3
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]	22.7	15.2	22.0	22.1	21.4	16.5	15.9	15.8
	Perm. Impacts (acres)[c]	10.7	5.5	10.3	10.3	9.8	6.4	6.0	6.0
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]	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

TABLE 6.4.2-2

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.

6.4.2.2 Wetland Mitigation

Enbridge is proposing to mitigate for wetland impacts through a Project-specific consolidated wetland mitigation site located in the Nemadji River watershed.

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 – 0401030105; Lower 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) includes proposed preservation, enhancement, and restoration of wetlands.

The site is located in northern Douglas County, Lake Superior Basin; Lower Nemadji River Watershed (HUC 10); 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.

6.5 VEGETATION, WILDLIFE, AND FISHERIES

6.5.1 Vegetation

6.5.1.1 Natural Communities

Natural Communities included in Wisconsin's Natural Heritage Inventory (NHI) are communities the DNR 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 (Boreal Forest, Emergent Marsh, and Northern Sedge Meadow) within 1 mile of the Project area (Table 6.5.1-1).

TABLE 6.5.1-1

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

Natural Community	**MP 602.0 – 605.8**	**MP 605.8 – 612.4**		**MP 612.4 – 613.4**	**MP 613.4 – 613.7**		**MP 613.7 – 614.0**	**MP 614.0 – 615.1**		**MP 615.1 – 616.1**
		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							
Floodplain Forest [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.

- Floodplain Forest: This lowland hardwood community occurs along large rivers that flood periodically. In northern floodplain forests, canopy dominants include balsam-poplar (*Populus balsamifera*), bur oak (*Quercus macrocarpa*), and box elder (*Acer negundo*).

- 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.

6.5.1.2 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 6.5.1-2).

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 6.5.1-2). 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 DNR requested field surveys for these eight species as discussed in further detail under Section 6.5.4.2.

TABLE 6.5.1-2

NHI Occurrences of Plant Species Within 1 Mile of the Project

Species	**MP 602.0 – 605.8**	**MP 605.8 – 612.4**		**MP 612.4 – 613.4**	**MP 613.4 – 613.7**		**MP 613.7 – 614.0**	**MP 614.0 – 615.1**		**MP 615.1 – 616.1**
		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							

TABLE 6.5.1-2

NHI Occurrences of Plant Species Within 1 Mile of the Project

Species	**MP 602.0 – 605.8**	**MP 605.8 – 612.4**		**MP 612.4 – 613.4**	**MP 613.4 – 613.7**		**MP 613.7 – 614.0**	**MP 614.0 – 615.1**		**MP 615.1 – 616.1**
		Route Alternative A1	Route Alternative A2		Route Alternative B1	Route Alternative B2		Route Alternative C1	Route Alternative C2	
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	X	X	
clustered bur reed (*Sparganium glomeratum*)	X	X	X	X	X		X	X	X	X
ENDANGERED										
floating marsh-marigold (*Caltha natans*)		X	X							
slender spike-rush (*Eleocharis nitida*)		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 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.

6.5.1.3 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 A). 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 A).

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 A) 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.

6.5.2 Wildlife

As described in Section 6.5.1.1, 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.

6.5.2.1 Sensitive Wildlife Species and Habitats

Species of Greatest Conservation Need and Priority Habitats

The WWAP's Implementation Plan (DNR, 2008) also identifies Natural Communities that are a priority for SGCNs. Two of the Natural Communities (Boreal Forest and Emergent Marsh; refer to Section 6.5.1.2) 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 (DNR, 2005).

Other Sensitive Areas and Species

According to DNR online mapping, the Project avoids all DNR 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 6.5.2-2). 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 DNR requested a habitat assessment for the upland sandpiper (refer to Section 6.5.4.2 for additional details).

There is an occurrence of one threatened species of reptile, the wood turtle (*Glyptemys insculpta*), within 1 mile of the Project (refer to Table 6.5.2-2). The WDNR requested a habitat assessment for the wood turtle (refer to Section 6.5.4.2 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 6.5.2-2). All three species are associated with wetland or aquatic habitats.

TABLE 6.5.2-1

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

Species	**MP 602.0 – 605.8**	**MP 605.8 – 612.4**		**MP 612.4 – 613.4**	**MP 613.4 – 613.7**		**MP 613.7 – 614.0**	**MP 614.0 – 615.1**		**MP 615.1 – 616.1**
		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	X	X							
a flat-headed mayfly (*Maccaffertium pulchellum*) [b]		X	X	X	X	X	X			
Connecticut warbler (*Oporornis agilis*) [a]	X	X	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	X		X	

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

6.5.2.2 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 A) 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.

6.5.3 Fisheries

6.5.3.1 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 6.5.3-1). 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 DNR online mapping, the Project avoids designated trout waters and the two DNR Fisheries Areas in Douglas County, the St. Louis/Red River Stream Bank Protection Area and Person Lake.

TABLE 6.5.3-1

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

Species	MP 602.0 – 605.8	MP 605.8 – 612.4		MP 612.4 – 613.4	MP 613.4 – 613.7		MP 613.7 – 614.0	MP 614.0 – 615.1		MP 615.1 – 616.1
		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							
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.

6.5.3.2 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 A) and limit the duration of construction in these waterbodies.

6.5.4 Threatened and Endangered Species

6.5.4.1 Federal Threatened and Endangered Resources

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*) (DNR, 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.[13] As explained in Section 5.4.1, 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 (DNR, 2005). The nearest portion of the Northwest Sands Ecological Landscape occurs more than 12 miles southeast of the Project.[14] Furthermore, there were no NHI occurrences of Kirtland's warbler within 1 mile of the Project area. As a

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

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

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 for nesting have been lost to commercial, residential, and recreational developments.[15] 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.[16] 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 DNR request Fassett's locoweed be targeted for botanical field surveys (refer to Section 6.5.4.2 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; DNR, 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 (DNR, 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.

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

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

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.

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.

6.5.4.2 State Threatened and Endangered Resources

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 5.5.4-2 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 511 occurrences of 8 species within the Project area. The biologists observed all species listed in Table 5.5.4-2 (except *Caltha natans*), plus *Juncus vaseyi* (a species of special concern in Wisconsin; refer to Section 6.5.1.2), 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 6.5.4-1.

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

TABLE 6.5.4-1

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

Species [Total Number of Occurrences]	**MP 602.0 – 605.8**	**MP 605.8 – 612.4**		**MP 612.4 – 613.4**	**MP 613.4 – 613.7**		**MP 613.7 – 614.0**	**MP 614.0 – 615.1**		**MP 615.1 – 616.1**
		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 [154] (*Petasites sagittatus*)		X	X							
seaside crowfoot [9] (*Ranunculus cymbalaria*)										X
tea-leaved willow [251] (*Salix planifolia*)	X	X	X					X	X	X
clustered bur reed [3] (*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 DNR 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 (DNR, 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 DNR, Enbridge will 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 DNR 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 (DNR, 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 (DNR, 2013b).

Enbridge used data from 2013 waterbody field surveys 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.

Based on the 2013 waterbody surveys, the Pokegama River crossing (MP 612.5) met the criteria of potentially suitable habitat for the wood turtle. Enbridge submitted the *Wisconsin 2013 Wood Turtle Desktop Habitat Review* to the DNR under separate cover.

Enbridge conducted a field-based assessment at the Pokegama River crossing within and adjacent to the Project area in May 2014 and determined that no suitable nesting habitat is present. The survey crew did not observe any individual wood turtles during the field assessment. Enbridge will submit a report summarizing the results of the assessment to the DNR under separate cover.

6.5.4.3 General Construction and Operation Impacts and Mitigation

Enbridge will continue to consult with the USFWS and the DNR 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.

6.6 LAND USE AND PUBLIC LANDS

The total land requirements for the Projects generally include a 110-foot-wide construction right-of-way, with ATWS at feature crossings (e.g., roads, waterbodies). Table 6.6-1 presents the land use requirements for the Project. Table 6.6-2 compares the land use impacts along the route options. As shown in Table 6.6-2, 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.

TABLE 6.6-1

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

Land Use Type [b] Impacts [c]	**MP 602.0 – 605.8**	**MP 605.8 – 612.4** Route Alternative A1	**MP 605.8 – 612.4** Route Alternative A2	**MP 612.4 – 613.4**	**MP 613.4 – 613.7** Route Alternative B1	**MP 613.4 – 613.7** Route Alternative B2	**MP 613.7 – 614.0**	**MP 614.0 – 615.1** Route Alternative C1	**MP 614.0 – 615.1** Route Alternative C2	**MP 615.1 – 616.1**
Total Length	3.8	6.5	5.8	1.0	0.3	0.2	0.3	1.2	1.2	1.0
Agricultural										
Length (miles)	0.1	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	0.0
Con (acres)	1.1	<0.1	<0.1	0.0	0.0	0.0	0.2	<0.1	<0.1	0.0
Op (acres)	0.8	<0.1	<0.1	0.0	0.0	0.0	0.1	<0.1	<0.1	0.0
% of Total Miles Crossed	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	<0.1%	<0.1%	<0.1%	0.0%
Forested										
Length (miles)	1.8	2.1	1.4	0.7	0.2	0.2	0.2	0.7	0.3	0.6
Con (acres)	26.5	31.9	21.6	11.7	2.7	2.6	2.0	10.4	3.2	8.6
Op (acres)	11.7	17.5	9.7	3.4	1.6	1.1	0.7	6.0	2.0	3.1
% of Total Miles Crossed	47.4%	32.3%	24.1%	70.0%	66.7%	100.0%	66.7%	58.3%	25.0%	60.0%
Wetlands										
Length (miles)	1.9	3.5	3.4	<0.1	0.1	0.0	<0.1	0.3	0.5	<0.1
Con (acres)	27.2	50.6	50.3	0.7	1.7	0.0	<0.1	4.3	6.4	0.1
Op (acres)	9.6	27.2	20.5	0.2	0.8	0.0	<0.1	2.5	4.0	<0.1
% of Total Miles Crossed	50.0%	53.8%	58.6%	<0.1%	33.3%	0.0%	<0.1%	25.0%	41.7%	10.0%
Open Land										
Length (miles)	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	<0.1	0.0
Con (acres)	0.0	1.1	1.2	0.0	0.0	0.0	0.0	1.2	0.5	0.0
Op (acres)	0.0	0.6	0.6	0.0	0.0	0.0	0.0	0.8	0.3	0.0
% of Total Miles Crossed	0.0%	1.5%	1.7%	0.0%	0.0%	0.0%	0.0%	8.3%	3.6%	0.0%
Shrubland										
Length (miles)	0.0	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Con (acres)	<0.1	6.2	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Op (acres)	0.0	3.6	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% of Total Miles Crossed	0.0%	6.2%	8.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Developed										
Length (miles)	<0.1	0.5	0.5	0.3	0.0	0.0	0.1	0.1	0.4	0.3
Con (acres)	0.3	5.9	6.5	4.2	0.0	0.0	2.0	0.9	5.5	10.3
Op (acres)	0.0	3.7	3.5	1.4	0.0	0.0	0.6	0.5	3.3	1.6

TABLE 6.6-1

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

Land Use Type [b] Impacts [c]	**MP 602.0 – 605.8**	**MP 605.8 – 612.4** Route Alternative A1	**MP 605.8 – 612.4** Route Alternative A2	**MP 612.4 – 613.4**	**MP 613.4 – 613.7** Route Alternative B1	**MP 613.4 – 613.7** Route Alternative B2	**MP 613.7 – 614.0**	**MP 614.0 – 615.1** Route Alternative C1	**MP 614.0 – 615.1** Route Alternative C2	**MP 615.1 – 616.1**
% of Total Miles Crossed	0.1%	7.7%	8.6%	30.0%	0.0%	0.0%	33.3%	8.3%	33.3%	30.0%

[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 cultivated 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 6.6-2

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)	14.1	13.3	14.0	14.1	14.1	13.4	13.4	13.3
	Con (acres)	211.7	199.1	209.9	210.4	208.7	202.1	200.9	200.3
	Op (acres)	97.9	81.9	96.6	97.8	96.5	83.4	83.2	82.1
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	0.8	0.7	0.9	0.9	0.7	0.7	0.8
Forested	Length Crossed (mi)	6.3	5.2	6.3	5.8	5.8	5.6	5.1	5.6
	Con (acres)	93.7	76.2	93.6	86.5	86.4	83.4	76.2	83.4
	Op (acres)	44.0	31.7	43.5	40.0	39.5	36.2	32.2	35.7
	% of Total Miles Crossed	44.7	39.1	45.0	41.2	41.5	41.8	38.1	42.1
Wetlands	Length Crossed (mi)	5.8	5.8	5.7	6.0	5.9	5.7	5.9	5.6
	Con (acres)	84.6	84.7	82.9	86.7	85.0	84.4	86.4	82.7
	Op (acres)	40.3	34.3	39.5	41.8	41.0	33.7	35.1	32.9
	% of Total Miles Crossed	41.1	43.6	40.7	42.4	41.7	42.5	44.0	42.1
Open Land	Length Crossed (mi)	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.2
	Con (acres)	2.3	1.7	2.3	1.6	1.6	2.3	1.7	2.3
	Op (acres)	1.4	0.9	1.4	0.9	0.9	1.4	0.9	1.4
	% of Total Miles Crossed	1.4	0.8	1.4	0.8	0.8	1.5	0.7	1.5
Shrubland	Length Crossed (mi)	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.5
	Con (acres)	6.2	6.5	6.2	6.2	6.2	6.5	6.5	6.5
	Op (acres)	3.6	3.7	3.6	3.6	3.6	3.7	3.7	3.7
	% of Total Miles Crossed	2.8	3.8	2.9	3.2	3.2	3.7	3.7	3.8
Developed	Length Crossed (mi)	1.3	1.7	1.3	1.6	1.6	1.3	1.7	1.3
	Con (acres)	23.6	28.7	23.6	28.1	28.1	24.2	28.7	24.2
	Op (acres)	7.8	10.4	7.8	10.6	10.6	7.6	10.4	7.6
	% of Total Miles Crossed	9.2	12.8	9.3	11.6	11.6	9.7	12.7	9.8

[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 cultivated 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).

6.6.1 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 A). 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 A). 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.

6.6.1.1 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 6.6.1-1 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 6.6.1-1

Tracts Enrolled in the Managed Forest or Forest Crop Law Program

Enbridge Tract No.	MP	Crossing Length (feet)	Legal Description
WI-DO-007.000	603.0	1,173.1	T48N, R15W, Sec. 32
WI-DO-010.000	603.8	114.4	T48N, R15W, Sec. 33
WI-DO-011.000	603.8	910.0	T48N, R15W, Sec. 33
WI-DO-017.000	604.2	333.5	T48N, R15W, Sec. 33
WI-DO-020.000	604.6	1,410.7	T48N, R15W, Sec. 34
WI-DO-023.000 [b]	605.3	N/A	T48N, R15W, Sec. 26
WI-DO-024.000	604.4	171.6	T48N, R15W, Sec. 26
WI-DO-025.000	605.4	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.

6.6.2 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.

6.6.3 Wetlands

Tables 6.6-1 and 6.6-2 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 6.4.2.

6.6.4 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 A).

6.6.5 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 A); however, Enbridge's maintenance of its permanent easement will prohibit the growth of woody vegetation over its pipelines for safety and pipeline integrity issues.

6.6.6 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 3.2.2.

6.6.7 Special Land Uses

6.6.7.1 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 4.1.5.3).

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.

6.6.7.2 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.

6.7 SOCIOECONOMICS

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.

6.7.1 General Construction and Operation Impacts and Mitigation

6.7.1.1 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.

6.7.1.2 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.

6.7.1.3 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.

6.7.1.4 Agriculture and Timber Production

Construction of the Project will affect agricultural land, including hayfields and pasture (refer to section 6.6). 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 B).

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 A) and all Federal, state, and local regulations.

6.7.1.5 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.

6.8 CULTURAL RESOURCES

6.8.1 Environmental Review of Impacts on Historic Sites

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.

6.8.2 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.

6.8.3 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 6.8.3-1). 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 6.8.3-1

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

6.8.4 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 DNR.

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.

6.8.5 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 C) 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.

7.0 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 5.4.1).

Table 7-1 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 7-1

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

Project Name	Project Proponent	Project Description	Type	Project Timeline
Line 67 Upgrade Project	Enbridge Energy	Increasing capacity on Line 67 from 450,000 barrels per day to 570,000 barrels per day into Enbridge's Superior, Wis. terminal	Oil Pipeline	In service by mid-2014
Superior Terminal Upgrade Projects	Enbridge Energy	Various upgrades due to expansion of the mainline pipeline system	Oil Storage Facility	Construction beginning 2014
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

7.1 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.

7.1.1 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.

7.1.2 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.

7.1.3 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.

7.1.4 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.

7.1.5 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.

7.1.6 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.

7.1.7 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.

7.1.8 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.

7.1.9 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 DNR: 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 DNR 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 DNR to identify proper avoidance and/or mitigation measures for construction activities at the three waterbodies with potentially suitable wood turtle habitat.

7.1.10 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 A). 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 A). 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.

7.1.11 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.

7.1.12 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 DNR. 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 C) 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.

7.1.13 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.

7.1.14 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.

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Appendix !

Environmental Protection Plan

Enbridge (U.S.) Inc.

ENVIRONMENTAL PROTECTION PLAN

October 2013

ENVIRONMENTAL PROTECTION PLAN

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FIGURES[1]

APPENDICES

[1] **Site-specific plans supersede any design presented in the typical details.**

INTRODUCTION

This Environmental Protection Plan (EPP) outlines construction-related environmental policies, procedures, and protection measures developed by Enbridge Pipelines (North Dakota) LLC (Enbridge) as a baseline for construction of the Sandpiper Pipeline Project (Sandpiper or Project). This EPP was developed based on Enbridge's experience implementing Best Management Practices (BMPs) during construction as well as the Federal Energy Regulatory Commission's (FERC's) Upland Erosion Control, Revegetation, and Maintenance Plan (May 2013 Version) and Wetland and Waterbody Construction and Mitigation Procedures (May 2013 Version). It is intended to meet or exceed federal, state, tribal, and local environmental protection and erosion control requirements, specifications and practices. The EPP is designed to address typical circumstances that may be encountered along the Project. Project-specific permit conditions and/or landowner agreements may supersede general practices described in this document.

This document includes the following sections:

- Section 1.0 describes general mitigation measures, including soil erosion and sedimentation control procedures, to be implemented during upland construction and upland restoration;
- Section 2.0 describes stream and river construction, crossing, and restoration;
- Section 3.0 describes practices for wetland construction, crossings, and restoration;
- Section 4.0 describes highway, road, and rail crossings;
- Section 5.0 describes construction dewatering;
- Section 6.0 outlines water appropriation practices;
- Section 7.0 addresses revegetation measures;
- Section 8.0 addresses winter construction issues;
- Section 9.0 addresses waste management issues;
- Section 10.0 addresses construction equipment-related spill prevention, containment and controls; and
- Section 11.0 addresses containment, response, and notification procedures for inadvertent releases of drilling fluid.

Alternative construction procedures implemented in lieu of this EPP will provide an equal or greater level of protection to the environment, and will be approved in writing by Enbridge. Modifications for the construction of dual pipelines are highlighted below in the appropriate sections.

Unless otherwise specified, the construction Contractor (Contractor) is responsible for implementing the requirements of this EPP.

Enbridge will provide appropriate construction oversight to confirm and document compliance with the measures of this EPP and requirements of applicable federal, state, tribal, and local permits. Enbridge's Environmental Inspectors (EIs) will assist the Contractor in interpreting and implementing the requirements of the EPP, and verify compliance with these procedures for

Enbridge. Enbridge will employ experienced EIs to manage unforeseen situations that are not directly addressed by the Project documents. Enbridge relies on the experience and judgment of the EIs, through coordination and consultations with Project management staff, to address unforeseen situations should they occur in the field. The EIs will be expected to use judgment in the field to interpret environmental conditions and requirements, but will not be authorized to make major modifications or changes without the prior written approval of Enbridge. The EI, in consultation with Enbridge Environment staff, will have the authority to stop activities and order corrective mitigation for actions that are not in compliance with the measures in this EPP, landowner agreements, or environmental permit requirements. The EI will maintain appropriate records to document compliance with these and other applicable environmental permit conditions.

1.0 GENERAL MITIGATION MEASURES

1.1 IDENTIFICATION OF AVOIDANCE AREAS

The EI will post signs for environmental features such as wetlands, waterbodies, drainages/drain tiles, buffer zones, rare plant or ecological community sites, invasive species and noxious weed locations, regulated wildlife habitat, cultural resources, and erosion-prone or steep slopes.

1.2 CONSTRUCTION LINE LIST AND PERMITS

Enbridge will provide the Contractor with a Construction Line List (CLL) that describes special requirements (e.g., timber salvage, topsoil segregation, restoration measures, fencing requirements, etc.) as agreed upon with landowners provided the conditions conform to the Project permits. The Contractor will comply with these special requirements and/or permit conditions.

The CLL identifies requirements and comments provided by Landowners; however it is not a comprehensive list of construction requirements. The CLL will be considered in conjunction with other Project documents and permits.

1.3 WET WEATHER SHUTDOWN

During construction, certain activities may be suspended in wet soil conditions, based on consideration of the following factors:

- extent of surface ponding;
- extent and depth of rutting and mixing of soil horizons;
- areal extent and location of potential rutting and compaction (i.e., can traffic be rerouted around wet area); and
- type of equipment and nature of the construction operations proposed for that day.

The Contractor will cease work in the applicable area until Enbridge determines that site conditions are such that work may continue. The EIs, in collaboration with Enbridge construction management, will ultimately decide if wet weather shutdown is necessary in a given location.

1.4 RIGHT-OF-WAY ACCESS

Access to the right-of-way (ROW) will be from public roadways and Enbridge-approved private access roads only. Enbridge is responsible for posting signs or other methods to identify approved access roads in the field and to ensure that access is confined to only the approved roads. Vehicle tracking of soil from the construction site will be minimized by installation and implementation of best management practices (BMPs) such as stone pads, timber mats, reducing equipment/vehicle access to the construction ROW where practicable (off-ROW parking), or equivalent. Installation of stone or timber mat access pads will be in accordance with applicable permits and state/federal specifications. If such BMPs are not adequately preventing sediment from being tracked onto public roads, street sweeping, or other equivalent means of collecting sediment, will be used. If soil is tracked onto a roadway, the contractor will remove accumulated material from the road and returned to the construction ROW within an upland area as soon as possible, but in no circumstances more than 24 hours after discovery. In addition, soil on roadways cannot be broomed, washed, and/or graded into the road ditch or onto the shoulder.

1.5 RIGHT-OF-WAY REQUIREMENTS

All construction equipment and vehicles will be confined to the approved construction ROW and additional temporary workspace. Prior to commencement of clearing operations, the outer limits of the construction ROW and additional temporary workspace areas will be marked with distinctive stakes and flagging by Enbridge. Construction activities are restricted to the approved designated areas.

The construction ROW (i.e., construction workspace) for the Project will vary and may include a portion of Enbridge's existing corridor, new permanent corridor, permitted temporary workspace, and site-specific extra workspaces as defined below and shown in Figures 1 through 3. The construction ROW width will be reduced in selected locations (e.g., wetlands, waterbodies, and forested shelterbelts), in accordance with applicable permit conditions, as indicated on the Project construction alignment sheets and in the field by the use of staking.

(a) ROW (Permanent)

Enbridge's existing permanent ROW varies in width. Additional footage may be added, depending on the location of the new pipeline(s) in relation to the existing pipelines. The ROW is maintained to facilitate access and aerial inspection of the pipeline system.

(b) Temporary Workspace

In addition to the ROW/permanent corridor, construction will require Temporary Workspaces (TWS). The TWS will be located adjacent to and contiguous with the proposed ROW/permanent corridor and will be identified on the construction alignment sheets and by distinctive staking of construction limits prior to clearing.

(c) Additional Temporary Workspace

Site-specific additional temporary workspace (ATWS) locations, (construction work areas beyond the permanent corridor and TWS previously described), will be required at select locations such as steep slopes, road, waterbody, railroad, some wetland crossings, and where it is necessary to cross under the existing pipelines or foreign utilities. ATWS will typically be located in uplands adjacent to the construction ROW and set at least 50-feet back from sensitive resource boundaries where site-specific field conditions allow. However, to complete work safely, Enbridge may need to locate ATWS within a wetland or within the 50-foot setback from a wetland or waterbody based on site-specific conditions. ATWS adjacent to waterbodies and/or wetlands is addressed further in Sections 2.0 and 3.0, respectively.

1.6 CONTROLLING SPREAD OF UNDESIRABLE SPECIES

It is Enbridge's intent to minimize the potential introduction and/or spread of undesirable species (i.e., invasive species, noxious weeds, or crop diseases) along the construction ROW due to pipeline construction activities. However, it is not practicable for Enbridge to eradicate undesirable species that are adjacent to the construction ROW. Enbridge will minimize the potential for the establishment of undesirable species by minimizing the time duration between final grading and permanent seeding.

In consultation with the applicable agencies, Enbridge will identify plant species that are consider noxious weeds and/or invasive plants that may occur within the counties being crossed by the pipeline corridor (refer to Appendix A).

1.6.1 Prevention and Control Measures

To prevent the introduction of the noxious weeds and invasive species identified into the Project area from other construction sites, construction equipment will be cleaned prior to arriving at the Project site. This cleaning consists of removing visible dirt from the equipment and blowing loose material from equipment using compressed air. Equipment designated for use within waterbodies will be washed and dried prior to use. Purge and clean all pumps before proceeding from one location to the next if designated noxious weeds or invasive species (e.g. zebra mussels, Eurasian milfoil, etc.) are known to be present in the area. The Contractor(s) will keep logs documenting the cleaning history of each piece of equipment and make the logs available to the EI upon request. Contractors may use the equipment cleaning log provided in Appendix A or an equivalent form approved by Enbridge. Equipment found to be in non-compliance with the cleaning requirement will not be allowed on the Project site until it has been adequately cleaned.

Prior to clearing and grading of the construction right-of-way and pending landowner permission, major infestation areas identified during surveys or by Enbridge's EIs may be treated with the recommended herbicides or their equivalents as identified through consultation with local authorities. All proposed herbicides will be reviewed and approved by Enbridge's Environment Department prior to use. Alternatively, full construction ROW topsoil segregation may be implemented for weed control to allow equipment to work through the area after topsoil has been stripped, as long as equipment stays on the subsoil (clearing, grading, and restoration equipment will still be cleaned). The Contractor(s) will obtain necessary permits and/or certifications for the use of the applicable herbicides, is responsible to limit off-ROW overspray, and will comply with state laws regarding the use of those herbicides. Contractor(s) will keep proper documentation of the locations where the herbicides have been used and provide such documentation to Enbridge within 3 days of completing the work. Weed control spraying will be restricted near certified organic farms and prohibited on certified organic farms.

Treatment of known infestation areas will be completed in accordance with applicable chemical contact times (as specified by the manufacturer) in advance of clearing and grading within the construction ROW. Treatment may be restricted in areas that are not readily accessible, such as areas where access is limited by topography or other site conditions such as saturated/inundated soils. In the event that an area is determined to be inaccessible, the EI will be notified and a site-specific alternative treatment method will be developed.

If additional noxious weed infestations are identified subsequent to herbicide applications, mechanical means (scrape down/blow down) may be used to remove weeds from tracked equipment prior to leaving the infested area. High pressure water wash stations may be established in select areas if the above measures do not adequately remove soil and vegetation debris from construction equipment. Enbridge will determine where this practice will be implemented. The Contractor(s) will keep logs documenting the cleaning history of each piece of equipment and make the logs available to the EI or other Enbridge Representative upon request. Any equipment found to be in noncompliance with the cleaning requirement will be removed from the Project site until it has been adequately cleaned.

To prevent the spread of noxious weeds and invasive species during construction, mulch used on the Project will be composed of weed-free material. Certified weed-free mulch may also be required at site-specific locations. The Contractor(s) will be responsible for identifying and acquiring sources of weed-free and certified weed-free mulch. Sources will be approved by Enbridge prior to purchase.

1.7 POTHOLING/HYDROVAC SLURRY

Hydrovac excavation is used to positively identify pipelines and other buried utilities. The Contractor will construct an unlined but bermed containment area or identify comparable containment (e.g., open top tank) to hold the hydrovac slurry in an Enbridge and landowner-approved upland area within the construction workspace or dispose of the material off-site at a licensed disposal facility. Once the slurry is drained and dry, it may be incorporated with the subsoil in an Enbridge and landowner-approved upland area within the construction workspace. Discharging hydrovac slurry on to topsoil is not permitted as the material will degrade the quality of the topsoil and potentially affect revegetation.

1.8 UPLAND CLEARING

The initial stage of construction involves the clearing of brush, trees, and tall herbaceous vegetation from the ROW. Clearing may be accomplished with chain saws, mowers, and hydraulic tree-cutting equipment.

1.8.1 Disposal of Non-Merchantable Timber

Unless otherwise directed by Enbridge, non-merchantable timber and slash will be disposed of by mowing, chipping, grinding, and/or hauling off site to an approved disposal facility or used in stabilizing erodible slopes or construction entrances. In non-agricultural, non-wetland areas, chips, mulch, or mechanically cut woody debris may be uniformly broadcast across the ROW where the material would ultimately be incorporated into the topsoil layer during grading activities, with landowner approval (coordinated through Enbridge ROW agents). Burning of non-merchantable wood may be allowed only where the Contractor has acquired all applicable permits and approvals (e.g. agency, tribal, and landowner) and in accordance with all tribal, state, and local regulations. The Contractor will provide Enbridge with copies of these permits and/or approvals prior to initiating burning.

1.8.2 Disposal of Merchantable Timber

All merchantable timber will be managed in accordance with Enbridge contract specifications.

1.8.3 Upland Grading and Stump Removal

To facilitate proper cleanup and restoration in upland areas, tree stumps outside the ditch line will be ground below normal ground surface or completely removed and hauled off to an approved disposal facility. Stumps in the ditch line will be completely removed, ground, and/or hauled off to an approved disposal facility.

1.9 TEMPORARY EROSION AND SEDIMENT CONTROLS

Temporary erosion and sediment controls (ECDs) include, but are not limited to, slope breakers, sediment barriers (i.e. silt fence, straw bales, bio-logs, etc.), stormwater diversions, trench breakers, mulch, and revegetation subsequent to seeding of exposed soils (refer to Figures 4 through 11). The Contractor will maintain erosion and sediment control structures as required in Project construction documents and as required by all applicable permits. Non-functional erosion and sediment controls will be repaired, replaced, or supplemented with functional materials within 24 hours after discovery, or as otherwise specified in the Project permits. ECDs will be installed after initial clearing but before grading activities, and will be replaced by permanent erosion controls as restoration is completed.

Temporary ECDs will be installed after clearing and prior to grubbing and grading activities at the base of sloped approaches to streams, wetlands, and roads. Temporary ECDs will also be installed at the edge of the construction ROW as needed, and/or in other areas determined by the EI to slow water leaving the site and prevent siltation of waterbodies and wetlands down slope or outside of the construction ROW (e.g., swales and side slopes). Temporary ECDs will be placed across the entire construction ROW at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from tile line inlets, drainage ways, wetlands, and/or waterbodies until the area is revegetated and there is no potential scouring or sediment transport to surface waters. Adequate room will be available between the base of the slope and the sediment barrier to accommodate ponding of water and sediment deposition.

If silt fence is used, when the depth of sediment reaches about one-third of the height, the sediment will be removed. Non-functional ECDs will be repaired, replaced, or supplemented with functional structures within 24 hours after discovery, or as otherwise specified in the Project permits.

Temporary ECDs installed across the travel lane may be removed during active daytime construction; however, ECDs will be properly reinstalled after equipment passage, or activities in the area are completed for the day. These ECDs will also be repaired and/or replaced prior to inclement weather when forecasted.

1.9.1 Temporary Stabilization

Installation of temporary seeding, mulch (straw or hydromulch), and erosion control mats may be required by Enbridge in certain locations (including topsoil piles) if there are construction delays within a spread of at least 14 days. The Contractor may be required by Enbridge to install temporary stabilization materials sooner based on site conditions, or as required in Project permits.

1.9.2 Erosion Control Blanket

The appropriate class of erosion control blanket will be installed in accordance with manufacture recommendations and/or state Department of Transportation (DOT) specifications on slopes greater than 5 percent that would be exposed over the winter and drain to surface waters (refer to Figures 8 and 9). The Contractor will attempt to install erosion control blankets on the exposed slopes prior to snowfall; however, construction progress and/or seasonal weather variations may prevent installation prior to the first snowfall. Installation of erosion control blankets and additional BMPs, as applicable based on site conditions, is required after the first snowfall to protect slopes prior to spring melt and runoff. Erosion control blankets will be installed running parallel (up and down) with the direction of the slope (not perpendicular).

1.9.3 Mulch

Mulch (weed-free straw, wood fiber hydromulch, or a functional equivalent) will be applied to disturbed areas (except for actively cultivated land and wetlands) if requested by the landowner or land managing agency, if specified by the applicable permits or licenses, or as required by Enbridge. Mulch will specifically be required on:

- Slopes greater than 5 percent; and
- Dry, sandy areas that can blow or wash away (field decision).

Mulch will be free of noxious weeds as listed in applicable state laws. Certified weed-free mulch may also be required at site-specific locations. The Contractor will be responsible for identifying and acquiring sources of weed-free and certified weed-free mulch. Sources will be approved by Enbridge prior to purchase.

Mulch will be applied at a rate of 2 tons per acre to cover at least 75 percent of the ground surface unless otherwise stipulated by permit conditions. Mulch will be uniformly distributed by a mechanical mulch blower, or by hand in areas not accessible to the mulch blower. Mulch will be anchored/crimped using a mulch-anchoring tool or disc set in the straight position to minimize loss by wind and water, as site conditions allow. In areas not accessible to a mulch-anchoring tool or too steep for safe operation, the mulch may be anchored by liquid tackifiers, with advance written approval from Enbridge. The manufacturer's recommended method and rate of application will be followed.

Hydro-mulch and liquid tackifier can be used in place of straw or weed-free hay mulch with prior approval from Enbridge. All hydromulch and liquid tackifier products used will be on the applicable state DOT product list. Application rates will be at the manufacturer's recommended rate, equal to or greater than 2 tons per acre of straw mulch.

1.9.4 Cat Tracking

Cat tracking, also known as horizontal slope grading, may be implemented based on site conditions (sandy or silt soils) to reduce erosion potential. Cat tracking is achieved by driving a bulldozer vertically up and down the slope which results in the tracks being oriented horizontally; creating small speed bumps for water (refer to Figure 11).

1.9.5 Temporary Slope Breakers

Temporary slope breakers will be installed to minimize concentrated or sheet flow runoff in disturbed areas in accordance with the following maximum allowable spacing unless otherwise specified in permit conditions.

Slope (%)	Approximate Spacing (ft)
3-5	250
5-15	200
15-25	150
>25	<100

If the length of the slope is less than the distance of the required spacing, slope breakers are not required unless a sensitive resource area (e.g., wetland or public roadway) is located immediately down slope, or as requested by the EI. Temporary slope breakers may be constructed using earthen subsoil material, silt fence, straw bales, or in non-agricultural land, rocked trenches may be used. On highly erodible slopes, slope breakers in the form of earthen berms will be used whenever possible.

Temporary slope breakers will be constructed according to the following specifications (refer to Figures 4 and 5):

- straw bales used as slope breakers will be trenched in and staked so as to not allow spacing between bales or allow flow underneath the bales;

- the outfall of temporary slope breakers will be directed off the construction ROW into a stable well-vegetated upland area or into an appropriate energy-dissipating sediment control device (e.g., silt fence, straw bales, rock aprons) to prevent the discharge of sediments (refer to Figure 4);

- proper slope breaker outfalls will be established where topsoil segregation and/or grading has created a barrier at the edge of the construction workspace; and

- gaps will be created through spoil piles where necessary to allow proper out letting of temporary berms.

1.10 UPLAND TOPSOIL SEGREGATION

Upland areas where topsoil will be stripped includes cropland, hay fields, pasture, residential areas, and other areas as requested by the Landowner or as specified in the Project plans, commitments, and/or permits. Topsoil will not be used to construct berms, trench breakers, temporary slope breakers, improving or maintaining roads, or to pad the pipe. Berms used for stacking pipe in pipe yards may be constructed using topsoil if landowner permission and necessary approvals are obtained. Gaps will be left and ECDs installed where stockpiled topsoil and spoil piles intersect with water conveyances (i.e., ditches, swales, and waterways) to maintain natural drainage.

Topsoil Segregation Methods

The following topsoil segregation methods may be employed during construction:

- Modified Ditch-Plus-Spoil Side (refer to Figure 1)

- Full Construction ROW (refer to Figure 2)

- Trench-Line-Only (refer to Figure 3)

A Modified Ditch-Plus-Spoil topsoil segregation technique will typically be used in active cropland, which will consist of stripping topsoil from the spoil storage area, ditch line, and the primary travel lane. The Trench-Line-Only topsoil segregation method may be used where Enbridge determines that the width of the construction ROW is insufficient for other methods to be used. Enbridge may also use the Trench-Line-Only topsoil segregation method in areas where there is a thick sod layer such as in hay fields, pastures, golf courses, and residential areas, unless otherwise requested by the landowner. Alternative topsoil segregation methods may be used on a site-specific basis or as requested by the landowner. Topsoil is not typically segregated in standing water wetlands unless specifically requested by the landowner and/or managing land agency in accordance with applicable permit conditions.

Depth of Upland Topsoil Stripping

In deep soils (more than 12 inches of topsoil), topsoil will be stripped to a minimum depth of 12 inches, unless otherwise specified/requested by other plans, permit conditions, or the landowner. Additional space may be needed for spoil storage if more than 12 inches of topsoil are segregated. If less than 12 inches of topsoil are present, the Contractor will attempt to segregate to the depth that is present.

1.11 UPLAND TRENCHING

Trenching in uplands is typically accomplished with a backhoe excavator or a rotary wheel ditching machine. Excavated material will be side cast (stockpiled) within the approved construction ROW separate from topsoil, and stored such that the area subject to erosion is minimized. Enbridge will coordinate with landowners to minimize disruption of access caused by the trench during construction. Where deemed appropriate by Enbridge, the Contractor will leave plugs of subsoil in the ditch or will construct temporary access bridges across the trench for the landowner to move livestock or equipment. Trenches may also be sloped where started and ended to allow ramps for wildlife to escape. Spacing of plugs and ramps will be determined in the field.

1.11.1 Timing

The length of time a trench is left open will be minimized to ensure that installation of the pipe and restoration of the construction ROW occurs in a timely fashion. Therefore, unless otherwise specified by Project permits or Enbridge, the Contractor will limit the amount of excavated open trench to a maximum of 3 days of anticipated welding production per spread, per pipe. This timeframe may be decreased at the discretion of Enbridge based on site conditions. Site-specific activities such as horizontal directional drilling, guided bores, road bores, tie-in points, and valve work may be performed independent of a spread.

1.12 FOAM PILLOW INSTALLATION

Use of foam pillows for pipe protection in the trench will be approved by Enbridge in advance and installed in accordance with applicable Project permits, local/state/federal regulations, and manufacturer's recommendations.

1.13 TRENCH BREAKERS

Trench breakers will be installed as deemed necessary by Enbridge in sloped areas after the pipe has been lowered into the trench. Trench breakers protect against subsurface water flow along the pipe after the trench is backfilled. Trench breakers will be constructed with bags filled with rock-free subsoil or sand. Use of foam trench breakers will be approved by Enbridge in advance and installed in accordance with applicable Project permits, local/state/federal regulations, and manufacturer's recommendations. Trench breakers will be placed from the bottom of the trench to near the top of the trench, completely surrounding the pipe and will be properly keyed into the undisturbed trench walls (refer to Figures 12 and 13). The location for trench breakers will be based on field conditions including the degree and length of slope, presence of down slope sensitive resource areas such as wetland and waterbodies, and proximity to other features such as roads and/or railroads. The following conditions apply to the placement and installation of trench breakers unless otherwise directed by Enbridge:

- Trench breakers will be installed on slopes greater than 5 percent adjacent to streams, wetlands, or other waterbodies.

- Topsoil cannot be used to construct trench breakers.

- Where the pipeline exits a wetland towards areas of lower relief, trench breakers will be installed (within the upland) where there is a potential for underground drainage along the pipe in order to prevent wetland or waterbody drainage.

- At all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep accumulated trench water out of the waterbody.

The actual location of each trench breaker will be selected through coordination between Enbridge's EIs, Enbridge's Craft Inspectors, and the Contractor's Foreman for backfilling activities.

1.14 DRAIN TILE INLET PROTECTION AND TILE REPAIRS

Enbridge will attempt to locate existing drain tile inlets that are located near the construction work area prior to construction. Drain tile inlets will be marked using flags. The Contractor will protect located drain tile inlets with the potential to receive stormwater from the construction Project using the appropriate ECDs until sources with the potential to discharge have been stabilized. The determination of the specific ECD will be made based on the location of an inlet with respect to the Project area, drainage area from the construction work area to the inlet, topography, vegetation, soils, and accessibility to the inlet. Where drain tile inlets are located off of Enbridge's construction ROW, Enbridge may not have authorization to install ECDs at the inlet site. In these cases, sediment control measures (typically silt fence) will be installed along the edge of the construction work area that drains to the inlet structure to minimize sedimentation.

If underground drainage tile is damaged by pipeline construction, it will be repaired in a manner that assures proper tile line operation at the point of repair in accordance with the Agricultural Protection Plan.

1.15 UPLAND BACKFILLING

Backfilling follows pipe installation and consists of replacing the material excavated from the trench. In areas where topsoil has been segregated, the subsoil will be replaced first, and the topsoil will be spread uniformly over the area from which it was removed. Prior to backfilling, the trench will be dewatered in accordance with the methods discussed in Section 5.0 if water obscures the trench bottom.

1.16 CLEANUP AND ROUGH/FINAL GRADING

All waste materials, including litter generated by construction crews, will be disposed of daily by the Contractor. Initial cleanup and rough grading activities may take place simultaneously. Cleanup involves removing construction debris (including litter generated by construction crews and excess rock) and large woody debris. Rough and final grading includes restoring disturbed areas as near as practicable to preconstruction conditions, returning the topsoil where topsoil has been stripped, preparing a seedbed and de-compacting subsoil (where applicable) for permanent seeding, installing or repairing temporary erosion control measures, repairing/replacing fences, and installing permanent erosion controls.

1.16.1 Timing

The Contractor will begin cleanup and rough grading (including installation of temporary erosion and sediment control measures) within 72 hours after backfilling the trench. The Contractor will attempt to complete this rough cleanup within one week. The Contractor will initiate final grading, topsoil replacement, seeding, and installation of permanent erosion control structures within 14 days after backfilling the trench. If seasonal or other weather conditions prevent compliance with these timeframes, temporary erosion controls will be maintained until conditions allow completion of cleanup.

1.17 PERMANENT EROSION AND SEDIMENT CONTROLS

During final grading, slopes in areas other than cropland will be stabilized with erosion control structures. With exception to actively cultivated areas, permanent berms (diversion dikes or slope breakers) will be installed on all slopes, according to the following maximum spacing requirements unless otherwise specified in permit conditions:

Slope (%)	Approximate Spacing (ft)
3-5	250
5-15	200
15-25	150
>25	<100

Permanent berms will be constructed according to the following specifications:

- Permanent berms will be constructed of compacted earth, stone, or functional equivalent as approved in advance by Enbridge.
- The outfall of berms will be directed toward appropriate energy-dissipating devices, and off the construction ROW if possible.
- Permanent berms will be inspected and repaired as deemed necessary by Enbridge to maintain function and prevent erosion.
- Erosion control blankets (curlex, jute, or equivalent) will be placed on slopes over 30 percent or that are a continuous slope to a sensitive resource area (e.g., wetland or waterway).

1.18 SOIL COMPACTION TREATMENT

Cultivated fields and compacted or rutted areas will be tilled prior to topsoil replacement with a deep tillage device or chisel plowed to loosen compacted subsoils. If subsequent construction and cleanup activities result in further compaction, additional measures will be undertaken to alleviate the soil compaction.

1.19 STONE REMOVAL

A diligent effort will be made to remove excess stones equal to or larger than 4 inches in diameter from the upper 8 inches of subsoil or as specified in permit conditions, contract documents, or landowner agreements. After the topsoil is replaced, stone removal efforts will cease when the size and density of stones on the construction ROW are similar to undisturbed areas adjacent to the construction ROW as determined by the EI. Excess rock will be piled in upland areas where landowner permission has been obtained, or will be hauled off-site to an Enbridge approved disposal site.

1.20 REPAIR OF DAMAGED CONSERVATION PRACTICES

The Contractor will restore all soil conservation practices (such as terraces, grassed waterways, etc.) that are damaged by the pipeline construction to preconstruction conditions to the extent practicable.

1.21 LAND LEVELING FOLLOWING CONSTRUCTION

Following the completion of the pipeline, the construction ROW will be restored to its pre-construction conditions as practical. Should uneven settling or documented surface drainage problems occur following the completion of pipeline construction and restoration, Enbridge will take appropriate steps to remedy the issue.

2.0 STREAM AND RIVER CROSSING GENERAL REQUIREMENTS

The procedures in this section apply to streams, rivers, and other waterbodies such as jurisdictional ditches, ponds, and lakes. These procedures require that judgment be applied in the field and will be implemented under the supervision of Enbridge.

Stream crossing requirements, including construction methods, timing, erosion control, and restoration are described in this section and in the stream crossing permits issued by state and federal agencies and by tribal authorities (as applicable). If the contractor considers certain parts of these procedures to be technically impractical due to site-specific engineering constraints, they may submit a request to Enbridge for approval of alternative measures that would provide an equal or greater level of protection to stream and river ecosystems. Enbridge will review the contractor's alternatives and consult with appropriate regulatory agencies and tribal resource specialists (as applicable). The contractor will receive written approval from Enbridge prior to implementing the alternatives. During wet and high runoff conditions, the EI will determine whether conditions warrant additional considerations for construction activities.

2.1 TIME WINDOW FOR CONSTRUCTION

All in-stream work activities (installation of dams, sheet piling, etc.) will be minimized to the extent practicable on an area and time duration basis. In-stream trenching will be conducted during periods permitted by the appropriate regulatory agencies and applicable permits. Unless otherwise specified in applicable permits and with exception to blasting and other rock breaking measures and directional drill, in-stream construction activities (specifically trenching, pipeline installation, backfill, and restoration of the streambed contours) for wet crossing methods will occur within the following timeframes:

- Minor Waterbodies (all waterbodies less than or equal to 10 feet wide at the water’s edge at the time of crossing): 24 hours

- Intermediate Waterbodies (all waterbodies greater than 10 feet wide but less than 100 feet wide at the water’s edge at the time of crossing): 48 hours

- Major Waterbodies (all waterbodies greater than 100 feet wide at the time of crossing): As specified by Enbridge or in the applicable permits.

These timeframes apply regardless of the presence or absence of flow. These timeframes also apply to dry crossing methods as a guideline and can be extended based on site-specific conditions with approval from Enbridge Environment staff, Construction Management, and the EI.

Stream crossings will be designed as close to perpendicular to the axis of the stream channel as engineering and routing constraints allow, creating the shortest crossing length.

2.2 CLEARING AND GRADING

The construction ROW width will consist of a 15-foot-wide neck down beginning 50 feet from the ordinary high water mark (OHWM) / ordinary high water level on the working side of the right-of-way. A 25-foot-wide neck down will be implemented on the spoil side of the construction ROW beginning 20 feet from the OHWM/OHWL (refer to Figures 15 through 17).

2.2.1 Impaired Waters

Where discharges of stormwater may occur to waters designated under Section 303(d) of the Clean Water Act as Impaired Waters, additional BMPs will be implemented as specified in the applicable Project permits.

2.3 ADDITIONAL TEMPORARY WORKSPACE

ATWS includes work areas outside the boundary of the typical construction ROW. These spaces are typically used to assemble pipe segments and for temporary spoil storage. Clearing of forested and brushy areas for ATWS will be avoided as much as possible. Woody vegetation in wetlands and riparian areas will typically not be cleared for the purpose of ATWS unless approved by appropriate regulatory agencies as stipulated in permits issued for the Project. ATWS will be constructed as follows:

- ATWS will be located at least 50 feet away from the OHWM/OHWL if topographic or other physical conditions such as stream channel meanders allow (refer to Figures 15 through 17).

- If safe work practices or site conditions do not allow for a 50-foot setback, ATWS should be located no closer than 20 feet from the OHWM/OHWL, subject to site-specific approval by Enbridge.

- ATWS will be limited to the minimum size needed to construct the stream crossing.

2.4 BRIDGES

Temporary equipment bridges will be used on most waterways (upon approval by the appropriate agency), including small waterways such as ditches and intermittent streams, where there is a potential for stormwater runoff or rain events to transport sediment downstream from equipment crossing the waterway. Bridges will be constructed as described below and will be removed as soon as possible during final restoration. Bridges will not typically be installed at directionally drilled waterbodies, unless there is no reasonable alternative that provides an efficient, economical way to transport heavy construction equipment around the waterbody by truck.

With exception to clearing-related equipment, fording of waterways is prohibited (i.e. civil survey, potholing, or other equipment are not permitted to ford waterways prior to bridge placement). Clearing equipment and equipment necessary for installation of equipment bridges will be allowed a single pass across waterbodies prior to bridge installation, unless restricted by applicable permits.

2.4.1 Types of Bridges

Equipment bridges will be constructed using one of the following techniques:

- Typical Span Type Bridge (timber mats - refer to Figure 19)
- Rock Flume (refer to Figure 20)
- Railroad flat cars
- Flexi-float or other pre-fabricated portable bridges
- Other methods as approved by Enbridge and appropriate agencies

2.4.2 Bridge Design and Maintenance

Bridges will be designed as close to perpendicular to the axis of the stream channel, creating the shortest crossing length and will be built and maintained in accordance with applicable permits. Equipment bridges will be designed to withstand the maximum foreseeable flow of the stream with headers and support structures being placed above the ordinary high water mark (OHWM) of the feature. Local jurisdictions may require stricter guidelines associated with bridge placement. Bridges will not restrict flow or pool water while the bridge is in place, and will be constructed with clean materials. Bridges will be designed and maintained to prevent soil from entering the waterbody. Soil that accumulates on the bridge decking will be removed as needed, or as deemed necessary by the EI.

2.5 STREAM AND RIVER CROSSING CONSTRUCTION METHODS

The following stream and river crossing methods are typically used, subject to further restrictions by Enbridge and applicable permits and subject to modifications as approved by appropriate regulatory agencies and tribal resource specialists (as applicable) during construction.

2.5.1 Wet Trench Method

Installation

The wet trench method will be used to cross streams and rivers not permitted to be flumed, dam and pumped, or directionally drilled. The following procedures will be used during wet trench crossings:

- Sediment control measures will be installed before grading from the 20-foot vegetative buffer left on each stream bank. Spoil containment structures will be installed back from the stream bank so that spoil does not migrate into the stream.

- Grading will be directed away from the waterbody to minimize the potential for sediment to enter the stream. Grading of stream banks will be restricted to the trench line and areas necessary for safe bridge installation.

- After grading, backhoes or draglines will be used to excavate the trench. Where possible, excavating equipment will operate from one or both banks, without entering the stream. If equipment must encroach into the stream, it will operate on clean construction mats. Streambed material will be segregated (e.g., upper one foot and the remaining trench spoil will be stored separately) and placed within a spoil containment structure in approved construction work area limits. Storage of streambed spoil within the stream will only be allowed if expressly approved in the applicable permits.

- Earthen trench plugs (hard plugs) between the stream and the upland trench will be left undisturbed during excavation of the in-stream trench to prevent diversion of the stream flow into the open trench and to prevent water that may have accumulated in the adjacent upland trench from entering the waterbody. Trench plugs will be removed immediately prior to pipe placement, and then replaced when the pipe is in place. Trench water accumulated upslope of trench plugs will be dewatered appropriately prior to trench plug removal.

- Water within the trench will be managed in accordance with Section 5.0

- Backfilling will begin after the pipe is positioned in the trench at the desired depth. Backfill material will consist of the spoil material excavated from the trench and parent streambed unless otherwise specified in state or federal permits. The in-stream trench will be backfilled so that the stream bottom is as near as practicable to its pre-construction condition, with no impediments to normal water flow.

Temporary Stabilization

The Contractor will restore the stream banks as near as practicable to pre-construction conditions unless that slope is determined to be unstable. If Enbridge determines the slope is considered unstable, the Contractor will reshape the banks to prevent slumping. Once the banks have been reshaped, ECDs will be installed within 24 hours of backfilling the crossing. Temporary slope breakers will be installed on all sloped approaches to streams in accordance with the spacing requirements previously specified.

A temporary seed mix (e.g., annual rye or annual oats) and mulch and/or erosion control blankets will be installed within a 50-foot buffer on either side of the stream, with exception to actively cultivated land. Silt fence or functional equivalent as approved in advance by Enbridge will be installed upslope of the temporary seeding area.

2.5.2 Dam and Pump Method

Installation

The dam and pump method is a dry crossing technique that is suitable for low flow streams and is generally preferred for crossing meandering channels. The dam and pump method involves damming of the stream upstream and downstream of the proposed trench before excavation (refer to Figure 16) and pumping water around the construction area. The following procedures will be used for dam and pump crossings:

- Dams may be constructed of sandbags, inflatable dams, aqua-dams, sheet piling, and/or steel plates. The dams will prevent the stream from flowing into the construction area. The dams will be continuously monitored for a proper seal. Additional sandbags, plastic sheeting, steel plating, or similar materials will be used where necessary to minimize the amount of water seeping around the dams and into the construction work area. The dam will not be removed until after the pipeline has been installed, the trench has been backfilled, and the banks have been stabilized.

- Pumping of the stream across the ROW will commence simultaneously with dam construction to prevent interruption of downstream flow. Stream flow will be pumped across the construction area through a hose and will be discharged to an energy-dissipation device, such as plywood boards, to prevent scouring of the streambed.

- The pumps and fuel containers will be located on the upstream side of the crossing and will be placed in impermeable, sided structures which will act as containment units (refer to Section 10.0). The pumps used for this crossing method will not be placed directly in the stream or on the streambed. Pumps will have a capacity greater than the anticipated stream flow. The pumping operation will be staffed 24 hours a day and pumping will be monitored and adjusted as necessary to maintain an even flow of water across the work area and near-normal water levels upstream and downstream from the crossing. .

The pump intake will be suspended to prevent sediment from being sucked from the bottom of stream and will be equipped with a screen, or equivalent device, to prevent fish uptake.

- Where possible, excavating equipment will operate from one or both banks, without entering the stream. If equipment must encroach into the stream, it will operate on clean construction mats (free of soil and plant material prior to being transported onto the construction ROW). Streambed material will be segregated as stated in the wet trench method and will be placed within a spoil containment structure in approved construction work area limits. Storage of streambed spoil within the stream will only be allowed if expressly approved in the applicable permits.

- Earthen trench plugs (hard plugs) between the stream and the upland trench will be left undisturbed during excavation of the in-stream trench to prevent diversion of the stream flow into the open trench and to prevent water that may have accumulated in the adjacent upland trench from entering the waterbody. Trench plugs will be removed immediately prior to pipe placement, and then replaced when the pipe is in place. Trench water accumulated upslope of trench plugs will be dewatered appropriately prior to trench plug removal.

- Standing water that is isolated in the construction area by the dams will be managed in accordance with Section 5.0

- Backfilling will begin after the pipe is positioned in the trench to the desired depth. Backfill material will consist of the spoil material and parent streambed excavated from the trench unless otherwise specified in state or federal permits. The in-stream trench will be backfilled so that the stream bottom is similar to its pre-construction condition, with no impediments to normal water flow.

Temporary Stabilization

Restoration of the stream banks and the installation of temporary erosion controls will be similar to that described for the wet trench method above but will occur immediately following installation of the pipeline. Once the stream banks have been stabilized, the dams and pump will be removed.

2.5.3 Flume Method

Installation

The flume method is a dry crossing technique that is suitable for crossing relatively narrow streams that have straight channels and are relatively free of large rocks and bedrock at the point of crossing (refer to Figure 17). This method involves placement of flume pipe(s) in the stream bed to convey stream flow across the construction area without introducing sediment to the water. The procedures for using the flume method are described below.

- The flume(s) will be of sufficient diameter to transport the maximum flows anticipated to be generated from the watershed. The flume(s), typically 40 to 60 feet in length, will be installed before trenching and will be aligned so as not to impound water upstream of the flume(s) or cause downstream bank erosion. The flumes will not be removed until after the pipeline has been installed, trench has been backfilled, and the stream banks have been stabilized.

- The upstream and downstream ends of the flume(s) will be incorporated into dams made of sand bags and plastic sheeting (or equivalent). The upstream dam will be constructed first and will funnel stream flow into the flume(s). The downstream dam will prevent backwash of water into the trench and construction work area. The dams will be continuously monitored for a proper seal. Adjustments to the dams will be made where necessary to prevent large volumes of water from seeping around the dams and into the trench and construction work area.

- Where possible, excavating equipment will operate from one or both banks, without entering the stream. If equipment must encroach into the stream, it will operate on clean construction mats. Streambed material will be segregated and placed within a spoil containment structure in approved construction work area limits. Storage of streambed spoil within the stream will only be allowed if expressly approved in the applicable permits.

- Earthen trench plugs (hard plugs) between the stream and the upland trench will be left undisturbed during excavation of the in-stream trench to prevent diversion of the stream flow into the open trench and to prevent water that may have accumulated in the adjacent upland trench from entering the waterbody. Trench plugs will be removed immediately prior to pipe placement, and then replaced when the pipe is in place. Trench water accumulated upslope of trench plugs will be dewatered appropriately prior to trench plug removal.

- If additional trench dewatering is necessary to complete the installation of the pipe, the discharge will be managed in accordance with Section 5.0.

- Backfilling will begin after the pipe is positioned in the trench to the desired depth. Backfill material will consist of the spoil material excavated from the trench and parent streambed unless otherwise specified in state or federal permits. The in-stream trench will be backfilled so that the stream bottom is similar to its pre-construction condition, with no impediments to normal water flow.

Temporary Stabilization

Restoration of the ROW and the installation of temporary erosion controls will be similar to that described for the wet trench method above but will occur immediately following installation of the pipeline. After the stream banks have been stabilized, the dams and flume will be removed from the stream bed allowing water to resume its flow in the channel.

2.5.4 Directional Drill and/or Guided Bore Method

Installation

Installing the pipe underneath a stream will involve placing a drill unit on one side of the stream (refer to Figure 18). A small-diameter pilot hole will be drilled under the stream along a prescribed profile. After the pilot hole has been completed, barrel reams will be used to enlarge the pilot hole to accommodate the desired pipeline diameter. Drilling mud will be necessary to remove cuttings and maintain the integrity of the hole. Water from an Enbridge-approved source will be used to prepare the slurry of drilling mud, and will be appropriated according to applicable permits. The pipe section will be pulled through the hole by the drilling rig and welded to the adjoining sections of pipe on each side of the river.

Drilling Mud

During drilling operations, drilling mud and slurry will be stored back from the waterbody in an earthen berm sediment control structure, in tanks, or by other methods so that it does not flow into the waterbody, adjacent wetlands or off the workspace (refer to Section 11.0 for additional details).

After the pipe is in place, excess drilling mud will be hauled off-site to an Enbridge-approved disposal location or licensed disposal facility.

Temporary Stabilization

The directional drilling/guided bore method normally does not result in the disturbance of the stream banks or riparian vegetation (with exception to extremely limited hand clearing of woody required to facilitate guide wire placement), which reduces the potential for erosion and sedimentation at the stream crossing. Consequently, temporary erosion control measures that are installed at open-cut crossings typically are not necessary for drilled/bored crossings.

2.6 PERMANENT RESTORATION

Stream/channel banks disturbed during installation of the pipelines will be stabilized with erosion control materials such as an erosion control blanket and seeded in accordance with Section 7.0. Permanent stabilization will be initiated within 24 hours after installation of the crossing using the wet trench method and prior to restoring flow using the dam and pump or flume method, unless site and permit conditions delay permanent installation. Where the banks have been disturbed, the Contractor will restore the slopes as near as practicable to pre-construction conditions unless that slope is determined by Enbridge to be unstable. Where the slope of the banks is determined to be unstable or has the potential to erode or fail, the banks will be reshaped to transition the disturbed areas into the natural stream bank with the intent to stabilize the bank and create a blended, natural appearance.

Berms or other sediment filter devices will be installed at the base of sloped approaches to streams greater than five percent and the outlet of the berm will be directed away from the stream into a well vegetated area. Temporary sediment control devices will remain in place until the area has stabilized and adequate revegetation has established.

2.6.1 Vegetative Bank Restoration

Typically, waterbody banks will be restored as near as practicable to preconstruction conditions after backfilling is complete and will be seeded with an appropriate seed mix as specified in Section 7.0 and covered with an erosion control blanket. Erosion controls, (e.g. straw bales, bio-logs, silt fences, etc.) will be installed as necessary based on site-specific conditions.

2.6.2 Supplemental Bank Stabilization

Unstable soils and/or site-specific factors such as stream velocity and flow direction may require additional restoration efforts, such as installation of rock rip-rap, to stabilize disturbed stream banks. Rock rip-rap will be used only where site-specific conditions require and where applicable permits or approvals have been acquired. Geotextile fabric and rock riprap will be placed according to site and permit conditions (refer to Figure 23). Disturbed soils upslope and on either side of the riprap will be prepared for seeding according to Section 7.0 and other stream bank protection requirements. Bioengineering techniques may also be implemented as determined by Enbridge (refer to Figures 26 through 28).

2.6.3 Bridge Removal

Equipment bridges will be removed during final cleanup or, if access is needed, after final cleanup and permanent seeding. Restoration of the bridge area will be completed upon bridge removal.

2.6.4 Swales

Swales will be restored as near as practicable to original conditions. Swales will be seeded and either mulched with straw or erosion control blankets will be installed to the perceivable top of bank for the width of the construction ROW.

3.0 WETLAND CROSSING GENERAL REQUIREMENTS

The procedures in this section apply to all wetlands that will be affected by the Project. These procedures require that judgment be applied in the field and will be implemented under the supervision of Enbridge and the EI. The intent of these procedures is to minimize construction-related disturbance and sedimentation of wetlands and to restore wetlands as nearly as possible to pre-existing conditions.

Wetland crossing requirements, including construction methods, timing, erosion control, and restoration, are described in this section and in the wetland crossing permits issued by state, federal and/or tribal agencies as applicable. If the contractor considers certain parts of these procedures to be technically impractical due to site-specific engineering constraints, they may submit a request to Enbridge for approval of alternative measures. Enbridge will review the contractor's alternatives and consult with appropriate regulatory agencies. The contractor must receive approval from Enbridge prior to implementing the alternatives.

3.1 WETLAND ACCESS

The Contractor will use the construction ROW and only approved roads to access wetland areas.

3.2 CLEARING

Clearing the construction ROW in wetlands will be similar to clearing in uplands. For construction to proceed, obstructions (e.g., trees, brush, and logs) need to be removed. Typically, low ground pressure equipment will be used, limiting disturbance to the wetland. Vegetation and trees within wetlands will be cut off at ground level, leaving existing root systems intact; clearing debris will generally be removed from the wetland for disposal. Hydro-axe debris, or similar can be left in the wetland if spread evenly in the construction ROW to a depth which will allow for normal revegetation, as determined by the EI.

3.3 ADDITIONAL TEMPORARY WORKSPACE IN WETLANDS

In general, Enbridge attempts to locate ATWS outside of wetlands wherever practicable; however, ATWS may be sited in select wetlands where the wetland is adjacent to a waterbody, road, railroads, foreign utility crossings, and/or pipeline cross-over with prior approval from the applicable regulatory agencies. Clearing of forested wetlands for ATWS will be avoided as much as possible.

- Staging areas, additional spoil storage areas, and other ATWS will be located in upland areas at least 50 feet away from wetland boundaries (refer to Figures 24), where safe work practices or site conditions permit. If site conditions do not permit a 50-foot setback, then these areas will be located as far away from the wetland as is practicable. Vegetation will not be cleared between these areas and the wetland in any event. No construction activities including vegetation clearing or earthwork will occur between the ATWS and the wetland.

- The size of the ATWS areas will be limited to the minimum needed to construct the wetland crossing.

3.4 GRADING IN A WETLAND

Grading activities will be confined to the area of the trench and will be minimized to the extent practicable. Grading outside the trench will only be allowed where required to ensure safety and restore the construction ROW after backfilling the trench with prior approval from Enbridge.

ECDs will be installed:

- across the entire construction ROW upslope of the wetland boundary, where necessary, to prevent sediment flow into the wetland;
- along the edge of the construction ROW as necessary to prevent sediment flow into off-ROW wetlands; and

- Along the edge of the construction ROW as necessary to contain spoil and sediment within the construction ROW through wetlands.

ECDs will be maintained in proper working order to prevent the flow of sediment into wetlands from spoil piles or sloped approaches that are adjacent to the wetlands. .

3.5 RIGHT-OF-WAY STABILIZATION

Tree stumps, brush riprap, imported soil, and rock fill will not be brought in to stabilize the right-of-way in wetlands. Where low ground pressure equipment is not used, construction equipment will operate from timber construction mats or equivalent means with prior approval from Enbridge (refer to Figure 24). To prevent the spread of noxious and invasive plant species, timber mats will be free of soil and plant material prior to being transported onto the construction ROW and/or moved from one area of the construction ROW to another area. Timber riprap (also known as corduroy road) will not be used without prior written approval from Enbridge and the appropriate regulatory agencies. Pre-existing corduroy roads in wetlands may be used but may not be improved, maintained, restored, or replaced without site-specific authorization from applicable agencies.

Subsoil from the pipeline trench within the immediate wetland may be placed on top of equipment mats for additional stabilization. Timber mats may be placed over the ditch line or on the working side to facilitate trench excavation. All timber mats, construction debris, and larger woody vegetative debris will be removed during cleanup of wetlands.

3.6 TRENCHING

Excavation of the pipeline trench in wetlands typically will be accomplished using backhoe excavators. The Contractor will take reasonable steps to insure that the duration of open trench in wetlands, including tie-ins, is minimized to the fullest extent possible.

3.6.1 Topsoil Segregation

When constructing in wetland areas without standing water, up to one foot of topsoil (organic layer) will be stripped from the trench line and stockpiled separate from trench spoil to preserve the native seed stock. In standing water wetlands, organic soil segregation is not typically practical; however, the Contractor will attempt to segregate as much of the organic layer as possible based on site/saturation conditions. If normally unsaturated wetlands are saturated at the time of construction, topsoil segregation will be attempted according to Figure 3 and based on recommendations from the EI and appropriate regulatory agencies.

3.6.2 Trench Breakers

Where the EI determines that the pipeline trench has the potential to drain or partially drain a wetland, trench breakers will be installed as necessary to maintain the original wetland hydrology.

3.7 PIPELINE INSTALLATION

The following procedures are intended to minimize siltation and disturbance to wetlands during installation.

3.7.1 Push/Pull Method

Large wetlands with standing water can generally not be crossed with typical crossing methods. In these areas, the pipeline will be assembled in an upland area and positioned in the trench using the “push-pull" and/or "float" techniques.

Usually this fabrication requires use of ATWS adjacent to the construction ROW. A backhoe (or equivalent) supported on timber mats or equivalent low ground pressure equipment will be used to dig the trench. . The prefabricated section of pipeline will then be pushed-pulled into position or floated across the wetland. When the pipeline is in position, floats, if used, will be removed and the pipeline will sink into position. The trench will then be backfilled and a backhoe or similar equipment working from construction mats or by low ground pressure equipment will be used restore the wetland.

3.7.2 Temporary Erosion and Sediment Controls

ECDs at approaches to wetlands will be installed as previously described and in accordance with Section 1.0.

3.7.3 Concrete Coating

Concrete will generally be mixed off-site, and concrete coated pipe will be transported to the construction ROW on trucks. If required, pre-fabricated concrete weights and/or saddlebag weights will also be used to provide negative buoyancy. Concrete weights will be manufactured off-site and transported to the ROW. Weights will be strung along the construction ROW, where necessary, until they are placed over the pipe within the excavated ditch. Limited mixing and coating activities may occur on the construction ROW for coating pipe joints and concrete weight repairs according to the concrete usage specifications in Section 10.0. Washing equipment used for mixing, pouring, casting, or coating will not be conducted within 100 feet of any wetland and will be conducted and contained in a leak-proof containment facility or impermeable liner. The EI will determine where ECDs will be installed down slope of equipment wash areas to capture sediments and minimize erosion from runoff.

3.8 BACKFILLING

Subsequent to pipe installation, backfilling of wetland trenches will take place immediately, or as approved by EI. The Contractor will restore wetlands as near as practicable to pre-construction conditions and will make a reasonable attempt to return the subsoil to its pre-construction density. During backfilling of wetland areas, subsoil material removed from the trench during construction will be replaced so that the material is not mounded above the adjacent ground surface (undisturbed trench wall). Subsoil that exceeds the elevation of the ground adjacent to the trench will be removed from the wetland and disposed of in an upland area or an Enbridge-approved disposal site. After the trench has been backfilled with subsoil, previously segregated topsoil will be spread over the trench area and mounded.

3.9 ROUGH GRADING, CLEANUP, AND TEMPORARY RESTORATION

Cleanup and rough grading activities may take place simultaneously. Cleanup typically involves removing construction debris and replacing fences removed during construction. Rough grading includes restoring original conditions within the disturbed areas (i.e., ditch line, spoil storage areas, and equipment travel lane) and installing or repairing temporary ECDs. Temporary slope breakers will be installed near the boundary between the wetland and adjacent sloped approaches, to prevent sediment flow into the wetland.

3.9.1 Timing

Cleanup and rough grading (including installation of temporary erosion control measures) will begin as soon as practical after the trench is backfilled, weather permitting.

3.9.2 Temporary Stabilization

Where necessary, disturbed wetland areas will be seeded with oats (40 lbs/acre) and/or a temporary seed mix, unless standing water is prevalent or unless permanent planting or seeding with native wetland vegetation is required by applicable permits. No fertilizer, lime, or mulch will be applied in wetlands.

4.0 HIGHWAY, ROAD AND RAIL CROSSINGS

4.1 ADDITIONAL WORKSPACE

Additional workspaces for bored road and railroad crossings and open-cut road crossings will be determined on a site-specific basis. These workspaces will be adjacent to the road or railroad and limited to the size needed to contain spoil from the crossing.

4.2 MAINTENANCE

Roadway crossings will be maintained in a condition that will prevent tracking of mud onto the roadway.

Rock tracking pads, constructed of stone as required by the applicable permits, will be installed adjacent to paved public roads to prevent or minimize the tracking of soil onto the roadway. If the roadside ditch is part of a jurisdictional waterway, a permit will be obtained prior to installing the tracking pad or culvert. If permitted in wetlands, tracking pads will be limited in size to reduce impacts. Tracking pads installed in wetlands will be constructed with clean rock placed on geotextile fabric, as approved by an EI and with approval from applicable regulatory agencies. All rock and fabric will be removed from the wetland during cleanup.

4.3 TEMPORARY EROSION AND SEDIMENT CONTROLS

Temporary ECDs (e.g., silt fence and/or double-staked straw bales) will be installed on sloped approaches to road crossings where vegetation has been disturbed (refer to Figure 25).

5.0 CONSTRUCTION DEWATERING

5.1 TRENCH DEWATERING

Prior to initiating dewatering activities, the EI will approve the water discharge situation to ensure that the best management practices are applied in such a way as to minimize the potential for scour and water containing sediment from reaching a wetland or waterbody. Furthermore, landowner approval is required in advance of placement of dewatering structures outside of the approved construction ROW. The Contractor will assess each water discharge situation to include:

- **Water Discharge Setting** - This includes:
  - Soil Type - The soil type the discharged water would flow over. The management of discharged water traveling over sandy soil is more likely to soak into the ground as compared to clay soils.
  - Ground Surface - The topography in the area that would influence the surface flow of the discharged water.
  - Adjustable Discharge rate - The flow rate of the discharged water (which may need to vary) can be managed based on the site conditions to minimize instances of water from reaching a sensitive resource area such as a wetland or waterbody. (Example - Water discharged at 500 gallons per minute may soak into the ground while if discharged at a higher flow rate would cause water to flow via overland runoff into a sensitive resource area)
  - Discharge Outfall - The amount of hose and number/size of pumps needed to attempt to discharge water at a location which drains away from waterbodies or wetlands.

- **Pump Intake** - Use floating suction hose or other similar measures to prevent sediment from being sucked from bottom of trench.

- **Overwhelming Existing Drainage** - If the discharge (assumed to be clean) enters a stream, the flow added to the stream will not exceed 50 percent of the peak storm event flow (to prevent adding high water volumes to a small stream channel that causes erosion due to imposing high flow conditions on the stream.

- **Filtering Mechanism –** All dewatering discharges will be directed through a filtering device as indicated below.
  - Well-Vegetated Upland Area – Water can be directed to a well-vegetated upland area through a geotextile filter bag. Geotextile bags need to be sized appropriately for the discharge flow and suspended sediment particle size.
  - Straw Bale Dewatering Structure – Where the dewatering discharge point cannot be located in an upland area due to site conditions and/or distance, the discharge should be directed into a straw bale dewatering structure. The size of the straw bale dewatering structure is dependent on the maximum water discharge rate (refer to Figure 21). A straw bale dewatering structure should be used in conjunction with a geotextile filter bag to provide additional filtration near sensitive resource areas.

- Alternative dewatering methods - Alternative methods may be approved by Enbridge on a site-specific basis.

5.1.1 Flow Measurement and Water Sampling

The volume of water discharged from the trench will be recorded as required by the applicable permits. The volume may be determined using a flow meter, or equivalent method, as approved by Enbridge or specified by applicable permit conditions.

Samples of the water discharged will be sampled if required by tribal permits and/or state-issued discharge permits.

5.1.2 Regulatory Notification and Reporting

Enbridge will notify and submit reports to appropriate tribal, state and federal agencies as required by all permits/authorizations.

5.2 HYDROSTATIC TEST DISCHARGES

Hydrostatic testing involves filling the new pipeline segments with water acquired in accordance with applicable permits (refer to Section 6.0), raising the internal pressure level, and holding that pressure for a specific period of time per federal DOT specifications. Hydrostatic testing will be done to verify that there are no flaws in the pipe or welds. Pre-built sections may be hydrostatically tested prior to installation using HDD and/or guided bore techniques. Hydrostatic testing will be conducted in accordance with applicable appropriation and discharge permits obtained by Enbridge. Hydrostatic test waters will not be transferred from one waterbody to another. Chlorinated source water will be used and treated as specified in applicable permits. After the hydrostatic test is complete, the line will be depressurized and the water discharged.

5.2.1 Refueling

The operation and refueling of hydrostatic test equipment will be in accordance with the conditions outlined in Section 10.0.

5.2.2 Siting of Test Manifolds

Hydrostatic test manifolds will be installed where necessary to ensure proper test pressures and incorporates changes due to topography. Where feasible, Enbridge will incorporate minor adjustments to the test manifold locations to avoid placement in wetlands and riparian areas. However, completely avoiding the placement of a test manifold in a wetland may not always be possible. The Contractor will install appropriate erosion control measures where the EI determines they are necessary.

5.2.3 Water Sampling

Water discharged from hydrostatic tests will be sampled as required by state-issued appropriation or discharge permits. Water volumes and flow rates will be recorded using the form provided in Appendix D.

5.2.4 Best Management Practices

Prior to hydrostatic testing the pipeline, Enbridge will prepare the pipe by removing accumulated construction debris, mill scale, dirt, and dust using a cleaning pig. The debris will be collected in a temporary receiver and will be properly disposed off-site of by the Contractor. Upon completion of the cleaning operation, the pipeline will be sealed with the test headers.

Test headers and pigs will be arranged to allow for rinse water to be installed ahead of the fill pigs. Rinse water will be treated and disposed of in accordance with applicable permit conditions.

Following testing, the test section will be depressurized and the water will be discharged to a well-vegetated, upland area with an appropriate dewatering structure such as a geotextile filter bag and/or a hay bale structure that will be lined with geotextile fabric. Direct discharges to surface waters, if allowed by permit, will be directed into an energy dissipation device such as a splash pup.

At no time will the discharge rate exceed the applicable discharge rates specified in state-issued or other discharge permits. In the event no maximum discharge rate is identified, discharges will be monitored and adjusted as necessary to avoid scouring, erosion, or sediment transport from the discharge location.

To minimize the potential for introduction and/or spread of invasive species due to hydrostatic testing activities, Enbridge will discharge water to the same source location from which it was appropriated. If water is used to test multiple test sections, it will be relayed back to the source water through the pipeline for final discharge. Test water will not be discharged to a waterbody other than the appropriation source, unless coordinated and permitted through the applicable agencies.

5.2.5 Flow Measurement

The total volume of water discharged will be determined with a flow meter (or equivalent), or as required by the applicable state permit. The total volume of water discharged will not exceed the volume specified in the applicable permit.

6.0 WATER APPROPRIATION

6.1 GENERAL

Water may be drawn from local sources, such as lakes, streams, and private or municipal wells for construction activities such as dust control, horizontal directional drilling/guided boring, trench dewatering, and hydrostatic testing. The Project will follow applicable permit conditions for the appropriation of water.

The intake hose will be suspended off of the stream or lake bottom and equipped with a screen, or equivalent device, to prevent fish uptake. During withdrawal, adequate waterbody flow rates and volumes will be maintained to protect aquatic life and allow for downstream uses. The volume and rate of withdrawal will be monitoring to comply with applicable permit conditions.

6.2 WATER SOURCES

Water will only be withdrawn from sources approved by Enbridge and in accordance with applicable permits. No additives to the water are permitted unless written approval is received from Enbridge and applicable permits authorize such additives.

If appropriation is scheduled to occur during possible periods of low flow, including frozen conditions, a backup source will be identified.

6.3 FLOW MEASUREMENT

At no time will the withdrawal rate for the water source exceed the rate specified in the applicable permits.

The Contractor will measure the withdrawal rate and total volumes of water appropriated with a flow meter (or equivalent) and provide the data to Enbridge, as required by the applicable permits.

6.4 WATER SAMPLING

Where required by permit conditions, Enbridge will sample the water during appropriation. The Contractor will assist Enbridge in obtaining these samples.

6.5 REGULATORY NOTIFICATION AND REPORTING

Enbridge will notify appropriate agencies of the time of appropriations if required by the state appropriations permits. Enbridge will submit reports regarding the volume and quality of the water withdrawn if required by the applicable permits.

7.0 REVEGETATION & MONITORING

This section was developed in conjunction with Natural Resources Conservation Service (NRCS) guidelines. Project-specific permit conditions and landowner requests (with exception to wetlands) for specific seed mixes (as indicated in the Project CLL) take precedence over this section.

7.1 PROJECT SEED SPECIFICATIONS

Seed used will be purchased on a “Pure Live Seed” (PLS) basis for seeding (both temporary and permanent) revegetation areas. Seed tags will identify:

- purity;
- germination;
- date tested;
- total weight and PLS weight;
- weed seed content; and
- seed supplier’s name and business information.

Seed will be used within 12 months of testing as required by applicable state rules and regulations. The seed tags on the seed sacks will also certify that the seed is “Noxious Weed Free”. Seed rates used on the Project will be based on PLS rate, not actual weight basis. Therefore, to determine the correct application rate if not indicated on the seed tag, a correction calculation will be performed based the purity and germination. For example, a seed mix that has a specified 10 pounds PLS per acre, 95 percent germination rate, and is 80 percent pure needs to be applied at the following rate:

(95% germination × 80% purity)/100 = 76% PLS
10 pounds PLS per acre/.76% PLS = 13.2 pounds per acre actual seeding rate

The species components of individual mixes are subject to availability at the time of purchase. Grass species may be substituted with alternative native or non-invasive species that are included in the NRCS guidelines and <u>subject to approval by Enbridge.</u>

Seed tags will be collected by the contractor and provided to Enbridge during seeding activities. The tags will be reviewed by the EI prior to installation to ensure that the seed mix complies with Enbridge’s specifications and that it is being applied to the correct location. If bulk delivery of seed is made, the above information will still be made available to Enbridge. Off-loading/on-loading of seed will not be performed in a designated wetland area.

Legume seed (if used) will be treated with an inoculant specific to the species and in accordance with the manufacturer’s recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydroseeding). When hydroseeding, four times the manufacturer’s recommended rate of inoculant will be used.

7.2 TEMPORARY REVEGETATION

Enbridge’s temporary seed mix (refer to Appendix C) was developed based on recommendations from the NRCS. Unless specifically requested by landowners or land managing agencies, Enbridge does not intend to establish temporary vegetation in actively cultivated land, standing water wetlands, and/or other standing water areas.

7.3 TIMING FOR TEMPORARY VEGETATION

Temporary revegetation will be established in construction work areas where 14 days or more will elapse between:

- the installation of the first pipeline and the second line where two pipelines will be co-constructed and active construction is ongoing;
- the completion of final grading at a site and the establishment of permanent vegetation; and/or,
- where there is a high risk of erosion due to site-specific soil conditions and topography.

Enbridge may require the Contractor(s) to conduct temporary seeding sooner than 14 days at site-specific locations near sensitive resource areas and/or areas prone to wind/water erosion.

Temporary vegetation should be established at any time between **April 1 and September 1**. Attempts at temporary revegetation after this date should be assessed on a site-specific basis and with approval from Enbridge.

7.4 MULCH

Mulch (weed-free straw, wood fiber hydromulch, or a functional equivalent) will be applied to disturbed areas (except for actively cultivated land and wetlands) if requested by the landowner or land managing agency, if specified by the applicable permits or licenses, or as required by Enbridge. Mulch will specifically be required on:

- Slopes greater than 5 percent; and
- Dry, sandy areas that can blow or wash away (field decision).

Mulch will be free of noxious weeds as listed in applicable state laws. Certified weed-free mulch may also be required at site-specific locations. The Contractor will be responsible for identifying and acquiring sources of weed-free and certified weed-free mulch. Sources will be approved by Enbridge prior to purchase.

Mulch will be applied at a rate of 2 tons per acre to cover at least 75 percent of the ground surface unless otherwise stipulated by permit conditions. Mulch will be uniformly distributed by a mechanical mulch blower, or by hand in areas not accessible to the mulch blower. Mulch will be anchored/crimped using a mulch-anchoring tool or disc set in the straight position to minimize loss by wind and water, as site conditions allow. In areas not accessible to a mulch-anchoring tool or too steep for safe operation, the mulch may be anchored by liquid tackifiers, with advance written approval from Enbridge. The manufacturer's recommended method and rate of application will be followed.

Hydro-mulch and liquid tackifier can be used in place of straw or weed-free hay mulch with prior approval from Enbridge. All hydromulch and liquid tackifier products used will be on the applicable state DOT product list. Application rates will be at the manufacturer's recommended rate, equal to or greater than 2 tons per acre of straw mulch.

7.5 PERMANENT REVEGETATION

Permanent vegetation will be established in areas disturbed within the construction work area (permanent easement, TWS, and ATWS) except in actively cultivated areas and standing water wetlands. The seed mixes for permanent seeding include native seed varieties commonly found and/or available from local seed distributors. Enbridge's seed mixes (refer to Appendix C) were selected to augment revegetation via natural recruitment from native seed stock in the topsoil and are not intended to change the natural species composition. Rates provided are assumed for a drill application and will be adjusted as discussed in Section 7.1.

7.6 UPLAND CONSTRUCTION AREAS

In consulting with the NRCS and other agencies, Enbridge developed a standard upland seed mix for restoring disturbed areas affected by the Project (Appendix C, Table 2). The mix includes species that will provide for effective erosion control and revegetation of the Project area. This seed mix will be used by Enbridge as the standard upland mix unless an alternate seed mix is specified by landowners or land managing agencies.

7.7 PERMANENT SEEDING OF WETLAND AREAS

7.7.1 Unsaturated Wetland Areas

Non-standing water wetlands will be seeded with the mix provided in Appendix C, Table 3 to provide temporary cover and allowed to revegetate naturally. The natural revegetation process will be encouraged by the seeds and rhizomes in the topsoil spread back over the right-of-way after pipe installation. No fertilizer, lime, or mulch will be applied in wetlands.

7.7.2 Saturated/Standing Water Wetlands

Enbridge does not propose to seed standing water wetland areas. It is widely accepted that the reestablishment of vegetation within standing water wetlands occurs best through natural process without supplemental seeding.

7.7.3 Forested Wetland Restoration

Enbridge proposes to allow natural reforestation of the temporary workspace area within forested wetlands via stump sprouting, root sprouting, and natural recruitment. Specific forested wetland restoration provisions will be followed as indicated in applicable permits issued for the Project.

7.8 PERMANENT SEEDING OF WATERBODY BANKS

Enbridge will reestablish stream bank vegetation using the Upland seed mix listed in Appendix C, Table 2, unless an alternate seed mix is requested by applicable agencies. Additional vegetation requirements may also be contained within Project specific permits. Where a waterbody is located within a wetland, the Contractor will re-seed the banks with the applicable wetland seed mix.

7.9 SPECIALIZED SEED MIXES

The following specialized seed mixes are available upon landowner request on a site-specific basis.

- Residential Areas: This seed mix will be used to reestablish residential lawns or other types of “turf-type” land cover.
- Pasture Areas: This seed mix will be used to reestablish active pastures and hayfields.
- Wildlife Areas: This seed mix will be used to provide a desirable food source for wildlife, specifically deer.
- Native Areas: In consultation with the NRCS, a native seed mix was also developed for restoring areas currently dominated by native plant species. The mix includes naturally

occurring species and provide for effective erosion control and revegetation of the Project area. This seed mix will be used by Enbridge at locations identified as high quality vegetation areas unless an alternate seed mix is specified by landowners or regulatory agencies.

- Roadways: This seed mix will be used to reestablish vegetation within upland areas of roadway easements.

7.10 CONSERVATION RESERVE PROGRAM (CRP) PROPERTIES

Enbridge's Land Agents will contact landowners where the construction ROW crosses land enrolled in CRP. Enbridge will work with the respective landowners to identify the parcel-specific CRP seed mixes. CRP lands will be seeded at the direction of the landowner per the site-specific landowner CRP requirements for that parcel and no non-CRP approved seed mix will be planted on CRP lands. CRP parcels will also be seeded with Enbridge's temporary cover seed mix. Seed for CRP seeding will meet the same criteria as other seed described in Section 7.1

7.11 SEED BED PREPARATION AND SEEDING PROCEDURES

After final grading, deep tillage will be performed in actively cultivated areas and in non-agricultural areas (as directed by Enbridge) to relieve soil compaction and promote root penetration. Deep tillage will not be conducted in non-farmed wetlands. The soil will then be tilled with a disc, field cultivator, or chisel plow (or equivalent) to prepare a seedbed, breaking up large clods and firm the soil surface. Tillage and equipment operations related to seeding and mulching will be performed parallel to ground contours as much as practicable. Fertilizer and other soil amendments will be incorporated into the soil during seedbed preparation as specified by Enbridge in the Project-specific CLL requirements and permits. No soil amendments will be applied in wetlands unless directed by the appropriate agencies.

7.12 SEEDING METHODS

Seed will be applied uniformly at specified rates across the prepared construction ROW by drilling, broadcasting, or hydroseeding. The EI will suspend seeding activities if conditions are such that equipment will cause rutting of the surface in the designated seeding areas. Enbridge will continue to monitor ROW conditions to resume seeding activities as site conditions improve and according to the general seeding timing restrictions listed in Section 7.14.

7.12.1 Drill Seeding

Seeding equipment will be capable of uniformly distributing the seed and sowing it at the required depth. Drills will be equipped with a feeding mechanism that will provide a uniform flow of seed at the desired application rate. Double-disc furrow openers equipped with depth bands and packer wheels to firm the soil over the seed will be used where practicable.

7.12.2 Broadcast Seeding

Broadcast seeding rate will be <u>double</u> the drill-seeding rate. Seed will be uniformly distributed by a mechanical or hand operated seeder. Following seeding, a cultipacker, harrow, or hand rake will be used to cover the seeds and firm the seedbed as is appropriate for the area.

7.12.3 Hydroseeding

Hydroseeding rate will be <u>double</u> the drill seeding rate, or the same as broadcast seeding rate. Seed will be applied alone or in a seed, fertilizer, and/or hydromulch slurry. If seeding is applied alone, the amount of hydromulch material will be adjusted to the seed slurry to show where seeding has taken place, providing a means to identify uniform cover of the construction ROW. Hydroseeders will provide continuous agitation and be capable of supplying a continuous, non-fluctuating flow of slurry. Enbridge will pre-approve all hydromulch products, which must be on the applicable state DOT product list.

7.13 SOIL AMENDMENTS

Enbridge will consult with NRCS representatives and review county soil survey information to assess where soil amendments, specifically the application of fertilizer or lime are needed to promote successful revegetation. No fertilizer or lime will be added with native seed mixes. When using non-native species on dry, dry-mesic and mesic sites for permanent seeding a minimum of 150 pounds of 20-10-10, and 2 tons of 80-85 lime or equivalent will be applied, unless otherwise specified or restricted by the landowner, NRCS, or land-managing agency. Soil amendments may be applied to agricultural, pasture, and/or residential lands if requested by landowners and/or land managing agencies. Enbridge will apply phosphate free fertilizers to areas within 100 feet of a waterway if soil amendments are required.

7.14 SEEDING PERIODS

These seeding windows have been developed in consultation with the NRCS and local/regional seed suppliers for normal average growing seasons, in conjunction with normal climate and soils conditions for maximum seed germination.

Seeding Periods

Native Mixes	
Spring Permanent Seeding	Fall Dormant Seeding
April 1 to June 15	Soil temperature below 55 degrees Fahrenheit

Enbridge will delay seeding during frozen ground conditions until the applicable spring seeding period or will complete dormant seeding where conditions allow (i.e., no snow cover). Enbridge will install temporary erosion controls during frozen conditions.

7.15 TIMING OF FINAL SEEDING

Upon final grading of the construction ROW, and upon the restoration of wetland and waterways, seeding and restoration/stabilization will occur within 48 hours. Other methods of stabilization will be used if temporary seeding is not appropriate due to seasonal conditions (e.g., mulch, erosion control matting).

7.16 EROSION & SEDIMENT CONTROL

Erosion control blankets, such as sewn straw mats, jute mats, coconut erosion control blankets, or biodegradable synthetic erosion control blankets, as approved by Enbridge, will be used on slopes over 30 percent, on stream banks and ditch banks and as directed by Enbridge.

7.17 DORMANT SEEDING

Dormant seeding is a method used after soil temperatures have cooled to 55 degrees Fahrenheit or cooler to prevent seed germination. Dormant seeding is only practicable if the soil is not frozen and snow is not present. Procedures for applying soil amendments, seedbed preparation, seeding, and mulching are the same as outlined for permanent revegetation in this section.

Where dormant seeding is conducted, one or more of the following temporary erosion and sediment controls will be put in place over the freshly seeded area unless the local soil conservation authority, landowner, or land managing agency specifies otherwise. The temporary measures will be in place within 48 hours of seeding, and are as follows:

- noxious weed-free straw mulch, at not more than 2 tons/acre, anchored;
- hydromulch, at 2 tons/acre, anchored; and/or
- erosion control blanket.

Additional erosion control measures will be applied as requested by the EI.

7.18 MONITORING

Enbridge will monitor and address all areas where stabilization techniques have been implemented in accordance with conditions identified in the applicable Project permits and/or licenses.

8.0 WINTER CONSTRUCTION

Frozen conditions can preclude effective topsoil segregation. When soil is frozen to a depth greater than the depth of topsoil, the soil will come off in thick slabs that contain both topsoil and subsoil, and mixing can result. If top soiling will proceed under these conditions, it should be done at the excavation only. A ripper should be used to break up the frozen topsoil over the trench line only. Care should be taken to only rip to the actual depth of topsoil or to a maximum depth of 12 inches, whichever is less. Topsoil in the spoil storage area should be graded smooth to minimize mixing during backfilling. Sufficient time is needed to allow the newly graded topsoil to freeze in place prior to trenching.

Summer construction of large diameter pipelines in saturated/standing water wetlands with unconsolidated soils can be difficult and potentially result in greater wetland disturbance including wider trench widths and extensive rutting/surface disturbance. Constructing across these types of wetlands in the winter can result in fewer impacts. Heavy construction equipment use and travel along the construction ROW, which may not be possible in summer conditions due to saturated, unstable soil conditions, can be accomplished in the winter by establishing temporary winter frost/ice roads. These frost/ice roads protect underlying vegetation and upper layers of wetland surfaces from disturbance potentially created during summer construction.

The area of open excavation will be minimized during winter construction to reduce amount of frozen backfill, and facilitate restoration to pre-construction contours. If winter conditions preclude final grading and cleanup, the Contractor will stabilize the area and temporary erosion control measures will remain in place until permanent erosion control measures are installed. Depending on site and weather conditions, Enbridge may require the Contractor to install dormant seeding, mulching, and/or installation of erosion control blanket on stream banks or other sensitive locations.

9.0 WASTE MANAGEMENT

The Contractor will properly handle, store, and dispose of all solid and hazardous materials and wastes that are used or generated by the Contractor as a result of the Project. The Contractor will determine if the materials and wastes associated with the Project classify as hazardous materials and/or wastes in accordance with applicable federal and/or state criteria. Upon request by Enbridge, the Contractor will provide documentation to Enbridge to substantiate findings of the regulatory status of materials and/or wastes used and/or generated as a result of the Project.

The Contractor will collect all waste materials, including oil or other waste liquids generated as a result of equipment maintenance, daily in suitable or approved containers (i.e., labeled and meeting any relevant regulatory requirements). On a routine basis, the Contractor will remove the containers of waste from the site and properly dispose of them. Throughout the duration of the Project, the Contractor will cleanup areas to the satisfaction of Enbridge. The Contractor is responsible for proper off-site disposal of all wastes generated during the Project. No wastes are to be left on Enbridge property, along the ROW, or buried in an excavation or otherwise disposed of on Enbridge property or ROW.

9.1 HAZARDOUS WASTES

If a Contractor generates a hazardous waste from materials they have brought on-site (e.g., paint clean-up solvents, waste paints, etc.), then the Contractor is responsible for proper waste collection, storage and disposal in accordance with all applicable regulations. The Contractor remains responsible for the proper handling, storage and disposal of the hazardous waste. Any release of the hazardous waste as a result of the improper handling, storage or disposal by the Contractor in this instance is the responsibility of the Contractor to rectify to the satisfaction of Enbridge and all applicable regulatory agencies.

9.2 ABRASIVE BLAST DEBRIS

The Contractor will contain and collect spent abrasive blast materials and place it into appropriate containers. The Contractor is responsible for covering the containers with appropriate means of rainwater and stormwater control to prevent said waters from entering or exiting the container. The Contractor is responsible for disposal of the spent abrasive in accordance with applicable federal, state and local regulatory requirements. The Contractor is responsible for determining if the spent abrasive is classified as a “hazardous” or “special” waste as defined by applicable federal and state regulations. If the spent abrasive is determined to be hazardous waste as a direct result of constituents of an Enbridge facility or equipment, Enbridge will coordinate proper disposal with the Contractor as previously discussed.

10.0 SPILL PREVENTION, CONTAINMENT, AND CONTROL MEASURES

This section describes planning, prevention and control measures to minimize impacts resulting from spills of fuels, petroleum products, or other regulated substances as a result of construction. These measures will be implemented by the Contractor, unless otherwise indicated by Enbridge.

10.1 PLANNING AND PREVENTION

Enbridge requires its Contractors to implement proper planning and preventative measures to minimize the likelihood of spills, and to quickly and successfully clean up a spill should one occur. This section sets forth minimum standards for handling and storing regulated substances and cleaning up spills. Potential sources of construction-related spills include machinery and equipment failure, fuel handling, transfer accidents and storage tank leaks. The Contractor will be responsible for implementing, at a minimum, the following planning and prevention measures.

10.2 ROLES AND RESPONSIBILITIES

10.2.1 Spill Coordinator

A Spill Coordinator will be designated by the Contractor, subject to approval by Enbridge. For all construction related spills, the Spill Coordinator will:

- report all spills to the Enbridge Representative immediately;
- report spills to appropriate federal, state and local agencies as soon as possible (subject to EI verification);
- mobilize on-site personnel, equipment, and materials for containment and/or cleanup commensurate with the extent of the spill;
- assist the Emergency Response Contractor (refer to a list of potential contractors provided in Appendix E) and monitor containment procedures to ensure that the actions are consistent with the requirements of this section;
- in consultation with Enbridge and appropriate agencies, determine when it is necessary to evacuate spill sites to safeguard human health;
- in consultation with Enbridge, coordinate with appropriate agencies the need to contact additional parties or agencies; and
- complete a Spill Report Form (refer to Appendix F) within 24-hours of the occurrence of a spill, regardless of the size of the spill.

10.2.2 Environmental Inspector

The EI will monitor the Contractor's compliance with the provisions of this section to ensure that appropriate agency notifications are made, spill resources are allocated, and clean-up is accomplished in accordance with applicable agency requirements

10.2.3 Authorized Personnel

Authorized Personnel are representatives of the Contractor who are designated to handle fuel, lubricants or other regulated substances. Authorized Personnel will be familiar with the requirements of this section and the consequences of non-compliance.

10.2.4 Construction Superintendent

The Contractor's Construction Superintendent or representative will notify the EI immediately of any spill of a petroleum product or hazardous liquid, regardless of volume.

10.2.5 Construction Personnel

Construction Personnel are representatives of the Contractor involved with the installation of the pipeline. Construction Personnel will notify the crew foreman or Spill Coordinator immediately of any spill of a petroleum product or hazardous liquid, regardless of volume.

10.3 TRAINING

The Contractor will train all employees handling fuels and other regulated substances to follow spill prevention procedures. The Contractor will train all employees who handle fuels and other regulated substances to prevent spills and to quickly and effectively contain and clean up spills that may occur in accordance with applicable regulations. .

10.4 EQUIPMENT

- Each construction crew will have adequate absorbent materials and containment booms on hand, to enable the rapid cleanup of any spill which may occur.

- The Contractor will maintain spill kits containing a sufficient quantity of absorbent and barrier materials to adequately contain and recover foreseeable spills. These kits may include, but are not limited to absorbent pads, straw bales, absorbent clay, sawdust, floor-drying agents, spill containment barriers, plastic sheeting, skimmer pumps, and holding tanks. This equipment will be located near fuel storage areas and other locations as necessary to be readily available to control foreseeable spills.

- Suitable plastic lining materials will be available for placement below and on top of temporarily-stored contaminated soils and materials.

- All fueling vehicles, and where necessary, service vehicles, will carry materials adequate to control foreseeable spills. Such material may include but not be limited to absorbent pads, commercial absorbent material, plastic bags with ties, and shovels.

- The Spill Coordinator will inform the Authorized Personnel, Construction Personnel, and the EIs of the locations of spill control equipment and materials, and have them readily accessible during construction activity. Spill kits should be clearly labeled for quick and easy identification in the field.

- All fuel nozzles will be equipped with functional automatic shut-offs.

- Fuel trucks transporting fuel to on-site construction equipment will travel only on approved access roads.

10.5 SUPERVISION AND INSPECTION

The Contractor will perform a pre-construction inspection and test of all equipment to ensure that it is in good repair. During construction, the Contractor will regularly inspect hoses, pipes, valves, and tanks to ensure equipment is free of leaks. Any equipment that found to be is leaking or in need of repair will be immediately removed from service by Contractor and repaired, prior to resuming work.

10.6 STORAGE AND HANDLING OF FUELS/HAZARDOUS LIQUIDS

10.6.1 Fuel Storage - General

The Contractor will follow proper fuel storage practices, including, but not limited to the following:

- Fuel storage will be at Contractor yards only or as approved by Enbridge.
- Proper signage at and adjacent to fuel storage areas to include "Fuel Storage Area – No smoking within 50 feet."
- Tools and materials to stop the flow of leaking will be kept on-site. Such equipment may include, but not be limited to, plugs of various sizes, 3M tank patches, a hammer, assorted sizes of metal screws with rubber washers, a screwdriver, and plastic tape.
- Fuels, lubricants, waste oil, and any other regulated substances will be stored in aboveground tanks only.
- Storage tanks and containers will conform to all applicable industry codes (NFPA, UFC, etc.).
- A suitable secondary containment structure will be utilized at each fuel storage site. These structures will be lined with suitable plastic sheeting; provide a minimum containment volume equal to 150 percent of the volume of the largest storage vessel..
- Secondary containment areas will not have drains. Precipitation may be drawn off as necessary. If visual inspection indicates that no spillage has occurred in the secondary containment structure, accumulated water may be drawn off and discharged in accordance with Section 5.0. If spillage has occurred in the structure, accumulated waste will be drawn off and pumped into drum storage for disposal.

10.6.2 Refueling

Contractor will make all efforts to dispense fuel by Authorized Personnel during daylight hours. Fuel dispensing operations will be attended by Authorized Personnel at all times. Personnel will be stationed at both ends of the hose during fueling unless both ends are visible and are readily accessible by one person.

10.6.3 Refueling, Maintenance, and Fuel Storage Near Wetlands and Waterbodies

Enbridge requires that the storage of petroleum products, refueling, maintenance, and lubricating operations take place in upland areas that are more than 100 feet from wetlands, streams, and waterbodies (including drainage ditches), and water supply wells. In addition, the

Contractor will store hazardous materials, chemicals, fuel and lubricating oils, and perform concrete coating activities outside these areas.

In certain instances, refueling or fuel storage may be unavoidable due to site-specific conditions or unique construction requirements (*e.g.* continuously operating pumps or equipment on barges). These locations will be approved in advance by the EI. Site-specific precautions, in addition to those practices described above, will be taken when refueling or maintenance activities are required within 100 feet of streams, wetlands or other waterbodies. These precautions include, but are not limited to:

- Adequate amounts of absorbent materials and containment booms will be kept on hand by each construction crew to enable the rapid cleanup of any spill which may occur;

- If fuel will be stored within wetlands or near streams for refueling of continuously operating pumps, secondary containment will be used;

- Secondary containment structures will be lined with suitable plastic sheeting, provide a containment volume of at least 150 percent of the storage vessel, and allow for at least one foot of freeboard; and

- Provide adequate lighting for these locations and activities.

10.6.4 Overnight parking

Overnight parking of equipment (including but not limited to light plants, generators, pumps, and machinery) is not allowed within 100 feet of a wetland or waterbody unless special containment provisions have been implemented and approved by the EI in advance.

10.6.5 Concrete Washout Handling

Concrete wash water, grindings and slurry, will not be discharged to wetlands, waterbodies, and storm sewer systems or allowed to drain onto adjacent properties. Wash water disposal will be limited to a defined area of the site or to an area designated for cement washout. The area(s) will be sufficient to contain the wash water and residual cement. Contractors hired to provide concrete products will provide equipment capable of reclaiming wash water during wash out.

10.7 INITIAL SPILL MANAGEMENT

10.7.1 Immediate Response

Immediately upon learning of any fuel, oil, hazardous material or other regulated substance spill, or upon learning of conditions that will lead to an imminent spill, the person discovering the situation will:

- Initiate actions to contain the fluid that has spilled or is about to spill, and initiate action to eliminate the source of the spill to the maximum extent that is safely possible.

- Notify the crew foreman and/or the Spill Coordinator and provide them with the following information:

  - Location and cause of the spill;
  - The type of material that has spilled; and

- Whether the spill has reached or is likely to reach any surface water.

Upon learning of a spill or a potential spill the Spill Coordinator will:

- Assess the situation and determine the need for further action;
- Direct subsequent activities and/or further assign responsibilities to other personnel; and
- Notify the EI.

10.7.2 Mobilization

The Spill Coordinator will mobilize on-site personnel, equipment, and materials for containment and/or cleanup commensurate with the extent of the spill. If the Spill Coordinator feels that a spill is beyond the scope of on-site equipment and personnel, the Spill Coordinator will immediately notify the Construction Superintendent that an Emergency Response Contractor is needed to contain and/or clean up the spill. Appendix E contains a list of potential Emergency Response Contractors. The Spill Coordinator will assist the Emergency Response Contractor and monitor containment procedures to ensure that the actions are consistent with the requirements of this Section.

In the event of a suspected Enbridge pipeline spill (to an adjacent pipeline), Enbridge's Emergency Pipeline Control Center will be notified at 1-800-858-5253 (24-hours/day), as well as the Enbridge EI. Actions requiring emergency response will be coordinated by Enbridge.

10.8 SPILL NOTIFICATION RESPONSIBILITIES

10.8.1 Notification Volumes

The Contractor's Construction Superintendent or representative will notify the Enbridge Representative and the EI immediately of any spill of a petroleum product or hazardous liquid, regardless of volume.

10.8.2 Spill Report Form

The Spill Coordinator will complete a Spill Report Form (Appendix F) for each release of a regulated substance, regardless of volume. The Spill Report Form will be submitted to the EI within 24 hours of the occurrence of a spill. Follow-up written reports, associated laboratory analyses, and other documentation may also be required separately on a site-specific basis as directed by the EI. Documentation is the responsibility of the Contractor.

10.8.3 Agency Notification

The Contractor will report spills to appropriate federal, state and local agencies as soon as possible. A listing of federal, state, and local agencies including reporting thresholds and timeframes is provided in Appendix G.

The Contractor, in coordination with Enbridge and the appropriate federal, state and local agencies will ensure that additional parties or agencies are properly notified. Additionally, the Contractor is responsible for ensuring that all cleanup activities required by a jurisdictional agency are satisfactorily met and provide documentation to Enbridge demonstrating this compliance.

10.9 SPILL CONTAINMENT AND CLEANUP

In the event of a spill, the Contractor will abide by all applicable federal, state and local regulations with respect to cleaning up the spill. All clean-up and other construction related spill activities will be completed by, and costs assumed by the Contractor. Specific cleanup measures for both upland and wetland/waterbody spills are described below.

10.9.1 Spill Control - Upland Areas

- If a spill should occur during refueling operations, **STOP** the operation until the spill can be controlled and the situation corrected.
- The source of the spill will be identified and contained immediately.
- For large spills on land, the spill will be contained and pumped immediately into tank trucks. The Contractor or, if necessary, an Emergency Response Contractor, will excavate contaminated soil.
- The spilled material and the contaminated soil will be treated and/or disposed of in accordance with all applicable federal, state, and local agency requirements.
- Smaller spills on land will be cleaned up with absorbent materials. Contaminated soil or other materials associated with these releases will also be collected and disposed of in accordance with applicable regulations.
- Flowing spills will be contained and/or absorbed before reaching surface waters or wetlands.
- Absorbent material(s) will be placed over spills to minimize spreading and to reduce its penetration into the soil.
- The Spill Coordinator, in consultation with the EI and appropriate agencies, determine when spill sites will be evacuated as necessary to safeguard human health. Evacuation parameters will include consideration for the potential of fire, explosion, and hazardous gases.

10.10 SPILL CONTROL - WETLANDS AND WATERBODIES

In addition to the above measures, the following conditions apply if a spill occurs near or into a wetland or waterbody, regardless of size:

- If a spill occurs during refueling operations, **STOP** the operation until the spill can be controlled and the situation corrected.
- The Contractor will use sorbent booms and pads to contain and recover released materials in standing water.
- If necessary, for large spills in waterbodies, The Contractor will secure an Emergency Response Contractor to further contain and clean up the spill.
- The Contractor will excavate contaminated soils in wetlands and temporarily place them on plastic sheeting in a bermed area, a minimum of 100 feet away from the wetland.

Contaminated soils will be covered with plastic sheeting while being stored temporarily and properly disposed of as soon as possible, in accordance with Section 10.11.

10.11 STORAGE AND DISPOSAL OF CONTAMINATED MATERIALS

- Appendix E lists potential treatment and disposal facilities for contaminated materials, petroleum products, and other construction-related wastes. The Contractor should recycle those wastes, such as motor oil, where there is an established recycling program available. Wastes such as grease or oily rags shall be disposed of in accordance with state requirements.

- The Contractor will store and dispose of all contaminated soils, absorbent materials, and other wastes in accordance with all applicable state and federal regulations.

- Only licensed carriers may be used to transport contaminated material from the site to a disposal facility.

- If it is necessary to temporarily store excavated soils on site, these materials will be placed on, and covered by, plastic sheeting, and the storage area bermed to prevent and contain runoff.

11.0 DRILLING FLUID RESPONSE, CONTAINMENT, AND NOTIFICATION PROCEDURES

Construction of a pipeline may include the use of trenchless methods known as the horizontal directional drilling (HDD) and guided/road bore methods. Throughout this section, both methods are referred to collectively as “drilling”. While the HDD method always includes the use of drilling fluid, the guided or road bore method might use drilling fluid or only use water to power and lubricate the bore. The HDD drilling fluids/mud consists primarily of water mixed with inert bentonite clay. Under certain conditions an additive may need to be mixed with the drilling fluids/mud for viscosity or lubricating reasons. Only non-hazardous additives will be used and a Material Safety Data Sheet (MSDS) for the drilling fluid will be maintained on-site.

This section elaborates on measures to be implemented by the Contractor if an inadvertent release of drilling fluid occurs despite prevention efforts. Prior to the commencement of drilling operations, the Contractor will inform construction personnel involved in as to the responsible party(ies) for release containment and response. The Contractor will ensure that the appropriate response personnel and containment equipment are on site for each drill/bore.

11.1 ON-SITE OBSERVATION DURING CONSTRUCTION

During construction of a drilled crossing, Contractor personnel will monitor the pipeline route throughout the process, as follows:

The Contractor will inform construction observers on what to watch for and will make them aware of the importance of timely detection and response actions to any release of drilling fluid.

- Construction observers will have appropriate, operational communication equipment (*e.g.,* radio and cell phones) available at all times during installation of the directionally drilled crossing, with the ability to communicate directly with the HDD operator.
- The HDD operator will monitor the annular drilling fluid pressures during pilot hole operations.
- If the HDD operator realizes a sustained loss in fluid pressure or loss of circulation:
    - The operator will immediately notify the construction observers of the assumed position of the drill tool; and
    - The Contractor will visually monitor the appropriate portion of the drill path where the drill tool is located to determine if an inadvertent return occurred. The Contractor may perform this monitoring by walking or by using a boat, as appropriate.
- Construction observers, EI(s), or the Enbridge HDD craft inspector have the authority to order installation of containment structures, if needed, and to require additional response measures if deemed appropriate.

11.2 CONTAINMENT, RESPONSE, AND CLEAN-UP EQUIPMENT

Containment, response and clean-up equipment will be available at both sides of an HDD crossing location and one side of a guided or road bore prior to the commencement to assure a timely response in the event of an inadvertent release of drilling fluid. Containment and response equipment includes but is not limited to:

- straw bales and staking
- pre-filled sandbags
- turbidity curtain (not necessary for guided or road bores that do not involve a waterbody)
- silt fence
- plastic sheeting and/or geotextile fabric
- shovels, brooms, buckets, and other appropriate hand tools
- pumps and sufficient hose
- fluid storage tanks (may not be necessary for guided or road bores)
- vacuum truck on 24-hour call
- one small boat (for larger rivers and open water wetlands)
- light plant/generator (only necessary where operations are conducted outside of daylight hours)

11.3 RESPONSE

In the event an inadvertent drilling fluid release is observed, the EI and the Contractor will assess to determine the amount of fluid being released and potential for the release to reach sensitive resource areas (e.g., wetlands and waterbodies). Response measures will vary based on location of inadvertent release as discussed below.

11.3.1 Upland Locations

Response measures include:

- The EI will evaluate the release to determine if containment structures are warranted and if they will effectively contain the release.
- If the amount of the surface release is not great enough to allow the practical physical collection from the affected area, it will be diluted with clean water and/or the fluid will be allowed to dry and dissipate naturally.
- Earthen or sandbag berms, silt fence, and/or hay bales will be installed to contain small releases and prevent migration of drilling fluid.
- The Contractor will remove excess fluid at a rate sufficient to prevent an uncontrolled release.
- If the amount of the surface release exceeds that which can be completely contained with hand-placed barriers, small collection sumps (less than 5 cubic yards) may be used (with approval from Enbridge) to remove released drilling fluid by the use of portable pumps and hoses.
- The EI will inform the Contractor to initiate immediate suspension of drilling operations if the fluid release cannot be effectively contained.

11.3.2 Wetland and Waterbody Locations

This section also applies to areas immediately adjacent to wetlands and waterbodies, such as stream banks or steep slopes, where drilling fluid releases could quickly reach surface waters.

- In the event of a drilling fluid release in wetlands, waterbodies, or adjacent areas:
    - The EI will evaluate the release, and the Contractor will implement appropriate containment measures.

  - The EI and the Contractor will evaluate the recovery measures to determine the most effective collection method.
  - Enbridge Engineering and the Contractor will review and adjust drill pressures, pump volume rates, and drill profile to minimize the extent of the release.
  - Enbridge will suspend drilling operations if containment measures do not effectively control the release.

- If the amount of the surface release exceeds that which can be contained with hand-placed barriers, small collection sumps (less than 5 cubic yards) may be excavated to collect released drilling fluid for removal by the use of portable pumps and hoses.
- If the amount of the surface release is not great enough to allow the practical physical collection from the affected area without causing additional impacts, with approval from both Enbridge Environmental and Construction Management, it may be diluted with clean water and/or the fluid will be allowed to dry and dissipate naturally.
- Excess fluid will be held within the containment area and removed using pumps or other appropriate measures at a rate sufficient to maintain secure containment.
- Recovered fluid will be stored in a temporary holding tank or other suitable structure out of the floodplain and/or wetland for reuse or eventual disposal in an approved disposal facility
- Enbridge will consult with the appropriate regulatory agencies to evaluate the circumstances of the release, discuss additional containment or cleanup requirements, and determine whether and under what conditions the HDD may proceed.

11.4 NOTIFICATION AND RESUMPTION OF SUSPENDED HDD OPERATIONS

The Contractor will immediately notify the EI of all drilling fluid releases. If the EI determines the release affects wetland or waterbody areas, he or she will immediately notify Enbridge Environment and Construction Management and the appropriate regulatory agencies.

If notifications are necessary during non-business hours they will be done according to prior arrangements made between Enbridge and the regulatory agencies. Follow-up notifications will be made as necessary and practicable.

The conditions under which drilling/boring operations can resume will be discussed with appropriate regulatory agencies and/or field representatives. If containment measures are functioning, and the circumstances and potential impacts of the release are understood, drilling/boring operations will resume.

11.5 CLEAN-UP

The following measures are to be considered as appropriate:

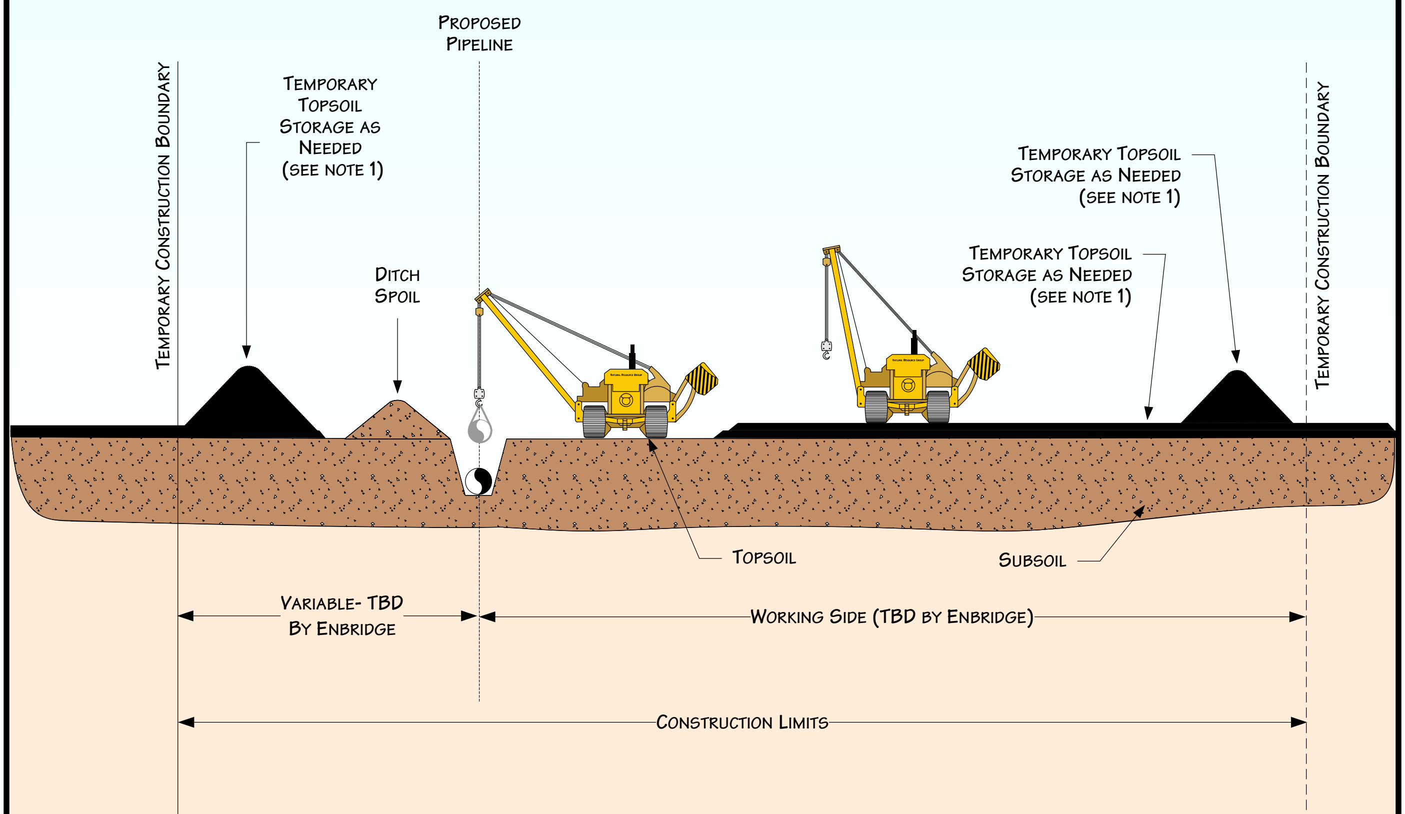
- Drilling fluid will be cleaned up by hand using hand shovels, buckets and soft-bristled brooms as possible without causing extensive ancillary damage to existing vegetation. Clean water washes may also be employed if deemed beneficial and feasible.
- Containment structures will be pumped out and the ground surface scraped to bare topsoil without causing undue loss of topsoil or ancillary damage to existing and adjacent vegetation.

- Material will be collected in containers for temporary storage prior to removal from the site.
- The EI will regularly evaluate the potential for secondary impact from the clean-up process and clean-up activities terminated if physical damage to the site is deemed to exceed the benefits of removal activities. This decision will be made in consultation with the appropriate regulatory agencies and/or Enbridge.

11.6 RESTORATION AND POST-CONSTRUCTION MONITORING

Following cleanup activities, restoration and revegetation of affected areas will be completed in accordance with all applicable local, state, and federal permits in addition to Enbridge's EPP. Enbridge will monitor the release site as appropriate to assure adequate restoration.

Figures



PROFILE

Notes:

1. Stockpile topsoil separately from ditch spoil as shown or in other configurations approved by the company.

Environmental Protection Plan

ENBRIDGE

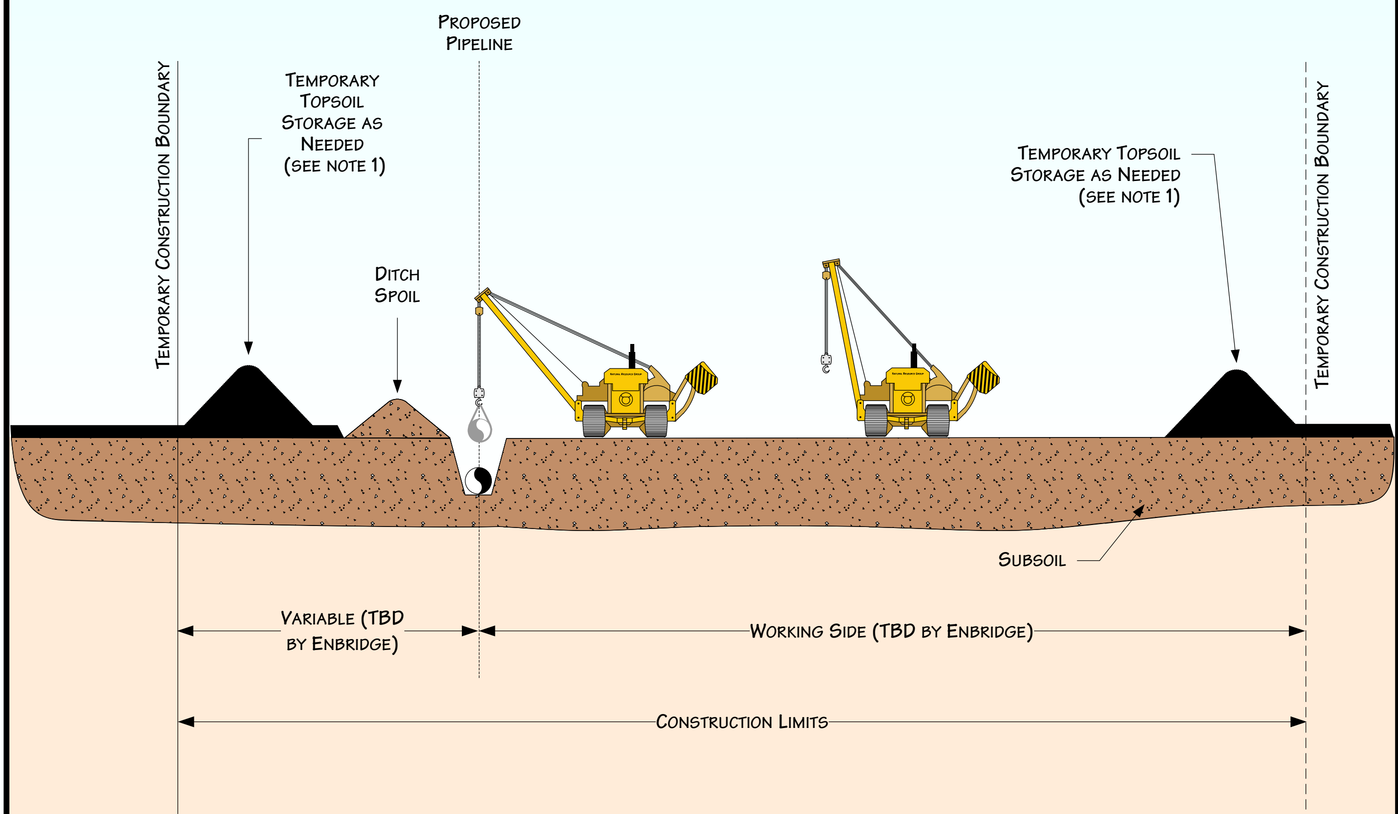
Figure 1

Environmental Protection Plan

Typical Topsoil Segregation –
Modified Ditch Plus Spoil Side

DATE:	7/9/2001
REVISED:	3/11/2011
SCALE:	NTS
DRAWN BY:	JPBOENTJE

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD

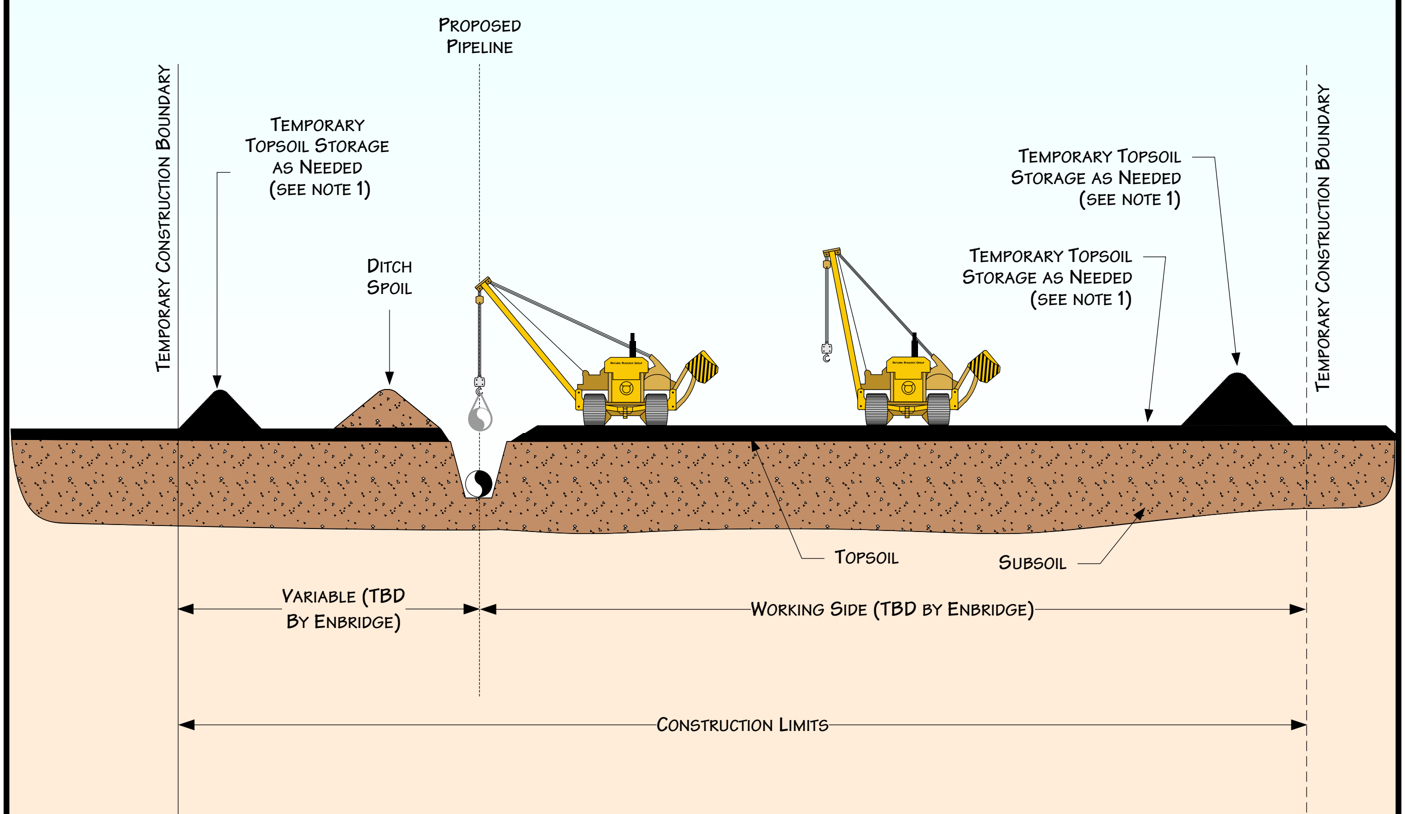


PROFILE

Notes:

1. Stockpile topsoil separately from ditch spoil as shown or in other configurations approved by the company.

Figure 2 **Environmental Protection Plan** Typical Topsoil Segregation - Full Right-of-Way	DATE: 7/9/2001 REVISED: 3/11/2011 SCALE: NTS DRAWN BY: JPBOENTJE K:_CLIENT_PROJECTS\D-F\EEL\2011-019\ FIG_1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD



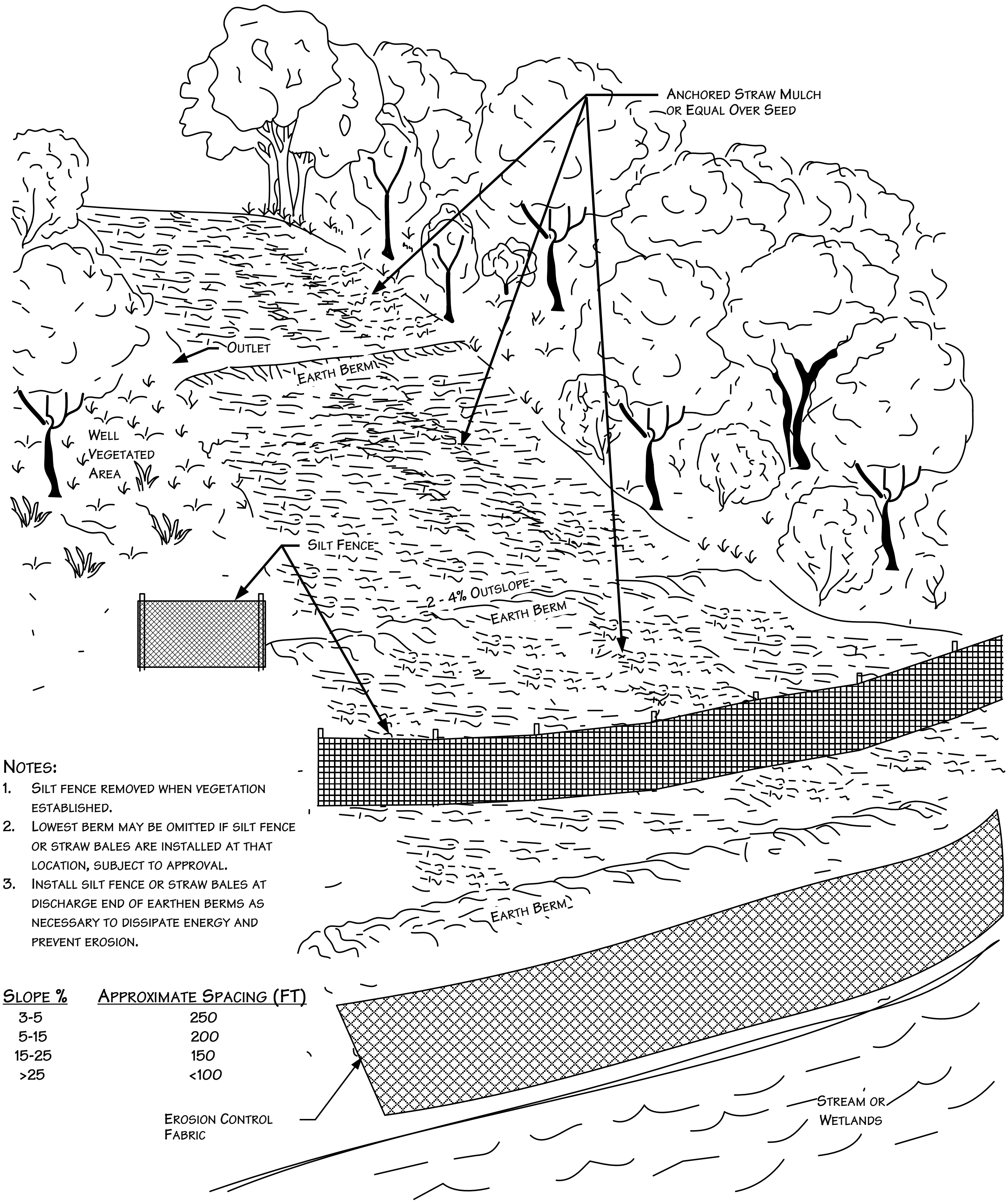
PROFILE

Notes:

1. Stockpile topsoil separately from ditch spoil as shown or in other configurations approved by the company.

ENBRIDGE	**Figure 3** **Environmental Protection Plan** Typical Topsoil Segregation – Trench Line Only

DATE: 7/9/2001
REVISED: 3/11/2011
SCALE: NTS
DRAWN BY: JPBOENTJE
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD



NOTES:

1. SILT FENCE REMOVED WHEN VEGETATION ESTABLISHED.
2. LOWEST BERM MAY BE OMITTED IF SILT FENCE OR STRAW BALES ARE INSTALLED AT THAT LOCATION, SUBJECT TO APPROVAL.
3. INSTALL SILT FENCE OR STRAW BALES AT DISCHARGE END OF EARTHEN BERMS AS NECESSARY TO DISSIPATE ENERGY AND PREVENT EROSION.

SLOPE %	APPROXIMATE SPACING (FT)
3-5	250
5-15	200
15-25	150
>25	<100

For environmental review purposes only.

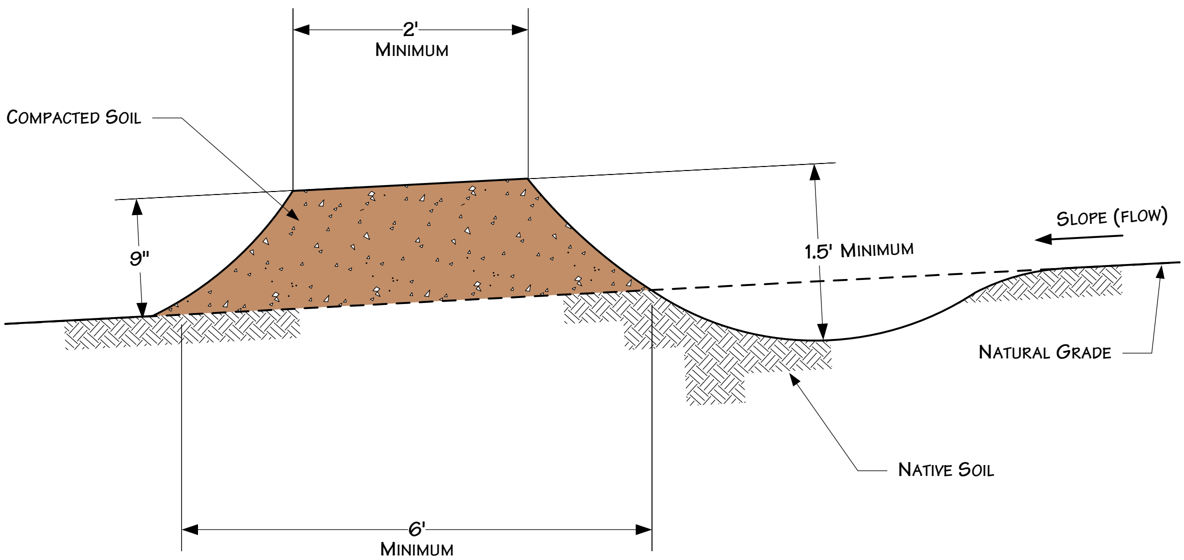
ENBRIDGE

Figure 4

Environmental Protection Plan
Typical Temporary or Permanent Berms
Perspective View

DATE: 11/14/2000
REVISED: 3/11/2011
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_4_BERMS_PERSPECTIVE_VIEW.VSD

NATURAL RESOURCE GROUP



NOTES
1. Berms shall be constructed with 2 to 4 percent outslope.
2. Berms shall be outleted to well vegetated stable areas, silt fences, straw bales or rock aprons.
3. Berms shall be spaced as described in construction specifications.
4. Additional information included on other drawings.

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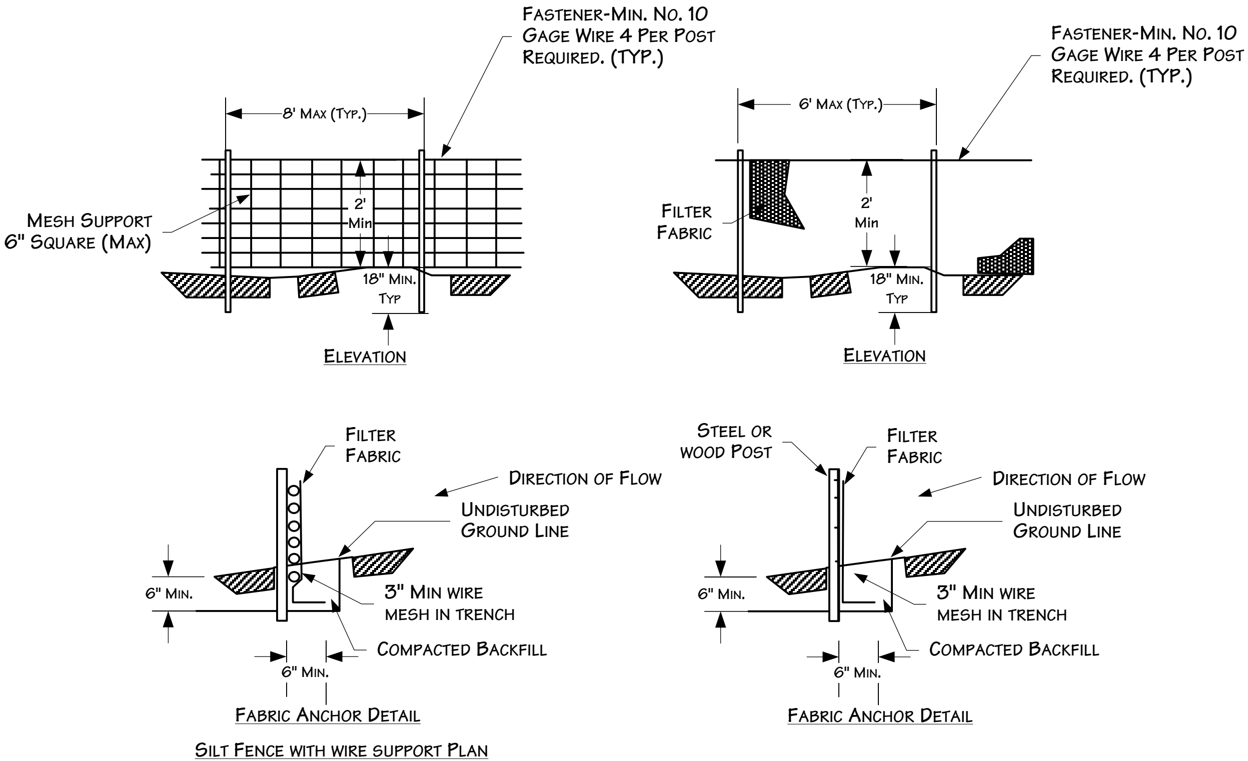
ENBRIDGE

Figure 5
Environmental Protection Plan
Typical Temporary or Permanent Berms
Elevation View

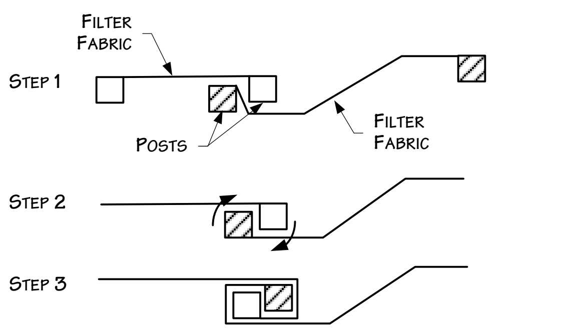
DATE: 5/25/2001	
REVISED: 3/11/2011	
SCALE: NTS	
DRAWN BY: KMKENDALL	
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_5_BERMS_ELEVATION_VIEW.VSD	

NATURAL RESOURCE GROUP



Silt Fence Plan
NTS

Notes:
1. Wires of mesh support shall be min. gage no. 12.
2. Filter fabric shall meet the requirements of the specification with equivalent opening size of at least 30 for nonwoven and 50 for woven. (Sieve No.)
3. The posts used to support the silt fence should be hardwood material with a minimum cross sectional area of 4 inches square and 4 feet long. Metal posts should be used in areas that pond water.



Attaching two silt fences

Notes:
1. Place the end post of the second fence inside the end post of the first fence.
2. Rotate both posts at least 180 degrees in a clockwise direction to create a tight seal with the fabric material.
3. Drive both posts a minimum of 18 inches in the ground and bury the flap.

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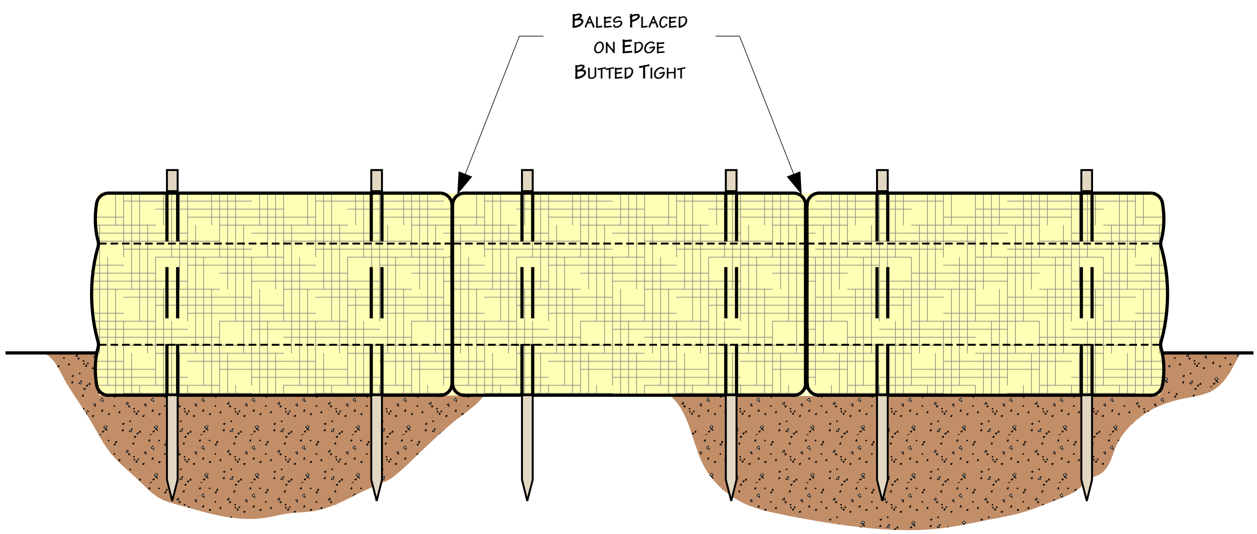
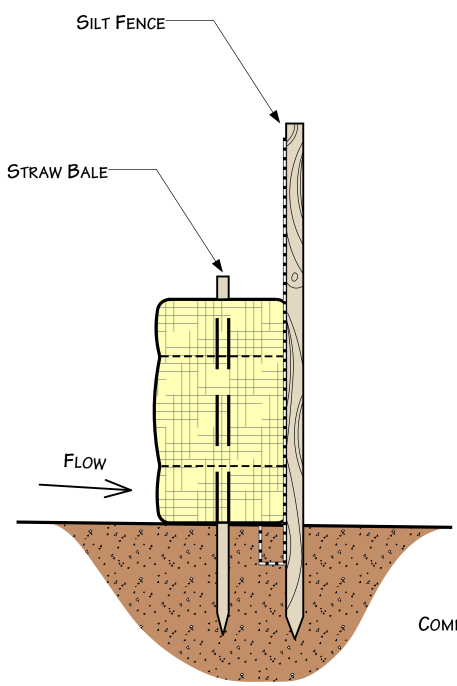
Figure 6
Environmental Protection Plan
Typical Silt Fence Installation

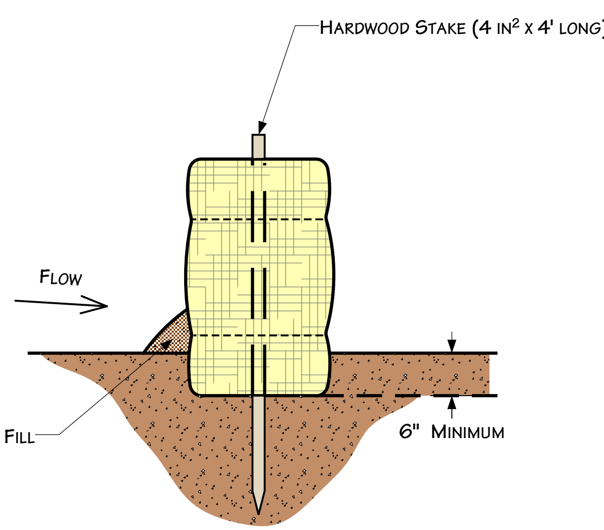
DATE: 5/25/2001
REVISED: 3/23/2011
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_6_SILT_FENCE_INSTALL.VSD

NATURAL RESOURCE GROUP





STRAW BALES & SILT FENCE



STRAW BALES ONLY

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Figure 7
Environmental Protection Plan
Typical Straw Bale Installation

DATE: 5/25/01
REVISED: 3/11/11
SCALE: Not to Scale
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_7_STRAW_BALE_INSTALL.VSD

NATURAL RESOURCE GROUP

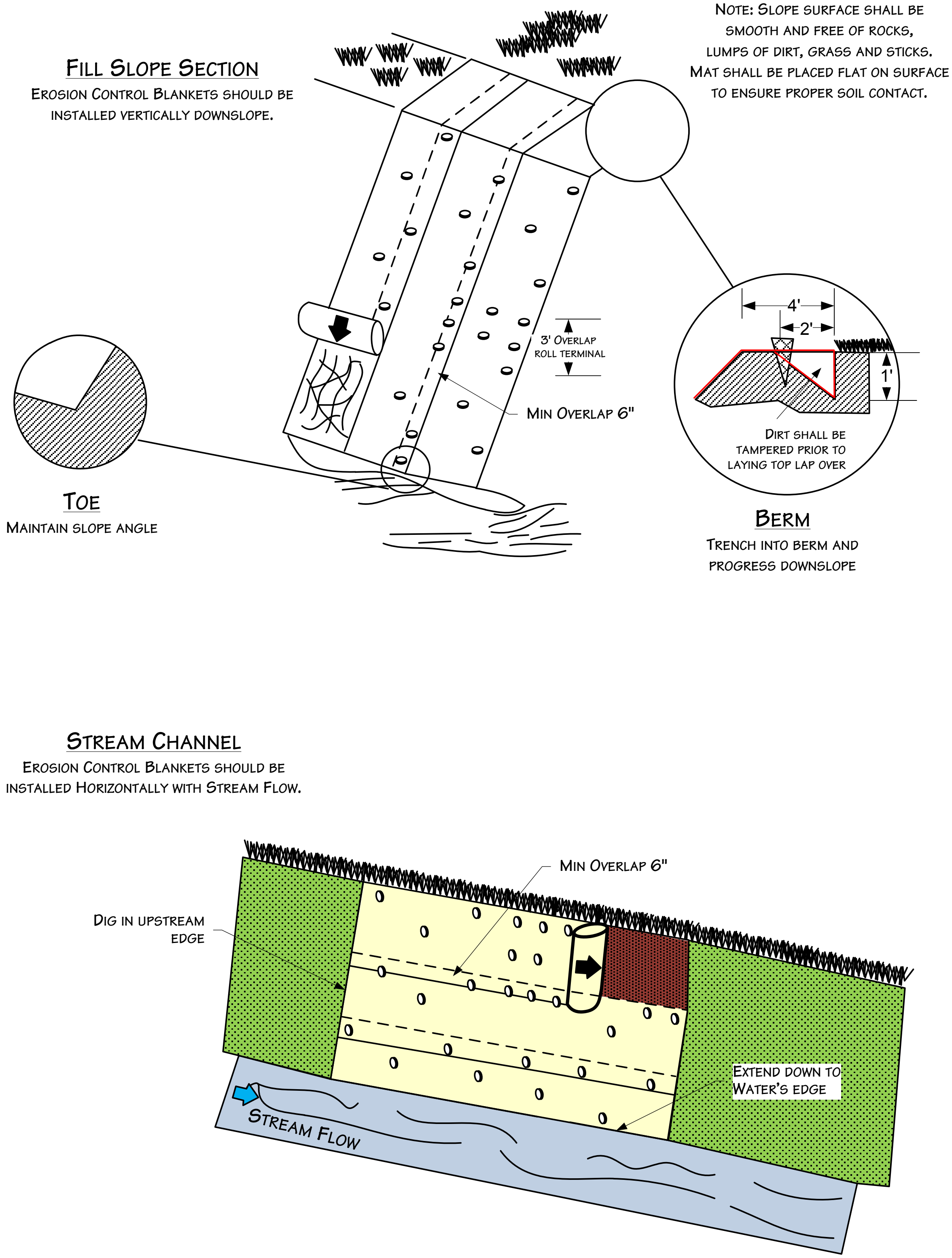

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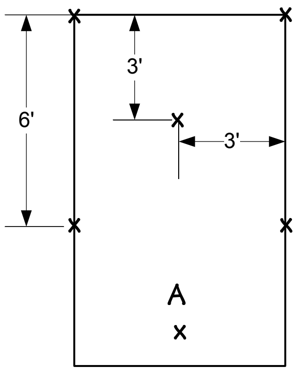
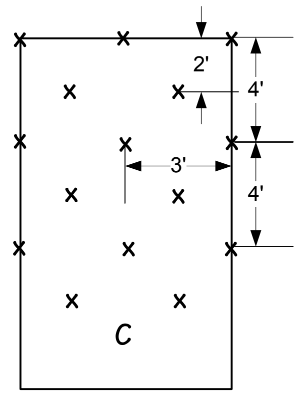
Figure 8
Environmental Protection Plan
Typical Erosion Control Blanket Installation

DATE: 5/25/2001
REVISED: 3/23/2011
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_8_EROSION_CONTROL_BLANKET_INSTALL.VSD

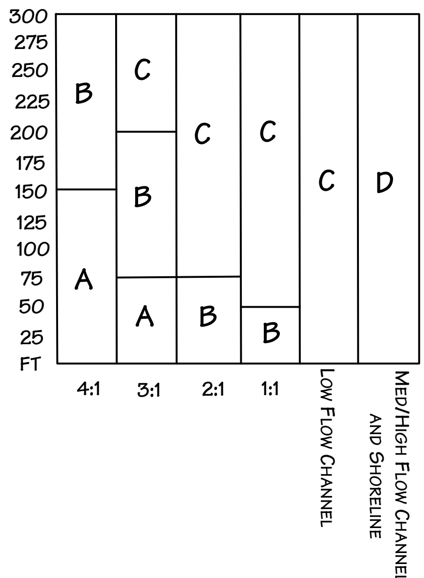
NATURAL RESOURCE GROUP

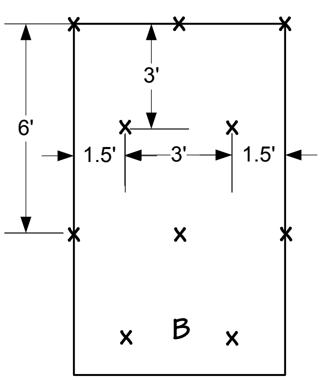


1 Staple Per Sq. Yd

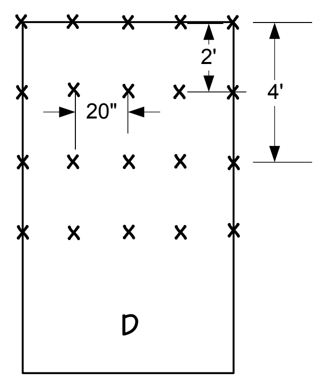


2 Staples Per Sq. Yd





1 ½ Staples Per Sq. Yd



3 1/2 Staples Per Sq. Yd

For optimum results, these recommended staple pattern guides must be followed. Suggested anchoring methods vary according to the manufacturer. This chart shows how to slope lengths and how gradients affect sampling patterns.

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Figure 9
Environmental Protection Plan
Typical Staple Pattern for Erosion Control Fabric

DATE: 5/25/2001
REVISED: 3/24/2011
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_9_STAPLE_PATTERN_EROSION_CONTROL_FABRIC.VSD

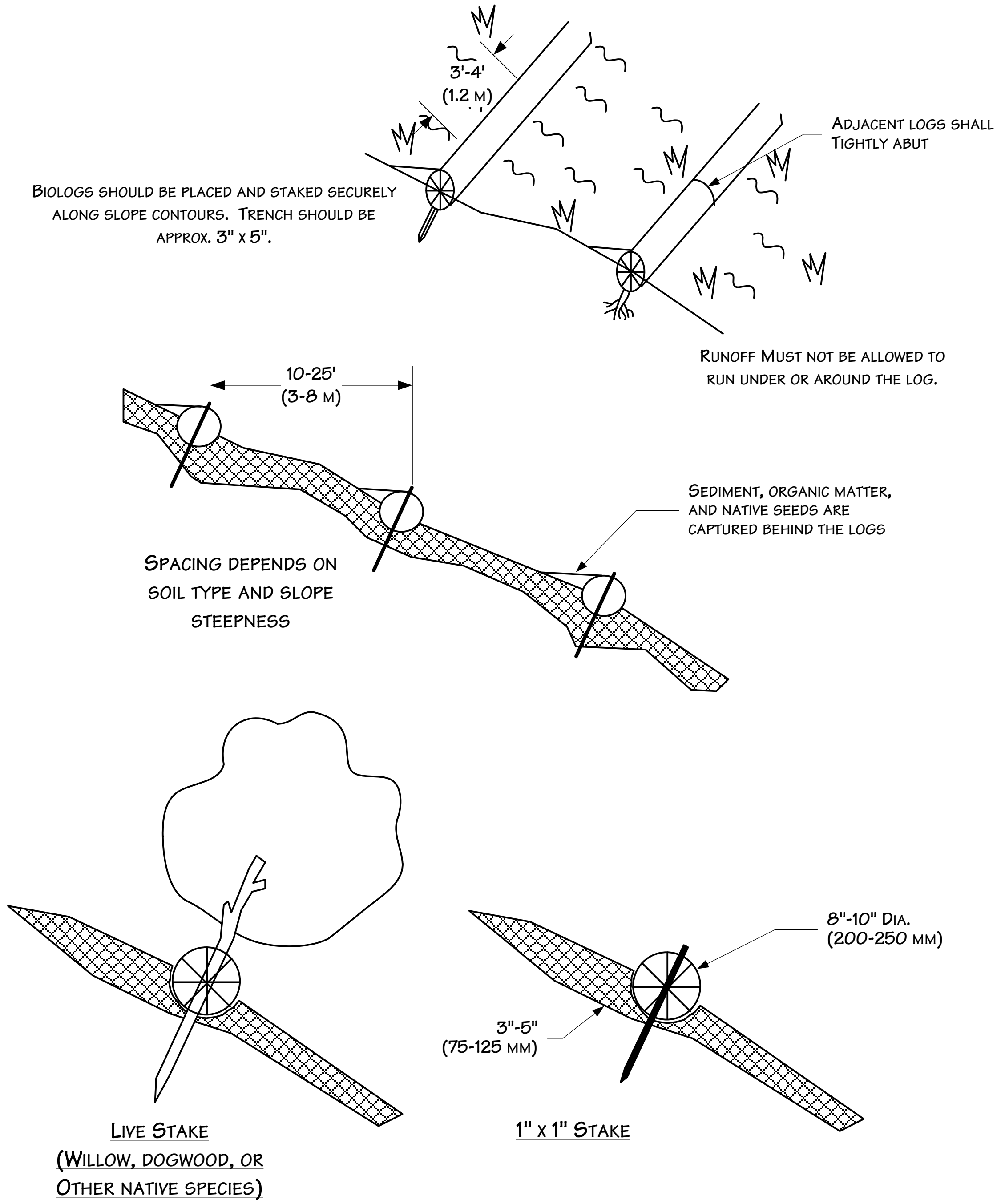

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Figure 10
Environmental Protection Plan
Typical Biolog Installation

DATE: 5/25/2001
REVISED: 3/24/2011
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_10_BIOLOG INSTALL.VSD

NATURAL RESOURCE GROUP

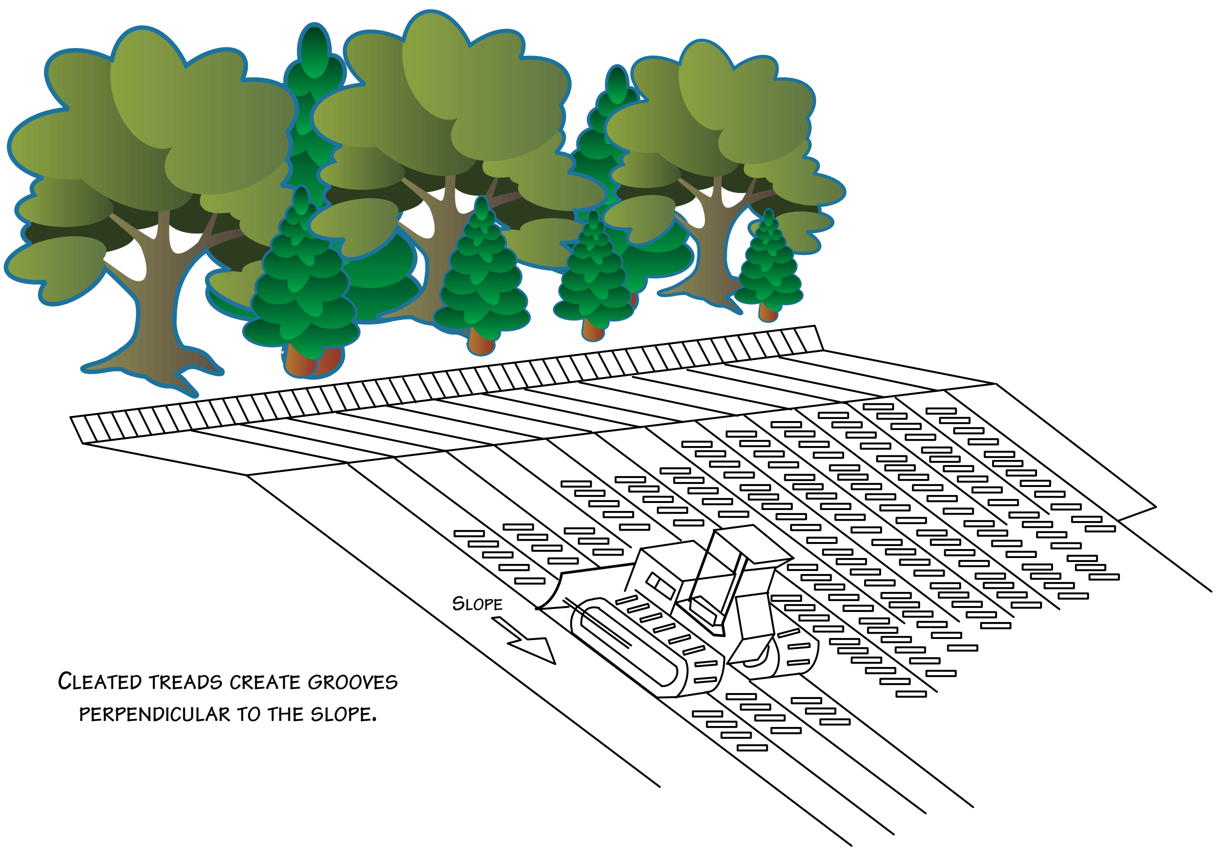

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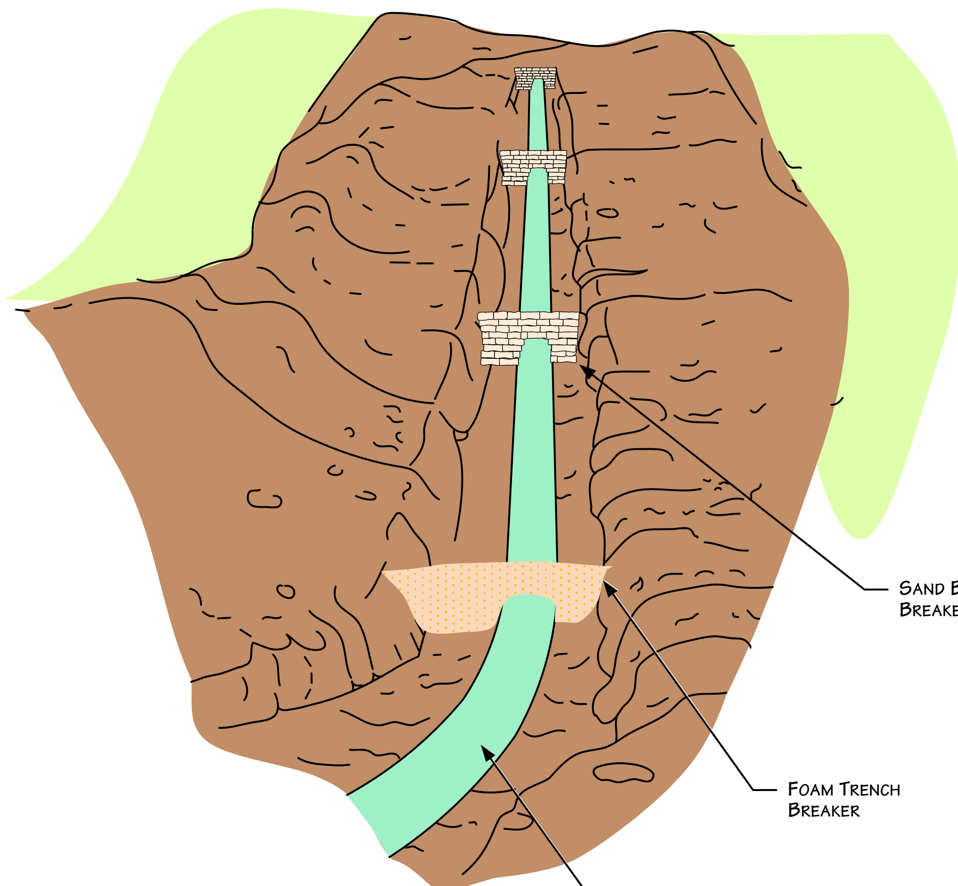
Figure 11
Environmental Protection Plan
Typical Cat Tracking

DATE: 5/25/2001	NATURAL RESOURCE GROUP
REVISED: 3/24/2011	
SCALE: NTS	
DRAWN BY: KMKENDALL	
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\ FIG_11_CAT_TRACKING.VSD	



NOTES

1. BAGS WILL NOT BE FILLED WITH TOPSOIL.
2. ADDITIONAL INFORMATION INCLUDED ON OTHER DRAWINGS.

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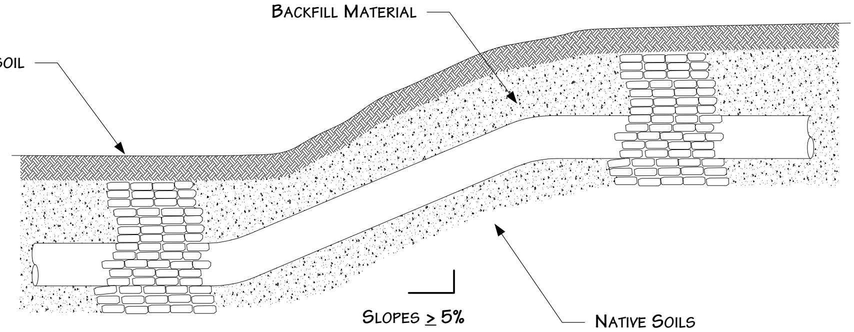
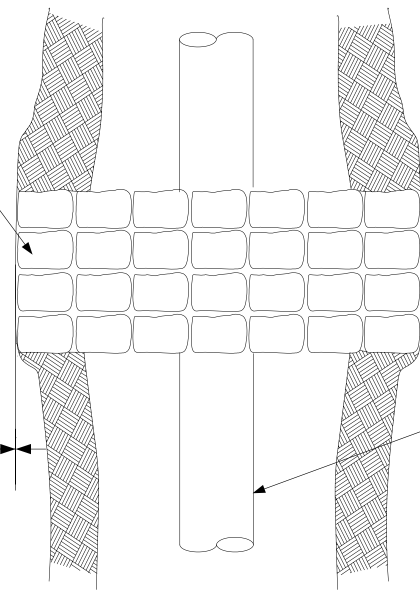
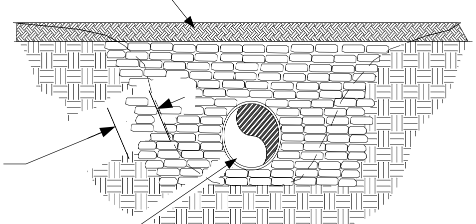
ENBRIDGE	**Figure 12** **Environmental Protection Plan** Typical Trench Breakers - Perspective View	DATE: 5/25/2001 REVISED: 3/11/11 SCALE: NTS DRAWN BY: KMKENDALL K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_12_TRENCH_BREAKER_PERSPECTIVE_VIEW.VSD



PROFILE VIEW
(NOT TO SCALE)



PLAN VIEW
(NOT TO SCALE)



FACE VIEW
(NOT TO SCALE)

NOTES

1. BAGS WILL NOT BE FILLED WITH TOPSOIL
2. ADDITIONAL INFORMATION INCLUDED ON OTHER DRAWINGS

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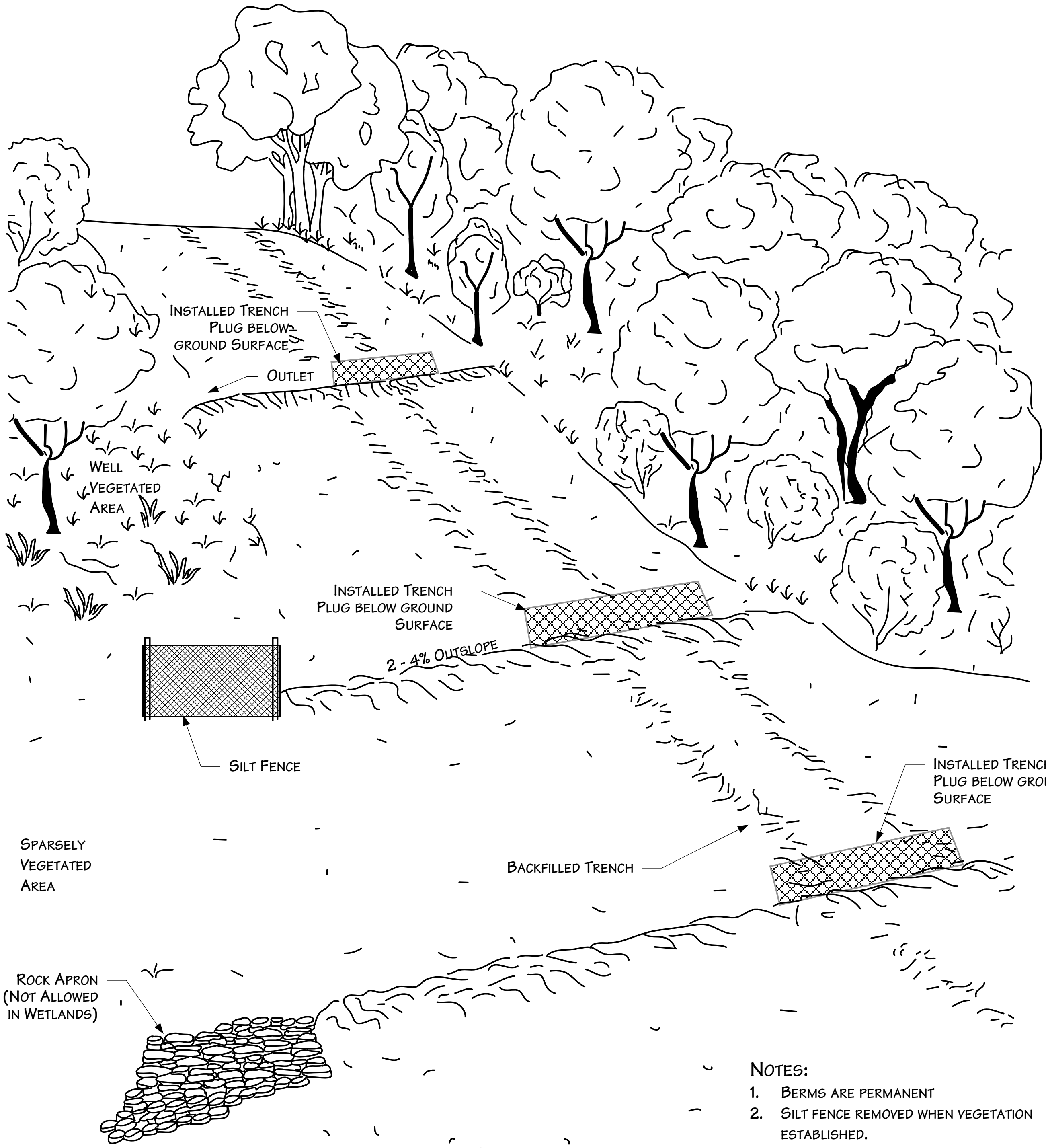
Figure 13
Environmental Protection Plan
Typical Trench Breakers – Plan & Profile View

DATE:	11/15/2000
REVISED:	3/11/11
SCALE:	NTS
DRAWN BY:	KMKENDALL

NATURAL RESOURCE GROUP

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_13_TRENCH_BREAKER_PLAN_PROFILE_VIEW.VSD



Perspective View
(Not to scale)

Slope %	Approximate Spacing (FT)
3-5	250
5-15	200
15-25	150
>25	<100

Notes:
1. Berms are permanent
2. Silt fence removed when vegetation established.
3. Lowest berm may be omitted if silt fence or straw bales are installed at that location, subject to approval.
4. Install silt fence or straw bales at discharge end of earthen berms as necessary to dissipate energy and prevent erosion.

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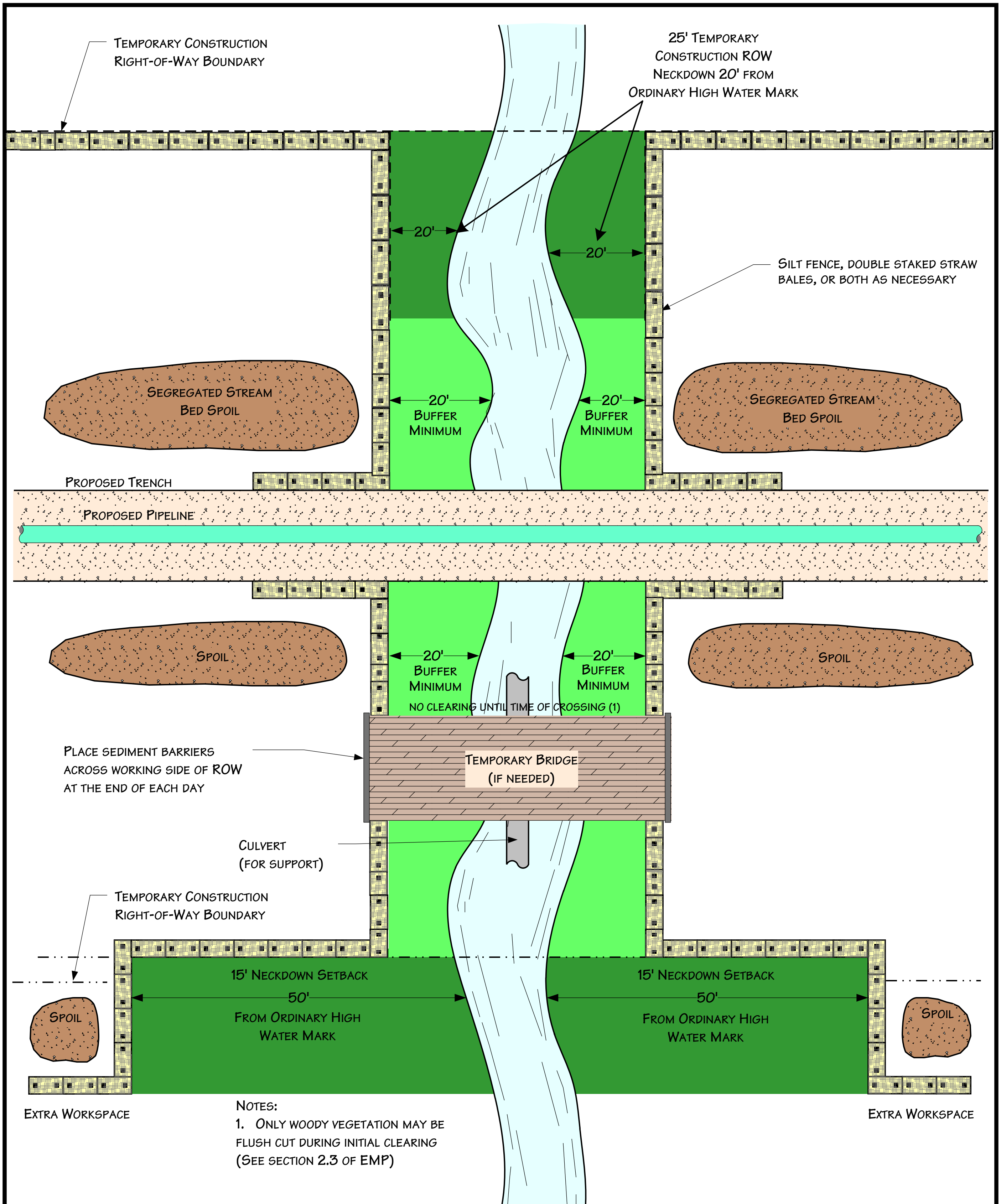
Figure 14
Environmental Protection Plan
Permanent Slope Breakers - Perspective View

DATE: 5/25/2001
REVISED: 3/11/11
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_14_SLOPE_BREAKERS_PERSPECTIVE_VIEW.VSD

Natural Resource Group



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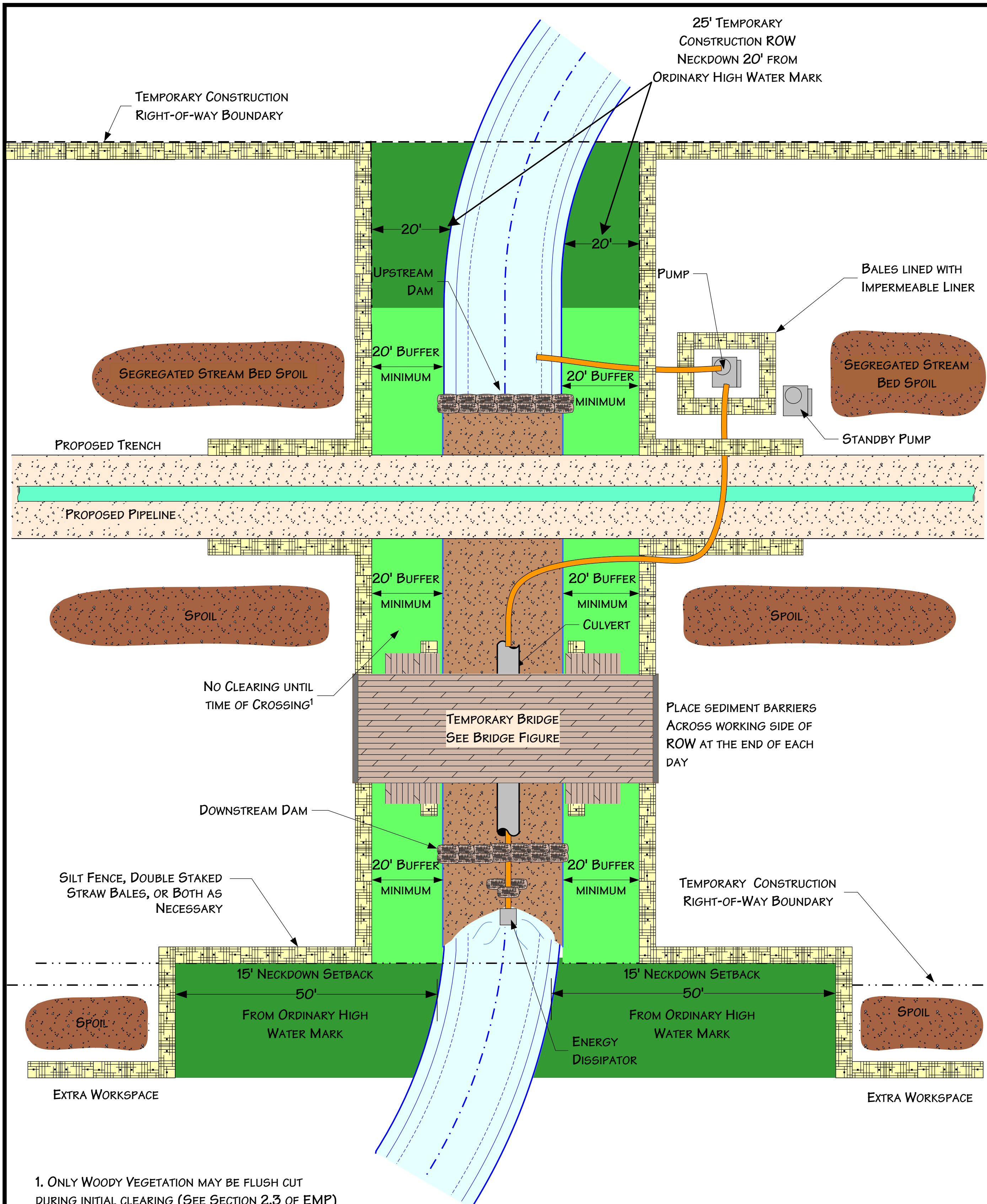
ENBRIDGE

Figure 15
Environmental Protection Plan
Typical Waterbody Crossing
Open Cut - Wet Trench Method

DATE: 11/29/2005
REVISED: 3/11/11
SCALE: NTS
DRAWN BY: JPB

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_15_WATERBODY_OPENCUT_WETTRENCH.VSD

NATURAL RESOURCE GROUP



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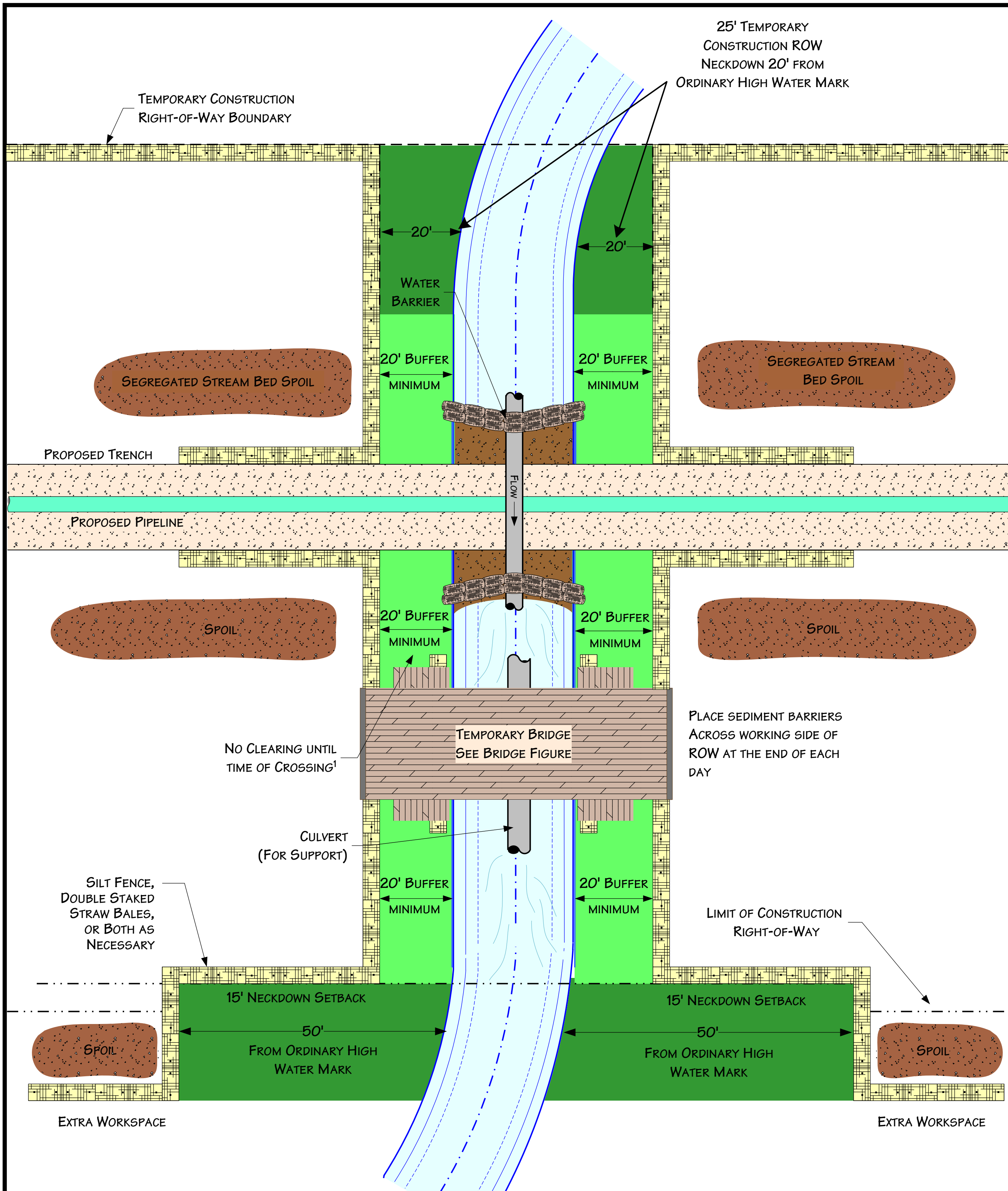
ENBRIDGE

Figure 16
Environmental Protection Plan
Typical Waterbody Crossing
Dam and Pump Method

DATE:	11/29/2005
REVISED:	4/20/09
SCALE:	NTS
DRAWN BY:	JPB

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\
FIG_16_WATERBODY_DAM_AND_PUMP.VSD

NATURAL RESOURCE GROUP



1. Only woody vegetation may be flush cut during initial clearing (See Section 2.3 of EMP)

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ENBRIDGE

Figure 17
Environmental Protection Plan
Typical Waterbody Crossing
Flume Method

DATE:	11/29/2005
REVISED:	3/11/11
SCALE:	NTS
DRAWN BY:	JPB

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_17_WATERBODY_FLUME.VSD

NATURAL RESOURCE GROUP

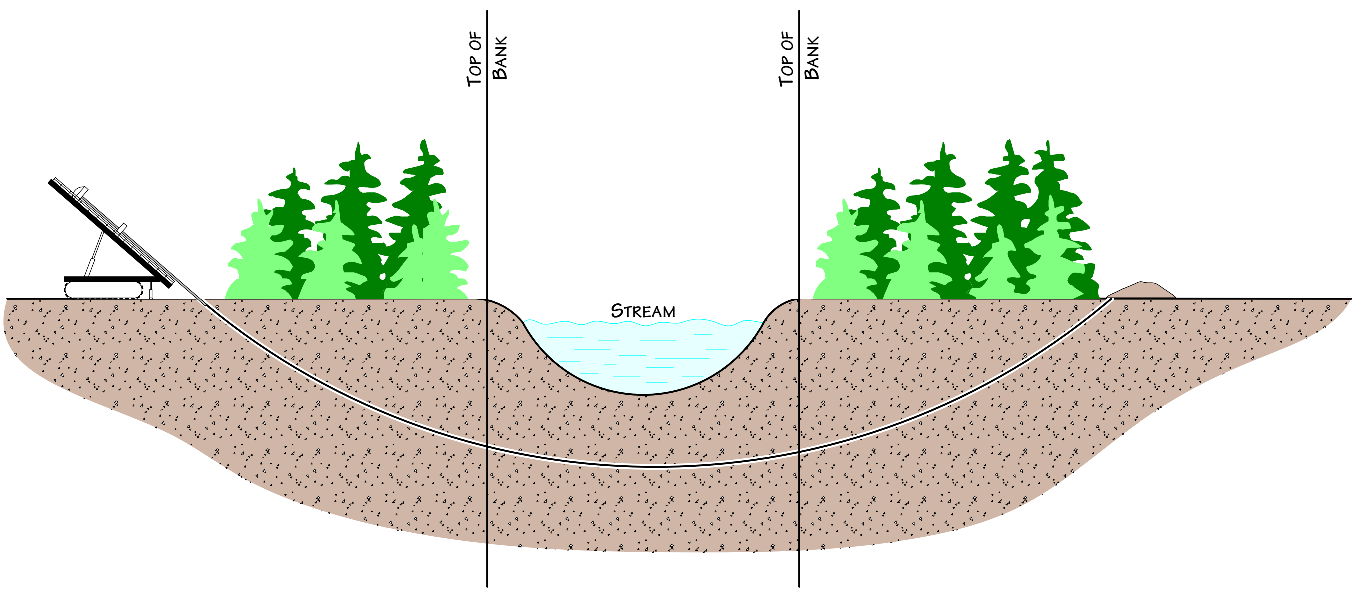

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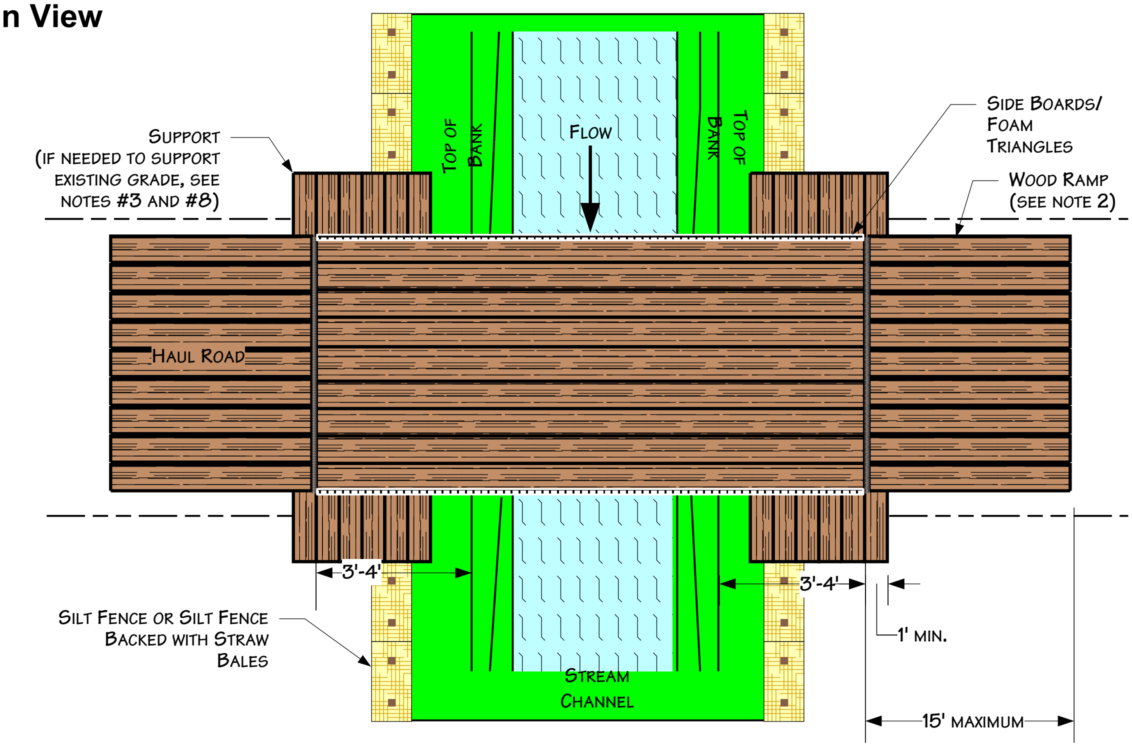
Figure 18
Environmental Protection Plan
Typical Waterbody Crossing
Directional Drill Method

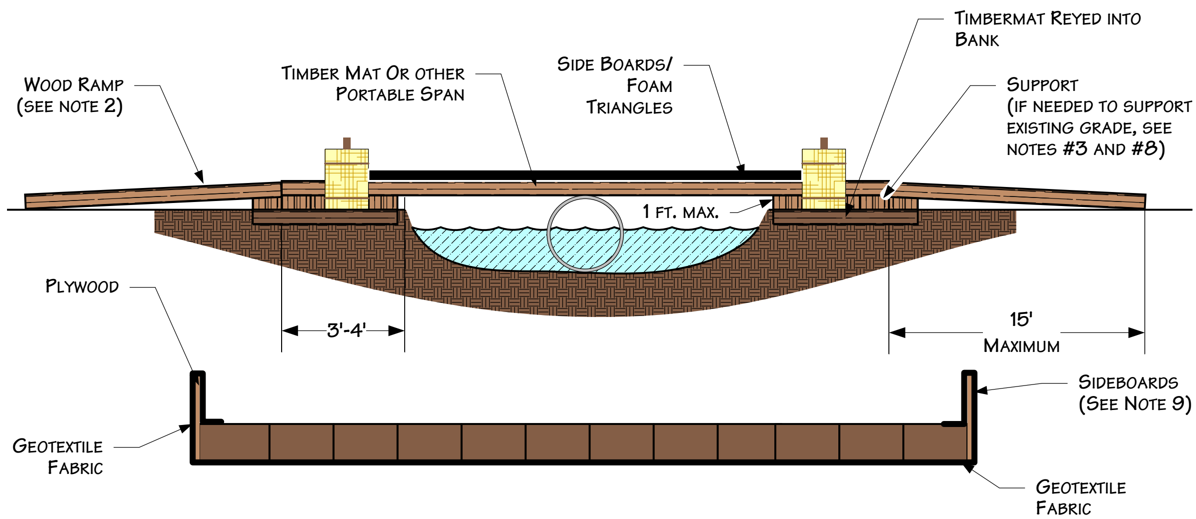
DATE: 7/14/2000
REVISED: 3/11/11
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_18_WATERBODY_DIRECTIONAL_DRILL.VSD

NATURAL RESOURCE GROUP

Plan View



Profile View



Notes:

1. Inspect bridge opening periodically and following rainfalls of over ½”. Remove any debris restricting flow and deposit it at an upland site outside of floodplain.
2. If physical circumstances prohibit wood or metal ramps, earthen ramps may be used as approved.
3. Inspect bridge elevation so bridge remains supported above high bank and does not sink into bank.
4. The culvert support must be anchored to the stream bottom and may not be supported with fill.
5. Earthen ramp cannot be taller than 1' and cannot extend for more than 15' on either side of the crossing.
6. The bridge must span from top of bank to top of bank.
7. Additional support must be added on top of bank and under span if initial support starts to settle.
8. Erosion and sedimentation control measures shall be inspected and maintained in accordance with the Company's Environmental Mitigation Plan
9. Sideboards will be installed on temporary bridges to minimize the potential for sediment transport. Sideboards may be constructed out of plywood, or equivalent, and affixed to the outer sides of the bridge. Geo-textile fabric, or equivalent, must also be adequately secured to the underside of the bridge to prevent material from falling through the bridge deck. The geo-textile fabric or an equivalent should be secured to the bottom of the bridge and wrapped around the sideboards in a continuous fashion.

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ENBRIDGE

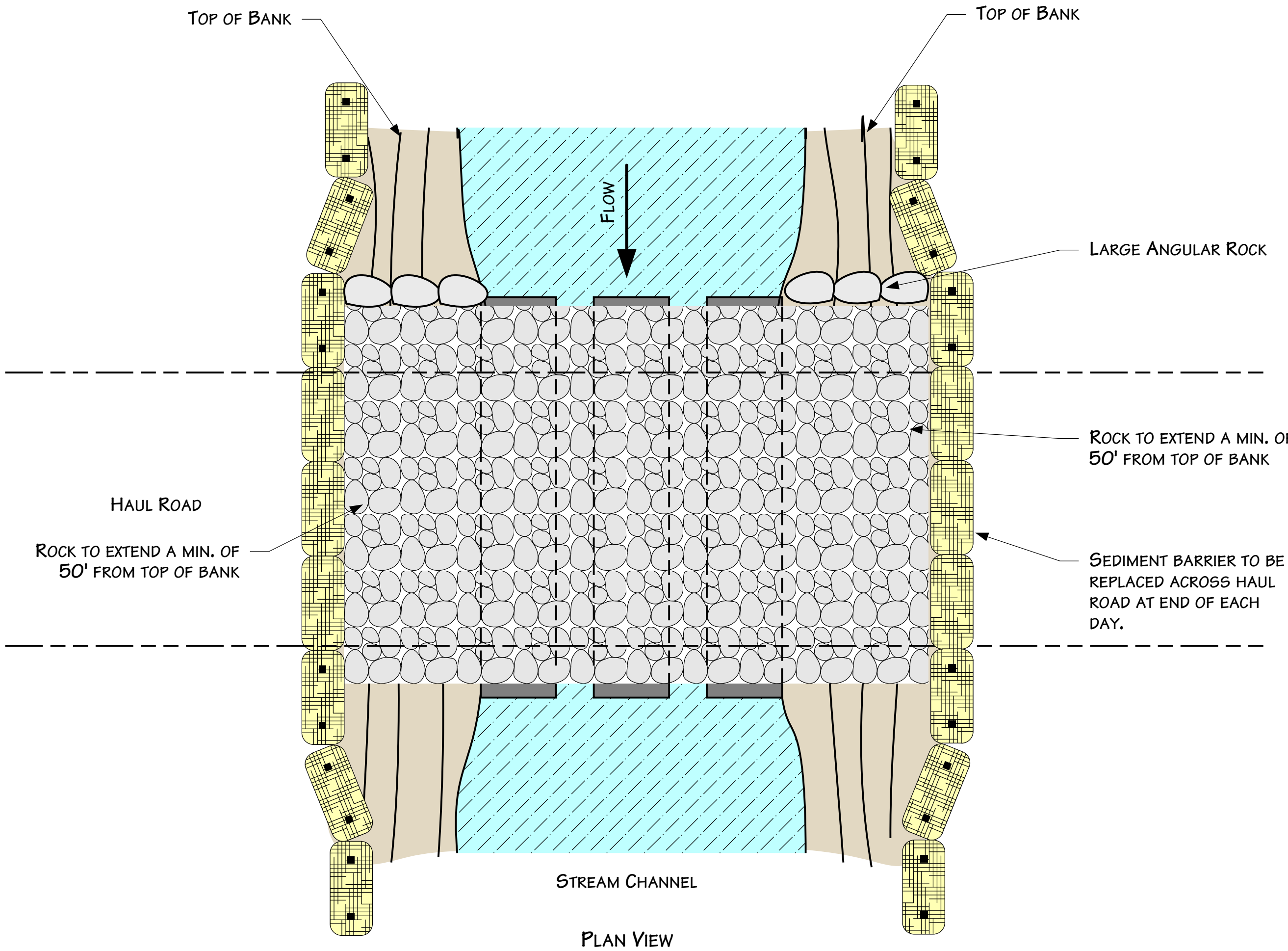
Figure 19

Environmental Protection Plan

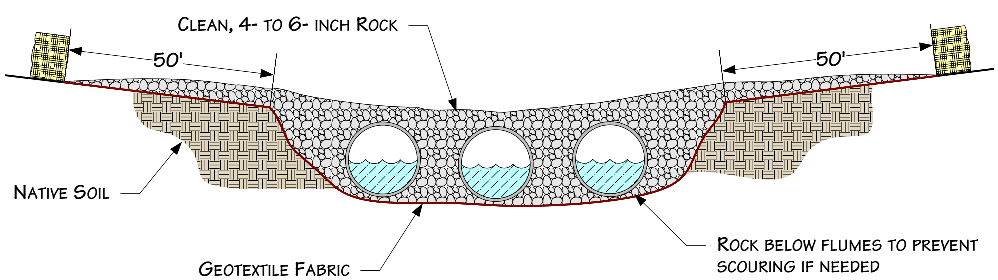
Typical Span Type Bridge
With or Without Instream Support

DATE:	3/11/2003
REVISED:	3/25/2011
SCALE:	NTS
DRAWN BY:	KMK6792

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_19_BRIDGE_SPAN.VSD



Plan View
(not to scale)



NOTES:

1. Steel flume pipe(s) sized to allow for stream flow and equipment load.
2. Straw bales shall be placed across bridge entrance every night.
3. Additional information included on other Drawings.

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ENBRIDGE

Figure 20
Environmental Protection Plan
Typical Rock Flume Bridge

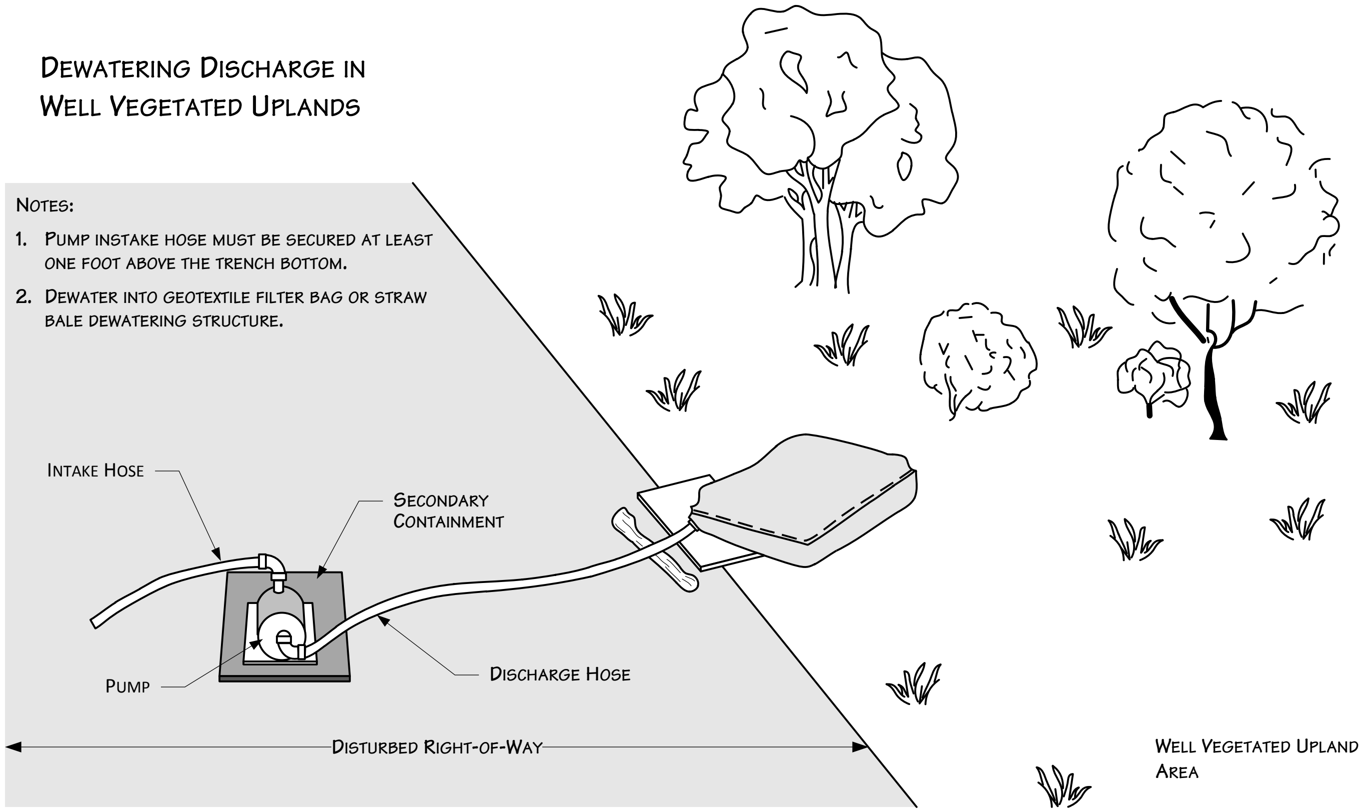
DATE: 5/25/2001
REVISED: 3/15/11
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_20_ROCK_FLUME_BRIDGE.VSD

NATURAL RESOURCE GROUP

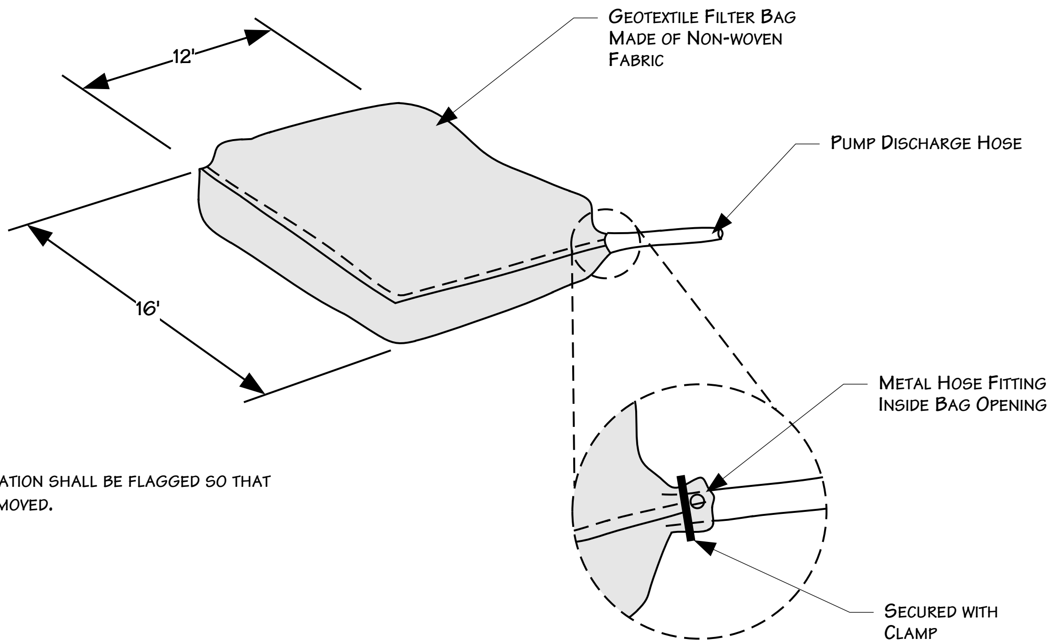
Dewatering Discharge in Well Vegetated Uplands

Notes:

1. Pump instake hose must be secured at least one foot above the trench bottom.
2. Dewater into geotextile filter bag or straw bale dewatering structure.



Geotextile Filter Bag



Note:

1. Filter bag location shall be flagged so that bag can be removed.

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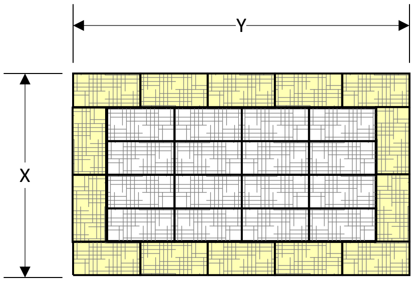
ENBRIDGE

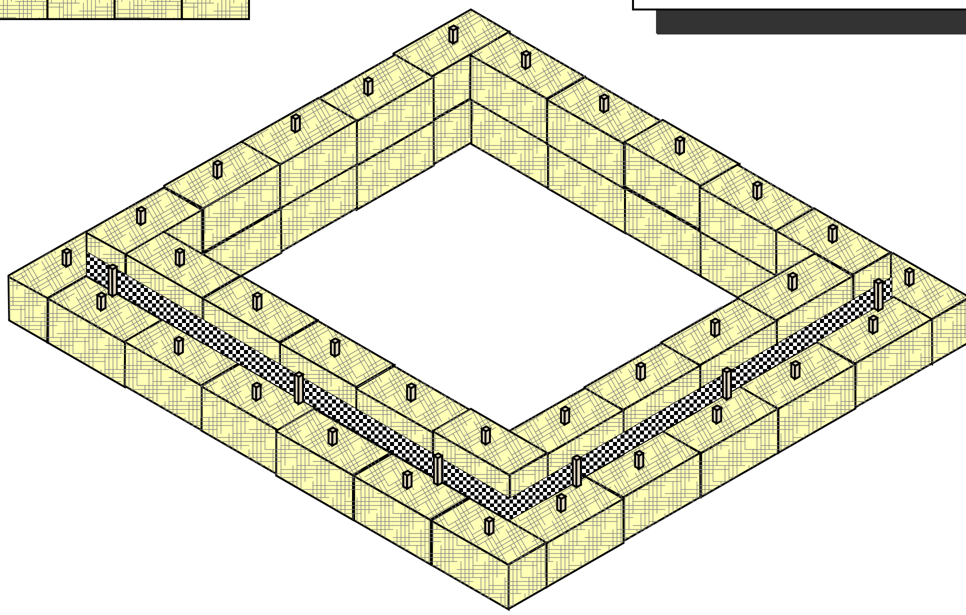
Figure 21
Environmental Protection Plan
Typical Dewatering Measures

DATE: 5/25/2001	NATURAL RESOURCE GROUP
REVISED: 3/15/11	
SCALE: NTS	
DRAWN BY: KMKENDALL	
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\ FIG_21_DEWATERING_MEASURES.VSD	

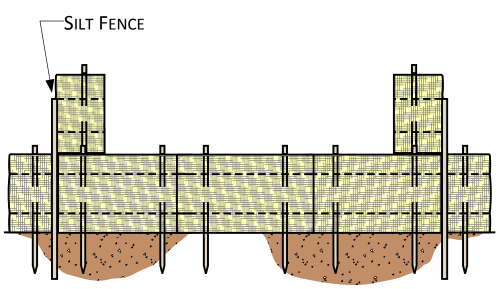


NOTES

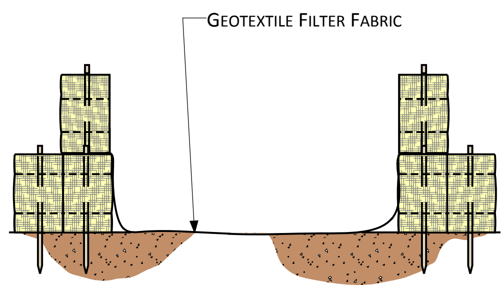
1. ARRANGE THE STRAW BALES TO THE X AND Y DIMENSIONS AS SPECIFICIED BELOW.
2. IF BOTTOM OF STRUCTURE IS NOT LINED WITH STRAW BALES (OPTION 1), LINE ENTIRE STRUCTURE WITH GEOTEXTILE FILTER FABRIC.



PERSPECTIVE VIEW



OPTION 1



OPTION 2

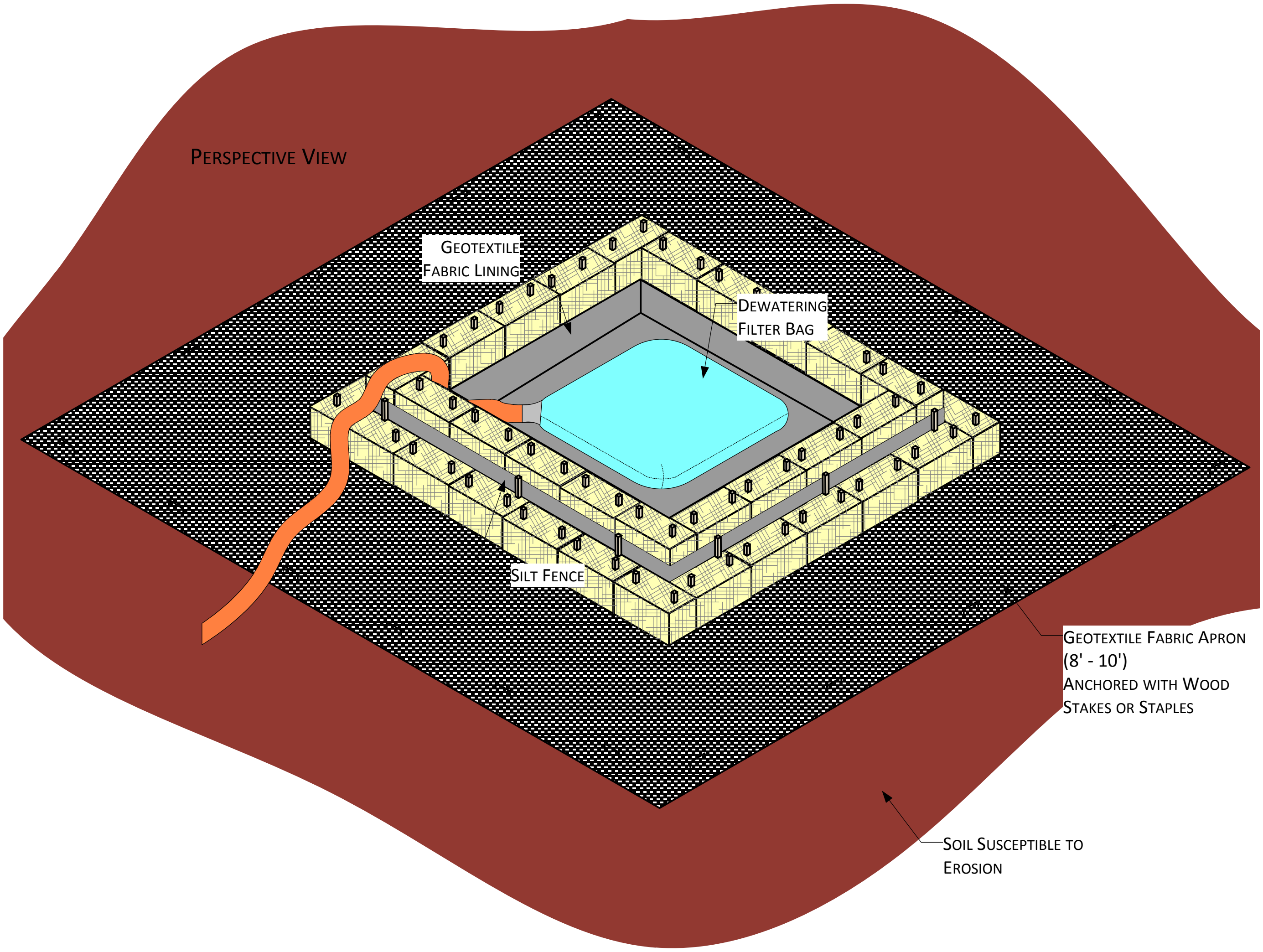
TYPICAL MINIMUM SUMP DIMENSIONS (FEET)		MAXIMUM PUMPING RATE
X	Y	GALLONS PER MINUTE
10	20	300
15	20	350
20	20	400
20	25	450
25	25	500
25	30	550
30	30	660

For environmental review purposes only.

Figure 22A
Environmental Protection Plan
Straw Bale Dewatering Structure

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\
FIG_22_STRAW_BALE_DEWATERING_STRUCTURE_C.VSD

SCALE: NTS | DATE: 3/11/2003 | REVISED: 3/25/2011 | DRAWN BY: KJANDERSON



Construct Dewatering Structure to accommodate anticipated pumping rates. See example below.

Example Pumping rate = 200 g.p.m.
Storage volume (c.f.) = 16 x 200 g.p.m. = 3200 c.f.
Height of straw bale structure = 3 feet (2 bales stacked) (based on height of bales, not silt fence)
Inside dimensions of structure = 33 x 33 feet square

Notes:

1. Silt fence ends must be wrapped to join two sections.
2. Install silt fence 2 inches above top of straw bales, and anchor a minimum of 8 inches straight down.
3. Silt fence post staking must be 4 feet or less.
4. Dewatering intake hose supported at least 1 foot from bottom of trench being dewatered.
5. Erosion and sedimentation control measures shall be inspected and maintained in accordance with the company's Upland Erosion Control, Revegetation, and Maintenance Plan.

For environmental review purposes only.

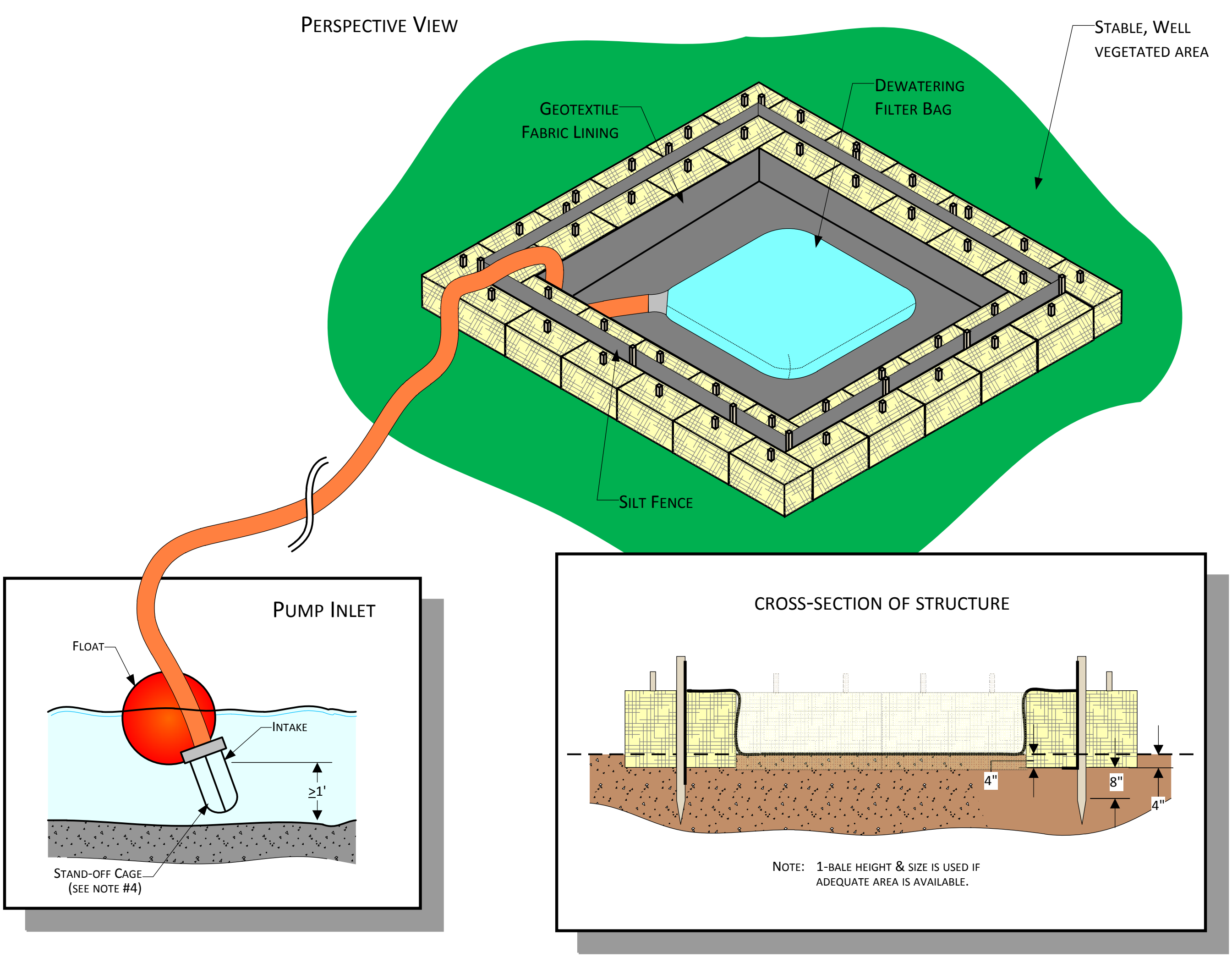
Figure 22B
Environmental Protection Plan
Straw Bale Dewatering Structure

ENBRIDGE

NATURAL RESOURCE GROUP

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\
FIG_22_STRAW_BALE_DEWATERING_STRUCTURE_C.VSD

SCALE: NTS	DATE: 3/11/2003	REVISED: 3/25/2011	DRAWN BY: KJANDERSON



CONSTRUCT DEWATERING STRUCTURE TO ACCOMMODATE ANTICIPATED PUMPING RATES. SEE EXAMPLE BELOW.

EXAMPLE PUMPING RATE = 200 G.P.M.
STORAGE VOLUME (C.F.) = 16 X 200 G.P.M. = 3200 C.F.
HEIGHT OF STRAW BALE STRUCTURE = 1.5 FEET (1 BALE) (BASED ON HEIGHT OF BALES, NOT SILT FENCE)
INSIDE DIMENSIONS OF STRUCTURE = 46 X 46 FEET SQUARE

NOTES:

1. SILT FENCE ENDS MUST BE WRAPPED TO JOIN TWO SECTIONS.
2. INSTALL SILT FENCE 2 INCHES ABOVE TOP OF STRAW BALE, AND ANCHOR A MINIMUM OF 8 INCHES STRAIGHT DOWN.
3. SILT FENCE POST STAKING MUST BE 4 FEET OR LESS.
4. DEWATERING INTAKE HOSE SUPPORTED AT LEAST 1 FOOT FROM BOTTOM OF TRENCH BEING DEWATERED.
5. USE A FILTER BAG AT THE DISCHARGE HOSE END.
6. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED IN ACCORDANCE WITH THE COMPANY'S UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN.

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Figure 22C
Environmental Protection Plan
Straw Bale Dewatering Structure

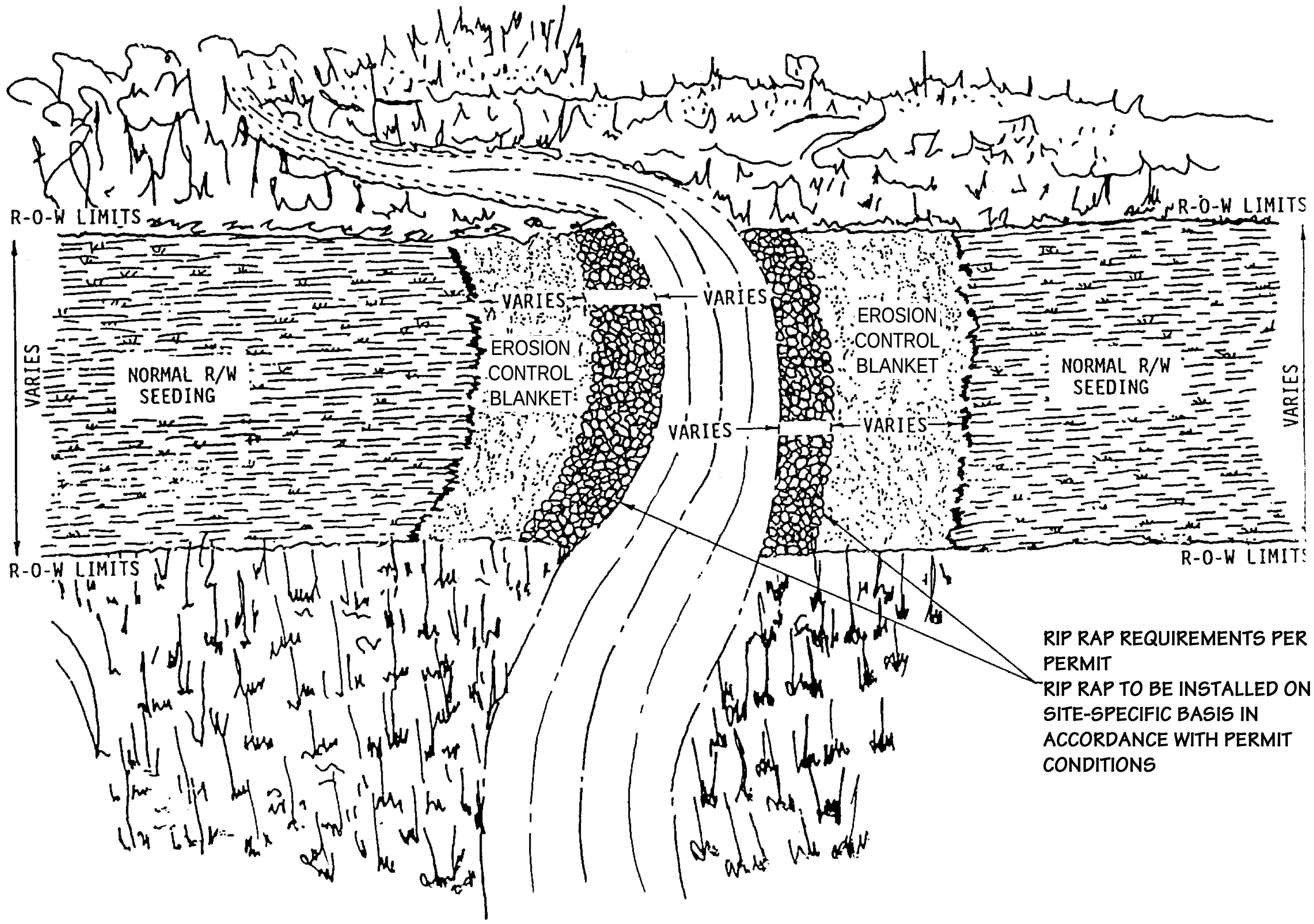
ENBRIDGE

NATURAL RESOURCE GROUP

K:_CLIENT_PROJECTS\D-F\EEL\2011-019\
FIG_22_STRAW_BALE_DEWATERING_STRUCTURE_C.VSD

SCALE: NTS	DATE: 3/11/2003	REVISED: 3/25/2011	DRAWN BY: KJANDERSON

NOTE: PLACE JUTE BLANKET A MINIMUM OF ONE (1) FOOT UNDER RIP RAP. EXTEND JUTE BLANKET FROM MEAN HIGH WATER LEVEL TO SEVERAL FEET BEHIND HIGH BANK.



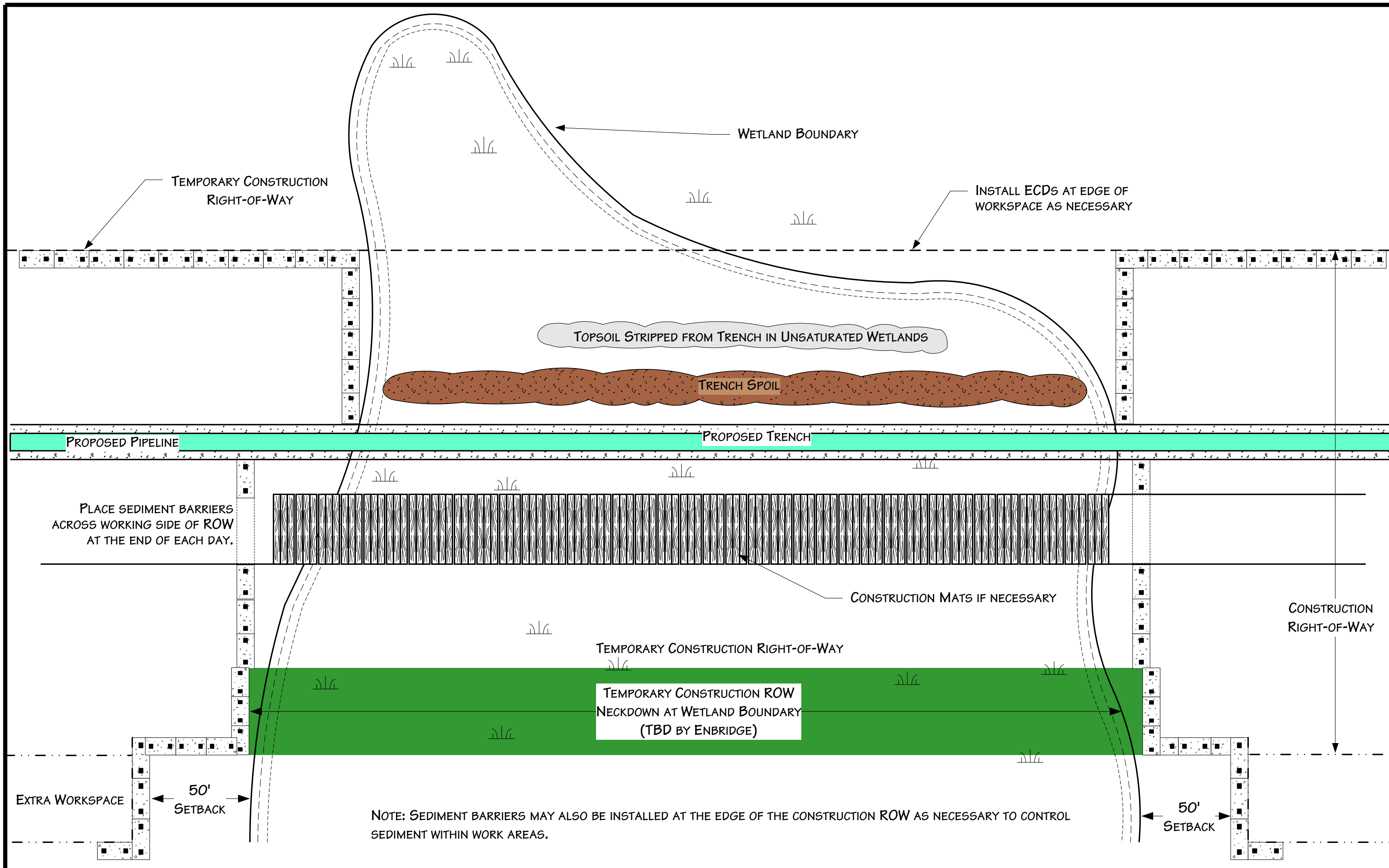
RIP RAP REQUIREMENTS PER PERMIT
RIP RAP TO BE INSTALLED ON A SITE-SPECIFIC BASIS IN ACCORDANCE WITH PERMIT CONDITIONS

For environmental review purposes only.

ENBRIDGE

Figure 23
Environmental Protection Plan
Typical Final Stream Bank Stabilization
Rip Rap & Erosion Control

DATE: 7/19/2000	NATURAL RESOURCE GROUP
REVISED: 3/14/11	
SCALE: NTS	
DRAWN BY: KMKENDALL	
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_23_STREAM_BANK_STABILIZATION.VSD	

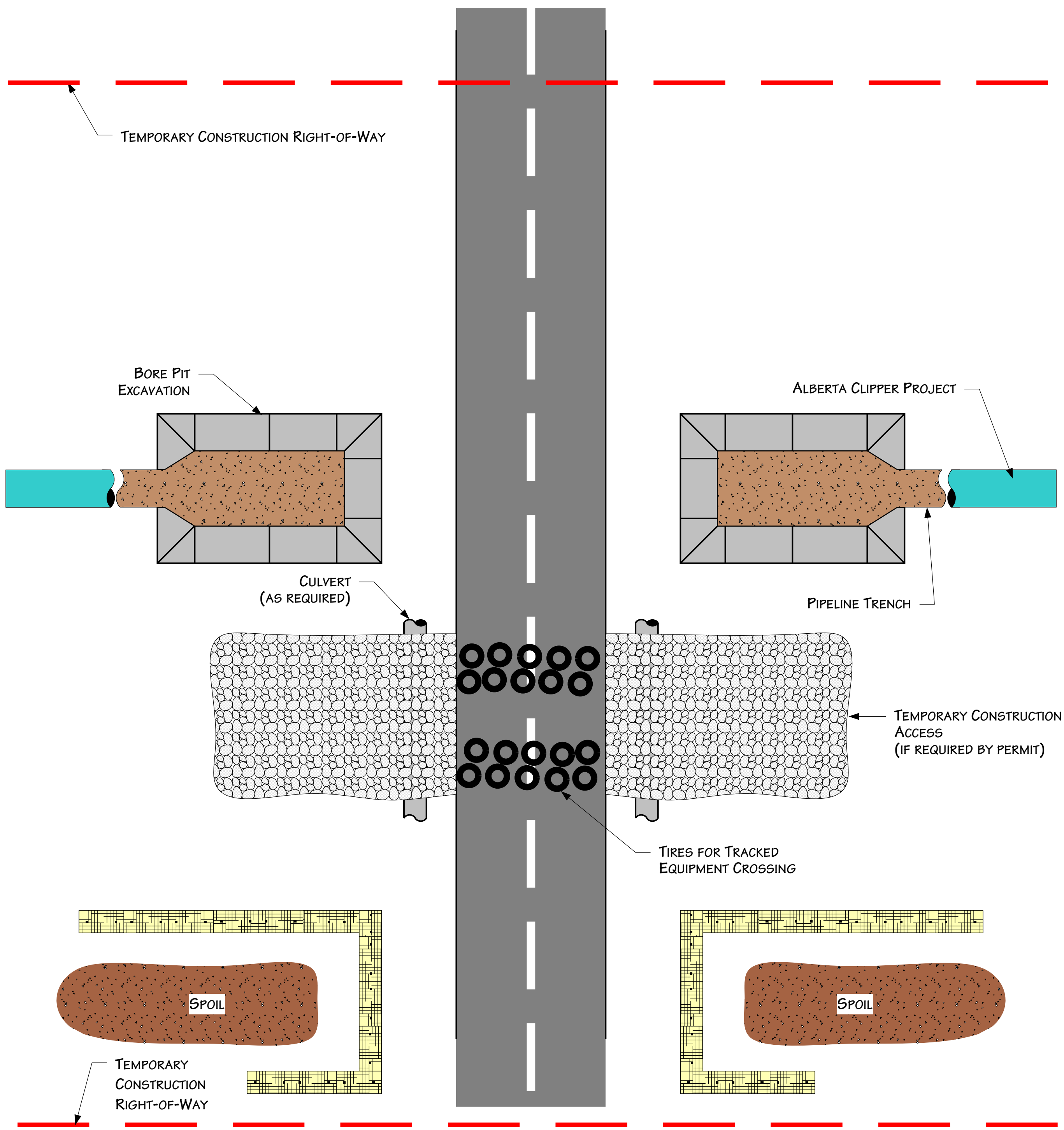


For environmental review purposes only.

ENBRIDGE

Figure 24
Environmental Protection Plan
Typical Wetland Crossing Method

DATE: 5/25/2001
REVISED: 3/14/11
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_24_WETLAND_CROSSING_METHOD.VSD



Plan View

Notes

1. Procedures shown in this drawing apply to improved roads.
2. Roads must be cleaned after equipment crosses and dirt placed in spoil containment areas.
3. Temporary access materials must be removed upon project completion.
4. Additional information included on other drawings or permits.
5. Construction areas located outside road ROW.

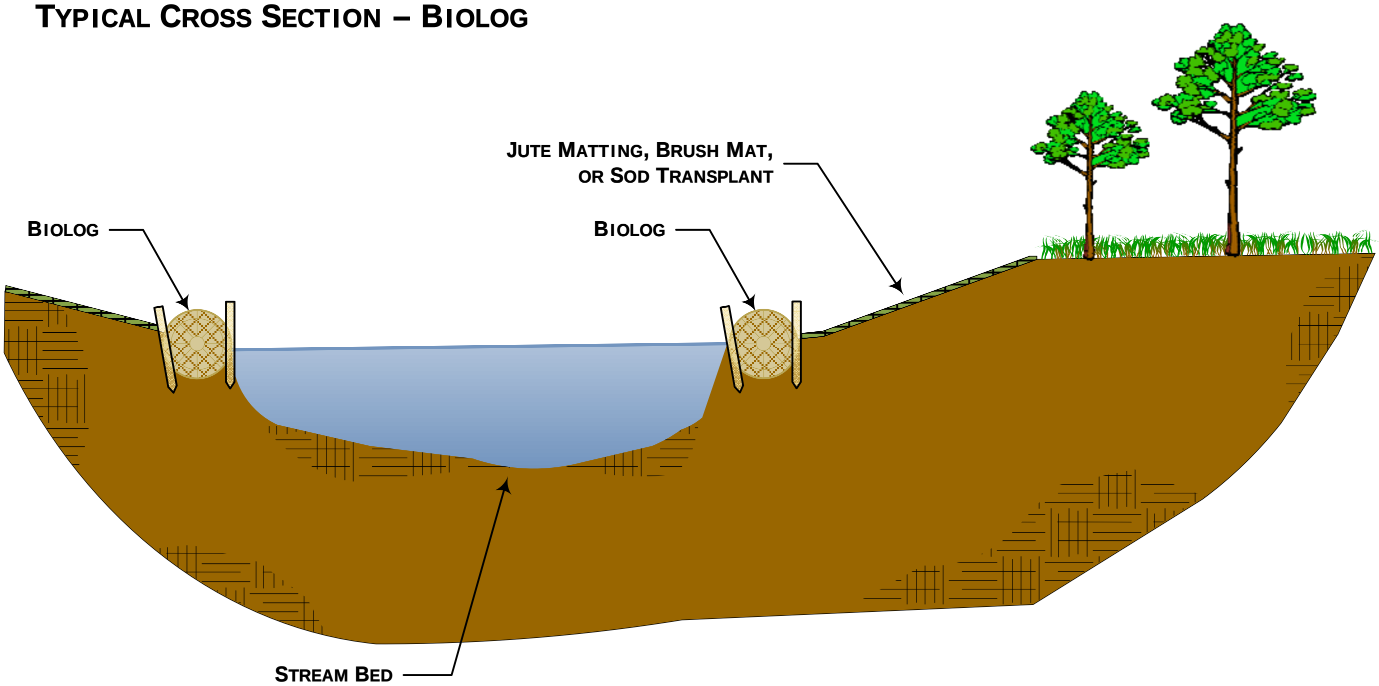
For environmental review purposes only.

ENBRIDGE

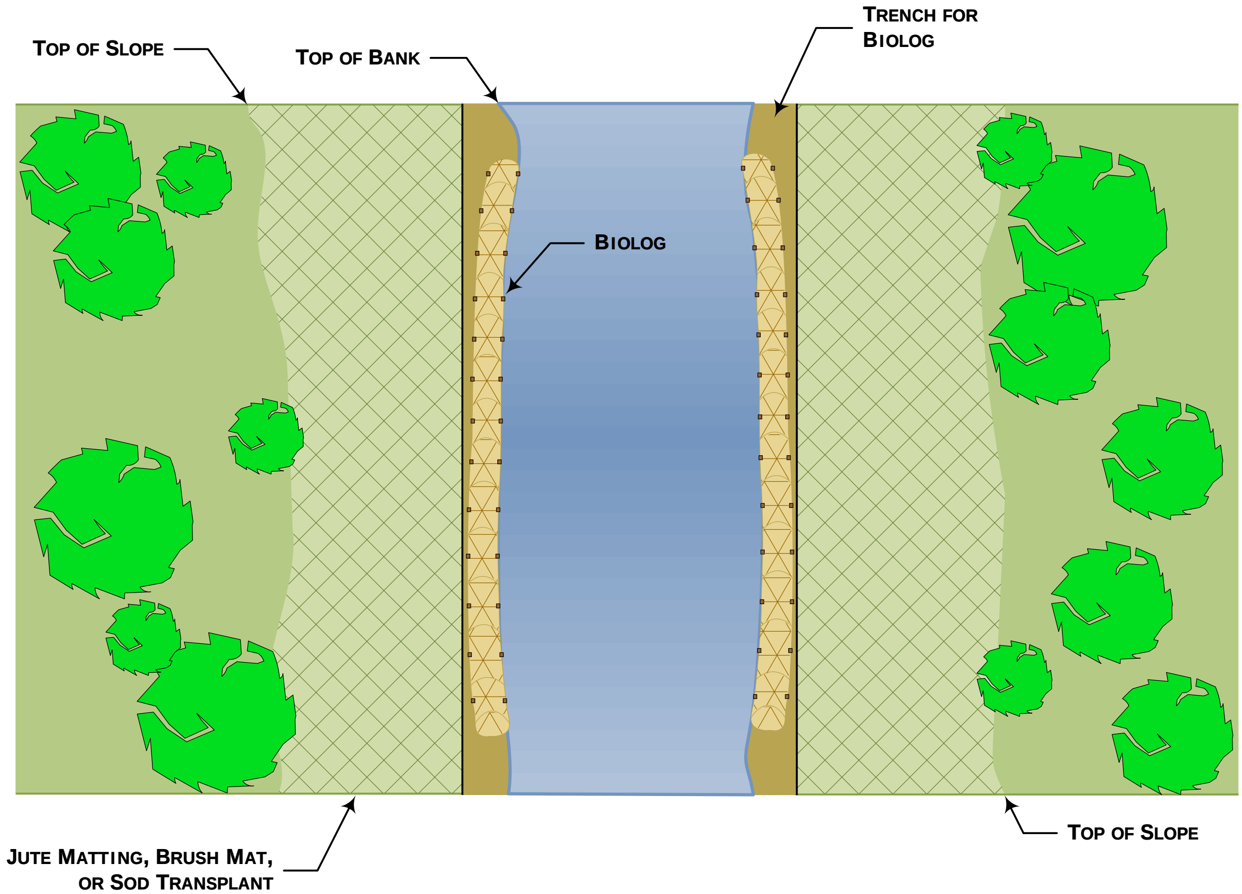
Figure 25
Environmental Protection Plan
Typical Improved Road Crossing
Directional Bore Method

DATE: 7/13/1999
REVISED: 3/14/11
SCALE: NTS
DRAWN BY: KMKENDALL
K:_CLIENT_PROJECTS\D-F\EEL\2011-019\FIG_25_IMPROVED_ROAD_BORE_CROSSING.VSD

Typical Cross Section – Biolog



Typical Plan View – Biolog

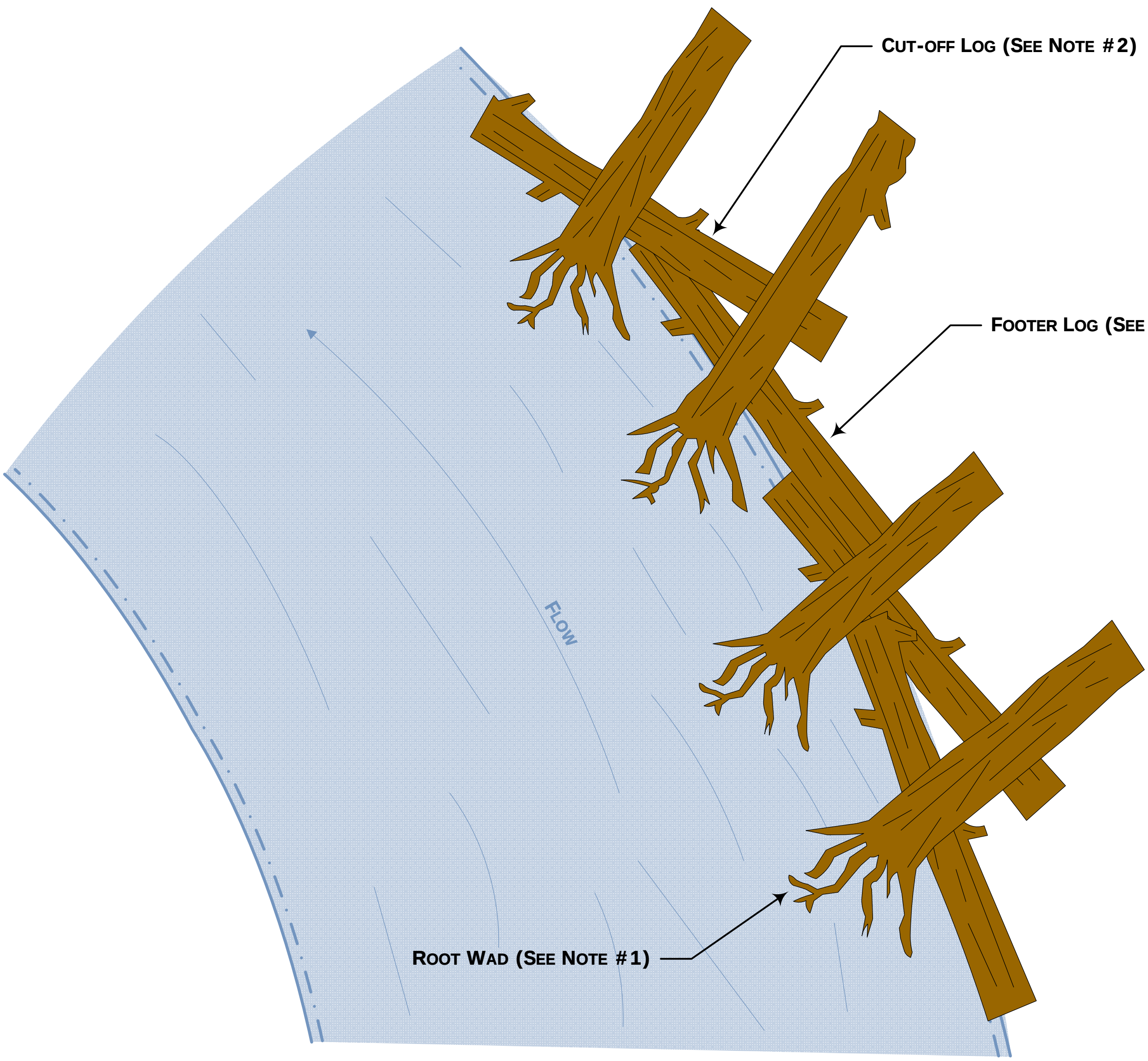


ENBRIDGE®

Figure 26
Typical Stream Bank Stabilization
Biolog

04/17/2013

Typical Plan View – Natural Material Revetment



Notes:

#1 – Root wad logs to be used on steep banks or based on agency recommendations.
#2 - Root wad logs to be anchored appropriately based on site-specific conditions or agency recommendations.

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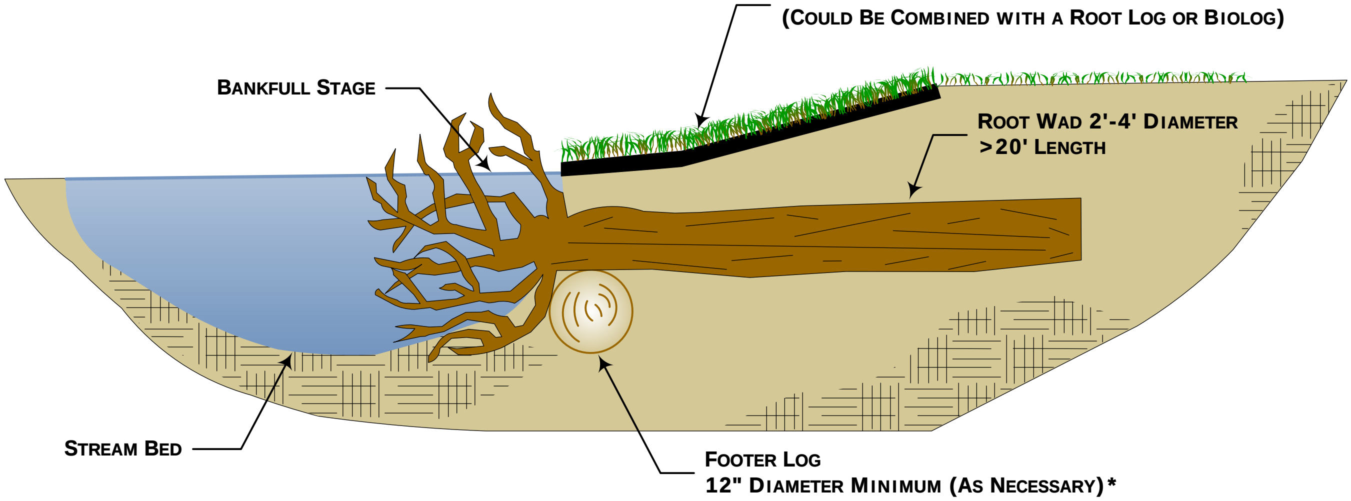
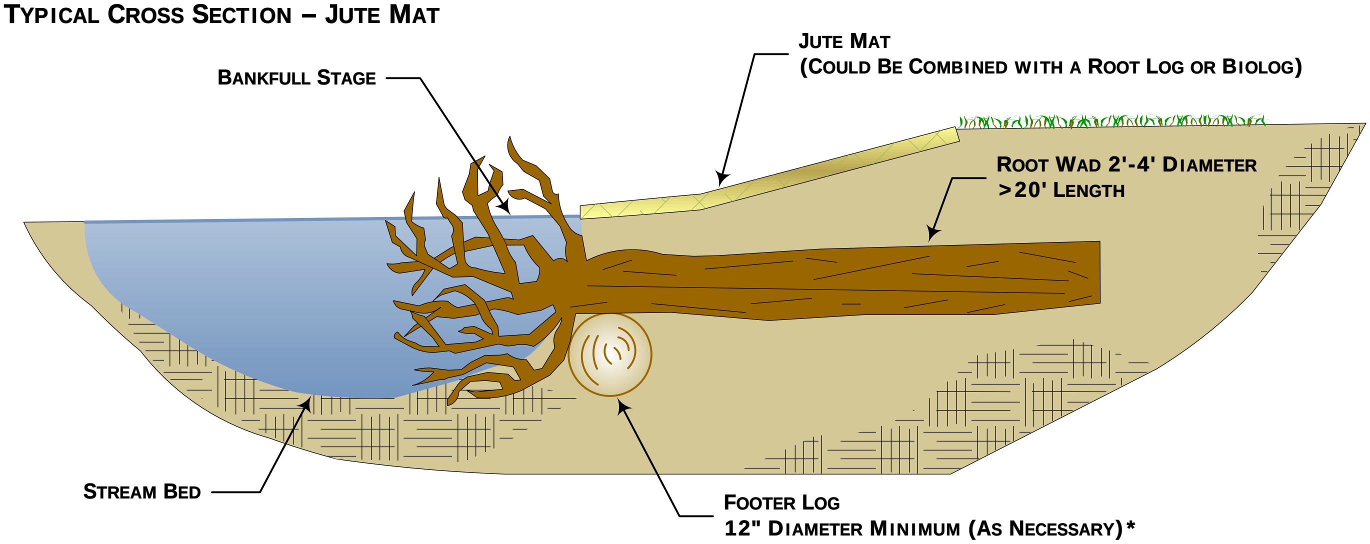
Figure 28
Typical Natural Material Revetment

04/17/2013

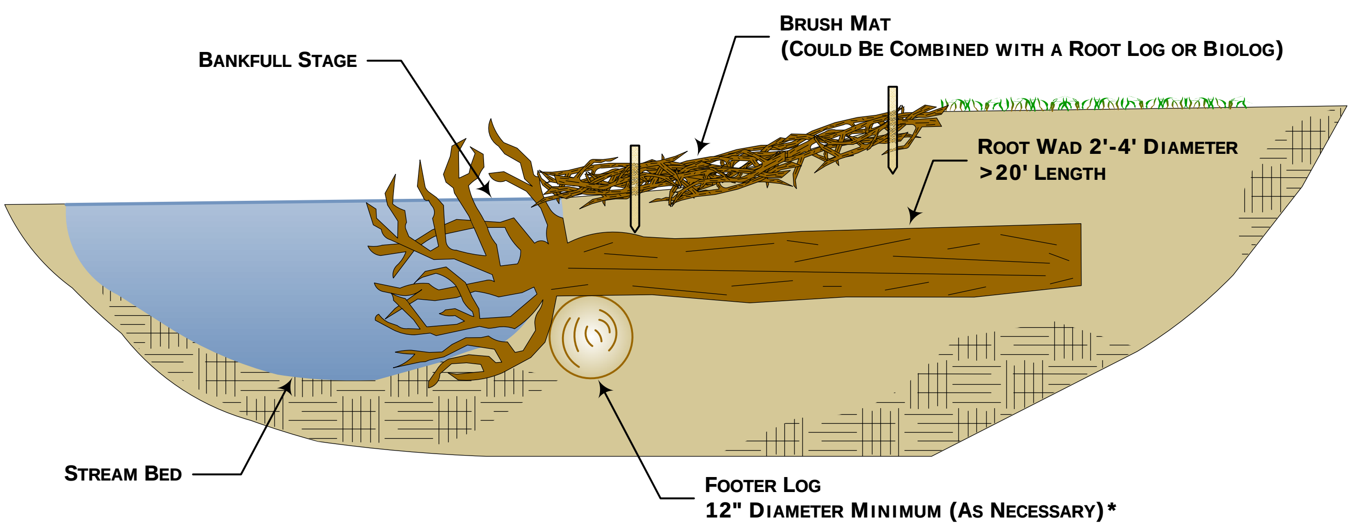
Typical Cross Section – Sod Transplant



Typical Cross Section – Jute Mat



Typical Cross Section – Brush Mat



ENBRIDGE

Figure 27
Typical Root Wad

04/17/2013

Appendix A

Noxious and Invasive Weed Species

Appendix A

Sandpiper Pipeline Project Noxious and Invasive Weed Species			
State/Weed Type	Common Name	Scientific Name	Regulatory Classification
NORTH DAKOTA			
Terrestrial Weeds	Russian knapweed	*Acroptilon repens*	NW [a]
	absinth wormwood	*Artemisia absinthium*	NW [a]
	musk thistle	*Carduus nutans*	NW [a]
	diffuse knapweed	*Centaurea diffusa*	NW [a]
	yellow starthistle	*Centaurea solstitialis*	NW [a]
	spotted knapweed	*Centaurea stoebe; Centaurea maculosa*	NW [a]
	Canada thistle	*Cirsium arvense*	NW [a]
	field bindweed	*Convolvulus arvensis*	NW [a]
	leafy spurge	*Euphorbia esula*	NW [a]
	Dalmatian toadflax	*Linaria dalmatica; Linaria genistifolia*	NW [a]
	purple loosestrife	*Lythrum salicaria; Lythrum virgatum*	NW [a]
	saltcedar	*Tamarix chinensis; Tamarix parviflora; Tamarix ramosissima*	NW [a]
Mountrail County	common tansy	*Tanacetum vulgare*	CONW [a]
	houndstounge	*Cynoglossum officinale*	CONW [a]
Ward County	scentless chamomile	*Anthemis arvensis*	CONW [a]
	yellow toadflax	*Linaria vulgaris*	CONW [a]
	houndstounge	*Cynoglossum officinale*	CONW [a]
Ramsey County	annual sowthistle	*Sonchus oleraceus*	CONW [a]
	scentless chamomile	*Anthemis arvensis*	CONW [a]
	common milkeed	*Asclepias syriaca*	CONW [a]
Nelson County	perennial sowthistle	*Sonchus arvensis*	CONW [a]
Grand Forks County	kochia	*Bassia scoparia*	CONW [a]
Aquatic Weeds	curly leaf pondweed	*Potamogeton crispus*	Regulated
	Eurasian watermilfoil	*Myriophyllum spicatum*	Regulated
	didymo or rock snot	*Didymosphenia geminata*	Prohibited
Aquatic Invertebrate Invasives (Bivalves)	Asian clam	*Corbicula fluminea*	Prohibited
	Zebra mussel	*Dreissena polymorpha*	Prohibited
	Quagga mussel	*Dreissena bugensis*	Prohibited
	New Zealand mudsnail	*Potamopyrgus antipodarum*	Prohibited
Aquatic Invertebrate Invasives	Rusty crayfish	*Orconectes rusticus*	Prohibited
	Scud	*Echinogammarus ischnus*	Prohibited
	Fishhook water flea	*Cercopagis pengoi*	Prohibited
	Spiny water flea	*Bythotrephes cederstroemi*	Prohibited
MINNESOTA			
Terrestrial Weeds	black swallow-wort	*Cynanchum louiseae*	SN [b]
	brown knapweed	*Centaurea jacea*	SN [b]
	Canada thistle	*Cirsium arvense*	SN, PS [c]
	common or European buckthorn	*Rhamnus cathartica*	RN [d]
	common reed – non-native subspecies	*Phragmites australis*	RN [d]

Sandpiper Pipeline Project Noxious and Invasive Weed Species			
State/Weed Type	Common Name	Scientific Name	Regulatory Classification
	common teasel	*Dipsacus fullonum*	SN [b]
	Cut-leaved teasel	*Dipsacus laciniatus*	SN [b]
	Dalmatian toadflax	*Linaria dalmatica*	SN [b]
	garlic mustard	*Alliaria petiolata*	SN [c]
	giant hogweed	*Heracleum mantegazzianum*	FN [b]
	glossy buckthorn, including all cultivars	*Frangula alnus*	RN [d]
	Grecian foxglove	*Digitalis lanata*	PS [b]
	Japanese hops	*Humulus japnicus*	SN [b]
	leafy spurge	*Euphorbia esula*	SN, PS [c]
	meadow knapweed	*Centaurea x moncktonii*	FN [b]
	multiflora rose	*Rosa multiflora*	RN [d]
	musk thistle	*Carduus nutans*	SN, PS [c]
	narrowleaf bittercress	*Cardamine impatiens*	SN [c]
	Oriental bittersweet	*Celastrus orbiculatus*	SN [b]
	plumeless thistle	*Carduus acanthoides*	SN, PS [c]
	purple loosestrife	*Lythrum salicaria, virgatum*	SN [c]
	spotted knapweed	*Centaurea stoebe*	SN [c]
	common tansy	*Tanacetum vulgare*	SN [c]
	wild parsnip	*Pastinaca sativa*	SN [c]
	yellow starthistle	*Centaurea solstitialis*	PI [b]
Aquatic Weeds	African oxygen weed	*Lagarosiphon major*	FN, PI; Prohibited Species
	ambulia	*Limnophila sessiliflora*	FN
	anchored or rooted water hyacinth	*Eichornia azurea*	FN
	aquarium watermoss, giant salvinia	*Salvinia molesta*	FN; Prohibited Species
	arrowhead	*Sagittaria sagittifolia*	FN
	arrowleaf false pickerelweed	*Monochoria hastata*	FN
	Australian stonecrop	*Crassula helmsii*	PI; Prohibited Species
	brittle naiad	*Najas minor*	PI; Prohibited Species
	broadleaf paper bark tree	*Melaleuca quenquinervia*	FN
	curly-leaf pondweed	*Potamogeton crispus*	PI; Prohibited Species
	European frog-bit	*Hydrocharis morsus-ranae*	PI; Prohibited Species
	Eurasian watermilfoil	*Myriophyllum spicatum*	PI; Prohibited Species
	exotic bur-reed	*Sparganium erectum*	FN
	ducklettuce	*Ottelia alismoides*	FN
	flowering rush	*Butomus umbellatus*	PE; Prohibited Species
	giant salvinia	*Salvinia auriculata*	FN
	giant salvinia	*Salvinia biloba*	FN
	giant salvinia	*Salvinia herzogii*	FN
	heart-shaped false pickerelweed	*Monochoria vaginalis*	FN
	hydrilla	*Hydrilla verticillata*	FN, PI; Prohibited Species
	Indian swampweed, Miramar weed	*Hygrophila polysperma*	FN; Prohibited Species

Sandpiper Pipeline Project Noxious and Invasive Weed Species			
State/Weed Type	Common Name	Scientific Name	Regulatory Classification
	Mediterranean strain (killer algae)	*Caulerpa taxifolia*	FN
	mosquito fern, water velvet	*Azolla pinnata*	FN
	purple loosestrife	*Lythrum salicaria, Lythrum virgatum*	PI, SN; Prohibited Species
	water aloe or water soldiers	*Stratioles aloides*	PI; Prohibited Species
	water chestnut	*Trapa natans*	PI; Prohibited Species
	water-spinach, swamp morning-glory	*Ipomoea aquatica*	FN
	wetland nightshade	*Solanum tampicense*	FN
	Brazilian waterweed	*Egeria densa*	Regulated Species
	Carolina fanwort or fanwort	*Cabomba caroliniana*	Regulated Species
	Chinese water spinach	*Ipomoea aquatica*	Regulated Species
	nonnative waterlilies	*Nymphaea spp.*	Regulated Species
	parrot's feather	*Myriophyllum aquaticum*	Regulated Species
	yellow iris or yellow flag	*Iris pseudacoris*	Regulated Species
Aquatic Invertibrate Invasives	faucet snail	*Bithynia tentaculata*	Prohibited Species
	New Zealand mud snail	*Potamopyrgus antipodarum*	Prohibited Species
	quagga mussel	*Dreissena bugensis*	Prohibited Species
	red swamp crayfish	*Procambarus clarkii*	Prohibited Species
	zebra mussel	*Dreissena spp.*	Prohibited Species
	Banded mystery snail	*Viviparus georgianus*	Regulated Species
	Chinese mystery snail, Japanese trap door snail	*Cipangopaludina spp.*	Regulated Species
	rusty crayfish	*Orconectes rusticus*	Regulated Species
	spiny water flea	*Bythotrephes longimanus*	Regulated Species
WISCONSIN			
Terrestrial Weeds	Amur honeysuckle	*Lonicera maackii*	Prohibited/Restricted
	Autumn olive	*Elaeagnus umbellata*	Restricted
	Bells honeysuckle	*Lonicera x bella*	Restricted
	Black swallow-wort	*Vincetoxicum nigrum*	Prohibited/Restricted
	Canada thistle	*Cirsium arvense*	Restricted
	Cattail hybrid	*Typha x glauca*	Restricted
	Celandine	*Chelidonium majus*	Prohibited/Restricted
	Chinese yam	*Dioscorea oppositifolia*	Prohibited
	Common buckthorn	*Rhamnus cathartica*	Restricted
	Common teasel	*Dipsacus fullonum subsp. sylvestris*	Restricted
	Creeping bellflower	*Campanula rapunculoides*	Restricted
	Cut-leaved teasel	*Dipsacus laciniatus*	Restricted
	Cypress spurge	*Euphorbia cyparissias*	Restricted
	Cypress spurge	*Euphorbia cyparissias*	Restricted
	European marsh thistle	*Cirsium palustre*	Prohibited/Restricted

Sandpiper Pipeline Project Noxious and Invasive Weed Species			
State/Weed Type	Common Name	Scientific Name	Regulatory Classification
	Garlic mustard	*Alliaria petiolata*	Restricted
	Giant hogweed	*Heracleum mantegazzianum*	Prohibited
	Giant knotweed	*Polygonum sachalinense*	Prohibited
	Glossy buckthorn	*Frangula alnus*	Restricted
	Hairy willow herb	*Epilobium hirsutum*	Prohibited/Restricted
	Helleborine orchid	*Epipactis helleborine*	Restricted
	Hemp nettle, brittlestem hemp nettle	*Galeopsis tetrahit*	Restricted
	Hill mustard	*Bunias orientalis*	Prohibited/Restricted
	Hound's tongue	*Cynoglossum officinale*	Restricted
	Japanese hedge-parsley	*Torilis japonica*	Prohibited/Restricted
	Japanese honeysuckle	*Lonicera japonica*	Prohibited
	Japanese hops	*Humulus japonicus*	Prohibited/Restricted
	Japanese knotweed	*Polygonum cuspidatum*	Restricted
	Japanese stilt grass	*Microstegium vimineum*	Prohibited
	Kudzu	*Pueraria lobata*	Prohibited
	Leafy spurge	*Euphorbia esula*	Restricted
	Lyme grass or sand ryegrass	*Leymus arenarius*	Prohibited/Restricted
	Mile-a-minute vine	*Polygonum perfoliatum*	Prohibited
	Morrow's honeysuckle	*Lonicera morrowii*	Restricted
	Multiflora rose	*Rosa multiflora*	Restricted
	Musk thistle	*Carduus nutans*	Restricted
	Narrow-leaf cattail	*Typha angustifolia*	Restricted
	Oriental bittersweet	*Celastrus orbiculatus*	Restricted
	Pale swallow-wort	*Vincetoxicum rossicum*	Prohibited
	Perennial pepperweed	*Lepidium latifolium*	Prohibited
	Phragmites, Common reed	*Phragmites australis*	Restricted
	Plumeless thistle	*Carduus acanthoides*	Restricted
	Poison hemlock	*Conium maculatum*	Prohibited/Restricted
	Porcelain berry	*Ampelopsis brevipedunculata*	Prohibited
	Princess tree	*Paulownia tomentosa*	Prohibited
	Purple loosestrife	*Lythrum salicaria*	Restricted
	Russian olive	*Elaeagnus angustifolia*	Restricted
	Sawtooth oak	*Quercus acutissima*	Prohibited
	Scotch broom	*Cytisus scoparius*	Prohibited
	Sericea lespedeza	*Lespedeza cuneata*	Prohibited
	Spotted knapweed	*Centaurea biebersteinii, c. stoebe*	Restricted
	Spreading hedge parsley	*Torilis arvensis*	Prohibited
	Tall or Reed manna grass	*Glyceria maxima*	Prohibited/Restricted
	Tansy	*Tanacetum vulgare*	Restricted

Sandpiper Pipeline Project Noxious and Invasive Weed Species			
State/Weed Type	Common Name	Scientific Name	Regulatory Classification
	Tartarian honeysuckle	*Lonicera tatarica*	Restricted
	Tree-of-heaven	*Ailanthus altissima*	Restricted
	Wild chervil	*Anthriscus sylvestris*	Prohibited/Restricted
	Wild parsnip	*Pastinaca sativa*	Restricted
	Wineberry	*Rubus phoenicolasius*	Prohibited
	Yellow star thistle	*Centaurea solstitialis*	Prohibited
Wetland Weeds	Dame's rocket	*Hesperis matronalis*	Restricted
	European marsh thistle	*Cirsium palustre*	Prohibited/Restricted
	Flowering rush	*Butomus umbellatus*	Restricted
Aquatic Weeds	Australian swamp crop	*Crassula helmsii*	Prohibited
	Brazilian waterweed	*Egeria densa*	Prohibited
	Brittle waternymph	*Najas minor*	Prohibited
	Curly-leaf pondweed	*Potamogeton crispus*	Restricted
	Eurasian water milfoil	*Myriophyllum spicatum*	Restricted
	European frog-bit	*Hydrocharis morsus-ranae*	Prohibited
	Fanwort, Carolina Fanwort	*Cabomba caroliniana*	Prohibited
	Flowering rush	*Butomus umbellatus*	Restricted
	Hydrilla	*Hydrilla verticillata*	Prohibited
	Oxygen-weed, African elodea	*Lagarosiphon major*	Prohibited
	Parrot feather	*Myriophyllum aquaticum*	Prohibited
	Water chestnut	*Trapa natans*	Prohibited
	Yellow floating heart	*Nymphoides peltata*	Prohibited
	N/A	*Ulva (Enteromorpha) spp.*	Prohibited
Aquatic Fish and Invertebrate Invasives	Asian clam	*Corbicula fluminea*	Prohibited
	Bloody shrimp	*Hemimysis anomala*	Prohibited
	Chinese mitten crabs	*Eriocheir sinensi*	Prohibited
	Chinese mystery snail	*Cipangopaludina chinensis*	Restricted
	Cylindro (cyanobacteria)	*Cylindrospermopsis raciborskii*	Prohibited
	Didymo or rock snot	*Didymoshpenia geminata*	Prohibited
	Faucet snail	*Bithynia tentaculata*	Prohibited
	Fishhook waterflea	*Cercopagis pengoi*	Prohibited
	Golden alga	*Prymneisum parvum*	Prohibited
	New Zealand mudsnail	*Potamopyrgus antipodarum*	Prohibited
	Novel cyanobacterial epiphyte of order Stigonematales	*Stigonematales spp.*	Prohibited
	Quagga mussels	*Dreissena bugensis*	Prohibited
	Red swamp crayfish	*Procambarus clarkii*	Prohibited
	Rusty crayfish	*Orconectes rusticus*	Restricted
	Spiny waterflea	*Bythotrephes cederstroemi*	Prohibited
	Starry stonewort (alga)	*Nitellopsis obtusa*	Prohibited

Sandpiper Pipeline Project Noxious and Invasive Weed Species			
State/Weed Type	Common Name	Scientific Name	Regulatory Classification
	Water flea	*Daphnia lumholtzi*	Prohibited
	Zebra mussel	*Dreissena polymorpha*	Restricted

North Dakota:
[a] Listed Regulated Species
Minnesota Control Status:
[b] Eradicate
[c] Control
[d] Restricted
Abbreviations:
NW = Noxious Weed
CONW = County Noxious Weed
SN = State noxious weed (Minnesota Department of Agriculture)
PS = State prohibited weed seed (Minnesota Department of Agriculture)
RN = Restricted noxious weed (Minnesota Department of Agriculture)
FN = Federal noxious weed (USDA-Animal Plant Health Inspection Service)
PI = Prohibited exotic species (Minnesota Department of Natural Resources)

Appendix B

Equipment Cleaning Log

Equipment Cleaning Log

Form Completed By: ______________________________

Date: ____________________ Time: ____________________

Location of Equipment (tract & milepost): ______________________________

Equipment Type: ______________________________

Equipment ID (e.g., company, unique ID number): ______________________________

Cleaning Method: (check all that apply)

□ Scrape Down
□ Steam Wash Blow Down (compressed air)
□ Power/Pressure Wash (water)
□ Other (Describe): ______________________________

Comments: ______________________________

____

____

____

____

Appendix C

Seed Mixes

Sandpiper Pipeline Project
Seed Mixes

Table 1 – North Dakota, Minnesota, and Wisconsin Temporary Cover Crop Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Oats *if summer seeding* (*Avena sativa*) or Winter Wheat *if dormant (late fall) or spring seeding* (*Triticum aestivum*)	40	50%
Annual Ryegrass (*Lolium italicum*), Annual Alfalfa (*Medicago sativa*), or Slender Wheat Grass (*Elymus trachycaulus*)	40	50%
GRAND TOTAL	**80 pounds**	**100%**

Table 2 – North Dakota Construction Area Standard Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (*Pascophyrum smithii*)	3.2	20%
Slender Wheatgrass (*Elymus trachycaulus*)	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (*Elytrigia intermedia*)	5.2	30%
Alfalfa	1.2	10%
Total	16.6	100%
Associated Companion Crop Mix		
Oats *if summer seeding* (*Avena sativa*) or Winter Wheat *if late fall (dormant) or spring seeding* (*Triticum aestivum*)	16	80%
Annual Ryegrass (*Lolium italicum*), or Slender Wheat Grass (*Elymus trachycaulus*)	4	20%
Companion/Cover Crop Total	20	100%
GRAND TOTAL	**36.6 pounds**	**100%**

Table 3 – Minnesota and Wisconsin Construction Area Standard Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Perennial Ryegrass (*Lolium perenne*)	2	17%
Canada Wild-rye (*Elymus canadensis*)	4	33%
Switchgrass (*Panicum virgatum*) (unimproved native variety)	4	33%
Timothy (*Phleum pratense*)	2	17%
Total	12	100%
Associated Companion Crop Mix		
Oats *if summer seeding* (*Avena sativa*) or Winter Wheat *if late fall (dormant) or spring seeding (Triticum aestivum)*	16	80%
Annual Ryegrass *(Lolium italicum)*, or Slender Wheat Grass (*Elymus trachycaulus*)	4	20%
Companion/Cover Crop Total	20	100%
GRAND TOTAL	**32 pounds**	**100%**

Table 4- North Dakota, Minnesota, and Wisconsin Unsaturated Wetland Seed Mix – General Restoration Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	Percent (%) of Seed
American Slough Grass *(Beckmannia syzigachne)*	6	30%
Annual Rye Grass *(Lolium perene)*	8	40%
Fowl Bluegrass *(Poa palustris)*	6	30%
GRAND TOTAL	**20.0 pounds**	**100%**

Table 5 – North Dakota, Minnesota, and Wisconsin Residential Area Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Kentucky Bluegrass *(Poa pratensis)*	82.5	52%
Perennial Ryegrass *(Lolium perenne)*	30	19%
Creeping Red Fescue *(Festuca rubra)*	37.5	23%
Annual Rye Grass *(Lolium italicum)*	10	6%
GRAND TOTAL	**160 pounds**	**100%**

Sandpiper Pipeline Project
Seed Mixes

Table 6 – North Dakota Livestock Grazing and Hay Production Areas Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (*Pascophyrum smithii*)	3.2	20%
Slender Wheatgrass (*Elymus trachycaulus)*	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (*Elytrigia intermedia*)	5.2	30%
Alfalfa	1.2	10%
Total	16.6	100%
Associated Companion Crop Mix		
Oats ***if summer seeding*** (*Avena sativa)* or Winter Wheat *if late fall (dormant) or spring seeding (Triticum aestivum)*	16	80%
Annual Ryegrass *(Lolium italicum)****,*** or Slender Wheat Grass (*Elymus trachycaulus)*	4	20%
Companion/Cover Crop Total	20	100%
GRAND TOTAL	**36.6 pounds**	**100%**

Table 7 – Minnesota and Wisconsin Livestock Grazing and Hay Production Areas Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Orchard Grass *(Dactylis glomerata)*	6	30%
Vernal Alfalfa (*Medicago sativa)*	2	10%
Climax Timothy *(Phleum pretense)*	3	15%
Tetraploid Perennial Ryegrass *(Lolium perenne)*	4	20%
Alsike Clover *(Trifolium hybridum)*	2	10%
Medium Red Clover *(Trifolium pretense)*	3	15%
Total	20	100%
Associated Cover Crop Mix		
Oats *if summer seeding* (*Avena sativa)* or Winter Wheat *if late fall (dormant) or spring seeding (Triticum aestivum)*	16	80%
Annual Ryegrass *(Lolium italicum)*, or Slender Wheat Grass (*Elymus trachycaulus)*	4	20%
Cover Crop Total	20	100%
GRAND TOTAL	**40 pounds**	**100%**

Table 8 – North Dakota Wildlife Area Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (*Pascophyrum smithii*)	4.0	34.5%
Slender Wheatgrass (*Elymus trachycaulus)*	1.0	8.6%
Green needlegrass (*Stipa viridula*)	2.4	20.7%
Sideoats grama (*Bouteloua curtipendula*)	2.4	20.7%
Blue grama (*Bouteloua gracilis*)	0.4	3.4%
Canada wildrye (*Elymus Canadensis*)	0.6	5.2%
Switchgrass (*Panicum virgatum*)	0.8	6.9%
GRAND TOTAL	**11.6 pounds**	**100%**

Table 9 – Minnesota and Wisconsin Wildlife Area Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Red Clover *(Trifolium pretense)*	4.5	30%
Alsike Clover *(Trifolium hybridum)*	4.5	30%
White Clover (*Trifolium repens)*	4.5	30%
Creeping Red Fescue *(Festuca rubra)*	1.5	10%
Total	15	100%
Associated Cover Crop Mix		
Oats *if summer seeding* (*Avena sativa)* or Winter Wheat *if spring seeding* *(Triticum aestivum)*	16	80%
Annual Ryegrass *(Lolium italicum)*, Annual Alfalfa (*Medicago sativa*), or Slender Wheat Grass (*Elymus trachycaulus)*	4	20%
Cover Crop Total	20	100%
GRAND TOTAL	**35 pounds**	**100%**

Sandpiper Pipeline Project
Seed Mixes

Table 10 – North Dakota Native Area Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (*Pascophyrum smithii*)	4.0	34.5%
Slender Wheatgrass (*Elymus trachycaulus)*	1.0	8.6%
Green needlegrass (*Stipa viridula*)	2.4	20.7%
Sideoats grama (*Bouteloua curtipendula*)	2.4	20.7%
Blue grama (*Bouteloua gracilis*)	0.4	3.4%
Canada wildrye (*Elymus Canadensis*)	0.6	5.2%
Switchgrass (*Panicum virgatum*)	0.8	6.9%
GRAND TOTAL	**11.6**	**100%**

Table 11 – Minnesota and Wisconsin Native Area Seed Mix [1/]

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Big Bluestem *(Andropogon gerardi)*	4	44%
Western Wheatgrass ***(Pascopyrum smithii)***	4	29%
Switchgrass *(Panicum virgatum)*	0.5	12%
Canada Wildrye *(Elymus canadensis)*	2	15%
Purple Prairie Clover *(Dalea purpureum)*	2 (ounces)	
Total	10.5 pounds	100%
Associated Cover Crop Mix		
Oats *if summer seeding* (*Avena sativa)* or Winter Wheat *if spring seeding (Triticum aestivum)*	16	80%
Slender Wheat Grass (*Elymus trachycaulus)*	4	20%
Cover Crop Total	20	100%
GRAND TOTAL	**30.5 pounds**	**100%**
1/ Applicable seeding dates: May 15 to June 30 or after soil temperatures are below 55 degrees Fahrenheit.		

Table 12 – North Dakota Roadside Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (*Pascophyrum smithii*)	3.2	20%
Slender Wheatgrass (*Elymus trachycaulus)*	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (*Elytrigia intermedia*)	5.2	30%
Alfalfa	1.2	10%
Total	16.6	100%
Associated Companion Crop Mix		
Oats *if summer seeding* (*Avena sativa)* or Winter Wheat *if late fall (dormant) or spring seeding (*Triticum *aestivum)*	16	80%
Annual Ryegrass *(Lolium italicum)*, or Slender Wheat Grass (*Elymus trachycaulus)*	4	20%
Companion/Cover Crop Total	20	100%
GRAND TOTAL	**36.6 pounds**	**100%**

Sandpiper Pipeline Project
Seed Mixes

Table 13 – Minnesota and Wisconsin Roadside Seed Mix

Seed Name	**Pure Live Seed (Pounds Per Acre)**	**% of Seed**
Kentucky Bluegrass – Certified Park (*Poa pratensis*)	22.3	32%
Canada Bluegrass (*Poa compressa*)	9.8	14%
Switch grass (*Panicum virgatum*)	2.1	3%
Slender Wheatgrass (*Elymus trachycaulus*)	2.8	4%
Perennial Rye-grass (*Lolium perenne*)	14.7	21%
Timothy (*Phleum pratense*)	2.1	3%
Redtop (*Agrostis gigantea*)	2.1	3%
Creeping Alfalfa (*Medicago sativa*)	4.2	6%
White clover (*Trifolium repens*)	2.1	3%
Hairy Vetch (*Vicia villosa*)	7.8	11%
Total	70 pounds	100%
Associated Cover Crop Mix		
Oats *if summer seeding* (*Avena sativa*) or Winter Wheat *if spring seeding* *(Triticum aestivum)*	16	80%
Annual Ryegrass *(Lolium italicum)*, Annual Alfalfa (*Medicago sativa*), or Slender Wheat Grass (*Elymus trachycaulus)*	4	20%
Cover Crop Total	20	100%
GRAND TOTAL	**90 pounds**	**100%**

Table 14 – North Dakota Conservation Reserve Program (CRP) Seed Mix

Seed Name	**Pure Live Seed (Pounds Per Acre)**	**% of Seed**
Tall wheat grass (*Thinopyrum ponticum*)	2.2	27.5
Intermediate or pubescent wheat grass (*Thinopyrum intermedium*)	4.3	53.75
Alfalfa (*Medicago sativa*)	1.1	13.75
Sweet clover (*Melilotus officinalis*)	0.4	5
GRAND TOTAL	**8 pounds**	**100%**

Table 15 – Minnesota Protected Waters Seed Mix[1]

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
American slough grass (*Beckmannia syzigachne*)	1.5	18.63%
Blue-joint grass (*Calamagrostis Canadensis)*	0.06	0.75%
Reed manna grass *(Glyceria grandis)*	0.18	2.24%
Fowl manna grass (*Glyceria grandis*)	0.12	1.49%
Rice Cut-grass *(Leersia oryzoides)*	0.24	2.98%
Annual ryegrass (*Lolium italicum*)	0.9	11.18%
Fowl bluegrass (*Poa palustris*)	1.8	22.36%
Tussock sedge (*Carex stricta*)	0.06	0.75%
Fox sedge (*Carex vulpinoidea*)	0.3	3.37%
Green bulrush (*Scirpus atrovirens*)	0.06	0.75%
Wool grass (*Scirpus cyperinus*)	0.006	0.07%
River bulrush (*Scirpus fluviatilis*)	0.24	2.98%
Soft-stem bulrush (*Scirpus validus*)	0.12	1.49%
Marsh milkweed (*Asclepias incarnate*)	0.12	1.49%
Flat-topped aster (*Aster umbellatus*)	0.3	3.73%
Joe-pye weed (*Eupatorium maculatum*)	0.3	3.73%
Boneset (*Eupatorium perfoliatum*)	0.24	2.98%
Sneezeweed (*Helenium autumnale*)	0.24	2.98%
Spotted Touch-me-not (*Impatiens capensis*)	0.06	0.75%
Great-blue lobelia (*Lobelia siphilitica*)	0.12	1.49%
Monkey flower (*Mimulus ringens*)	0.006	0.07%
Mountain mint (*Pycnanthemum virginianum*)	0.12	1.49%
Giant goldenrod (*Solidago gigantean*)	0.24	2.98%
Blue vervain (*Verbena hastate*)	0.36	4.47%
Ironweed (*Veronia fasciculate*)	0.36	4.47%
Total	6.0	100%
Associated Cover Crop Mix		
Slender Wheat Grass (*Elymus trachycaulus)*	2	100%
Cover Crop Total	2	100%
GRAND TOTAL	**8 pounds**	**100%**

[1] Applicable seeding dates: May 15 to June 30 or after soil temperatures are below 55 degrees Fahrenheit.
[2] Quantities and availability may be limited.

Table 16 – North Dakota Park and Recreation Department - Suggested grass/forb mix for Restoration of the Northern Tallgrass Prairie

The following is a suggested mix for the restoration project. This mix matches the typical plant species found within the Northern Tallgrass Prairie plant community.

Grass Species	**Common Name**
**Andropogon gerardii*	Big bluestem
**Panicum virgatum*	Switchgrass
**Calamagrostis canadensis*	Bluejoint
**Calamagrostis stricta*	Slimsteam reedgrass
**Spartina pectinata*	Prairie cordgrass
Koeleria macrantha	Prairie junegrass
Bouteloua curtipendula	Sideoats grama
Nassella viridula	Green needlegrass
Pascopyrum smithii	Western wheatgrass
Forb Species	**Common Name**
Achillea millefolium	Common yarrow
Anemone Canadensis	Canadian anemone
Artemisia ludoviciana	White sagebrush
Pediomelum argophyllum	Silvery scurfpea
Rudbeckia hirta	Blackeyed susan
Polygala verticillata	Milkwort
Ratibida columnifera	Prairie coneflower
Solidago Canadensis	Canada goldenrod
Symphyotrichum ericoides	White heath aster
Vicia americana	American vetch
Dalea purpurea	Purple prairie clover

*****Indicates dominates within this plant community.

Regarding: Wet-Mesic Tallgrass Prairie

Community Description

Andropogon gerardii - (Panicum virgatum) - Muhlenbergia richardsonis Herbaceous Vegetation
Translated Name: Big Bluestem - (Switchgrass) - Mat Muhly Herbaceous Vegetation
Common Name: Northern Wet-Mesic Tallgrass Prairie
Unique Identifier: CEGL002199
Classification Approach: International Vegetation Classification (IVC)
Summary: This big bluestem wet-mesic prairie type is found in the northern tallgrass prairie region of the United States and Canada. In South Dakota, soils are moist loams and poorly drained silt loams derived from glacial drift. The vegetation is dominated by a dense layer of tall grasses, such as *Andropogon gerardii* and *Panicum virgatum*, with associates of *Calamagrostis canadensis, Calamagrostis stricta*, and *Spartina pectinata*. *Muhlenbergia richardsonis* may be a diagnostic, less dominant species of the northern tallgrass prairie. In the Sheyenne Delta, this type may form a distinctive wet-mesic sand prairie type.

Appendix D

Enbridge Environment Hydrotest Discharge Authorization and Documentation

Enbridge Environment Hydrotest Discharge Authorization & Documentation - *Instructions*

The purpose of this form is to document and insure that appropriate planning occurs prior to hydrostatic test discharge activities as well as the proper recording of necessary information during the actual discharge event. If the discharge permit specifies the need for a Certified Operator, he/she is responsible for the final section of the form. Otherwise, an Environmental Inspector will be responsible for completion of this form.

Part 1: Basic Discharge Information: All information must be completed. Coordination with Enbridge Engineering is necessary to obtain the exact test section length and volume of water to be discharged. The estimated duration of the discharge must be calculated using the maximum permitted rate (or the anticipated rate, if lower than the permitted rate) and the total volume of water to be discharged. This is critical information and will ensure that any required sampling is conducted at the appropriate frequency specified in the permit.

Part 2: Pre-Discharge Planning Checklist: A pre-discharge planning meeting must be held with the Certified Operator (if required), Contractor, Craft Inspection, Environmental Inspection, and Construction Management staff to review items included in the checklist and any other pertinent information deemed necessary. A full copy of the permit and discharge plan must be provided to all participants. Upon completion of this meeting, all participants must sign the form to indicate that they understand all steps of the discharge process. ***Note: In order to proceed with discharge activities, the Enbridge Construction Manager and Environment Staff assigned to the project, or their designees, must review the information and provide their authorization by signing and dating the form.***

Part 3: Discharge Monitoring: A copy of the permit, discharge plan, and parts one and two of the form must be on-site at all times during the discharge event. In addition to the items specified on the form, the following photographs are required:

- Receiving water before, during, and after the discharge (minimum 3 photos/day)
- Discharge structure/device before and during the discharge (minimum 3 photos/day)

As noted, upon completion of the discharge event, the Certified Operator or Environmental Inspector, Craft Inspector, Contractor Foreman, and Enbridge Construction Manager must sign and date the form. ***<u>The completed form, along with the supplemental photographs, and a copy of the chain of custody for any samples submitted for laboratory analysis must be submitted to the Enbridge Environment Project Manager/Lead within 12 hours of ending the discharge.</u>*** ***Any permit violations will be reported to the applicable agencies by the Enbridge Environment Project Manager/Lead within the timeframes specified in the discharge permit.***

Enbridge Environment Hydrotest Discharge Authorization & Documentation

Part 1: Basic Discharge Information

Date: ___________
Project Name: ____ Spread: __________ Tract #: __________
Test Section Identification: ____
Pipe Diameter (inches): ______________ Test Section Length (feet): _____________________________
Volume to be discharged (gallons): ______________________
Permitted Discharge Rate (gpm): _______________ Est. Duration of Discharge (hours): ______________
Receiving Waterbody Name/Nearest Surface Waterbody: ____
Certified Operator Name and Number (if applicable): ____

Part 2: Pre-Discharge Planning Checklist

Note: All items must be complete prior to initiating discharge activities

- ☐ Notification to agency(ies) provided (if applicable - attach copy of notification documentation)
- ☐ Flow meter installed and functional in accordance with manufacturers recommendations
- ☐ Sample collection port/tap installed or other positive means of direct sampline of discharge water (only necessary if sampling is required)
- ☐ Review of discharge permit and site-specific plan complete (attach a copy of the permit and approved site specific plan)
- ☐ Discharge structure/BMPs installed according to approved plan
- ☐ Complete the table below, including quantity of samples required in accordance with the permit based on anticipated discharge duration. Add other parameters as specified in the permit:

Parameter	Analytical Method Number	Container type	Container Volume	Preservation	Maximum Holding Times	Permit Limit	Sample Type	Frequency of Analysis Specified in Permit	Number of Samples Required
pH	NA	Polyethylene / Glass	NA	None required	Analyze immediately		Field measurement		
Dissolved Oxygen	NA	Glass bottle and top	NA	None required	Analyze immediately		Field measurement		
TSS	106.2	Polyethylene	500 ml	Cool to 4° C	7 days				
Oil & Grease	1664	Amber Glass	1 liter	Cool to 4° C, HCL or H_2SO_4 to pH <2	28 days				

- ☐ Indicate responsible party for emergency/upset/spill notifications in accordance with the permit:____
- ☐ Indicate responsible party for to begin flow diversion when change in coloration observed: ____

All staff involved in hydrostatic test discharge activities must review the above information and print and sign their name below indicating their participation in a pre-job planning meeting and that they understand the discharge plan, permit, and procedures and are prepared to properly implement them. Attach additional sheets as necessary.

Name (print and sign):

Certified Operator or Environmental Inspector Signature: ____

Enbridge Environment and Construction Management staff reviewed the pre-planning information provided and approve the initiation of discharge activities.

Enbridge Environment Staff Signature and Date: ____
Enbridge Construction Manager Signature and Date: ____

Part 3: Discharge Monitoring - attach additional sheets as necessary

Note: Flow rate must be recorded hourly, sample frequency must be in accordance with the permit specifications

Date	Time	Recorded/Sampled By	Flow Rate (gpm)	pH	Dissolved Oxygen (mg/l)	TSS Sample Collected?	Oil & Grease Sample Collected?	Other (indicate)

Flow meter manufacturer and model: ______________________________

Flow meter date of last calibration : ______________________________

pH/Dissolved Oxygen instrument manufacturer and model: ____________________

pH/Dissolved Oxygen instrument date of last calibration: ____________________

Date and Time discharge start: ____________________ Date and Time discharge complete: ______________

Equipment, Discharge, and Receiving Water Inspection Notes (minimum 3 enteries per day):

Outfall Observations & Photo Documentation Notes (note presence or absence of any unusual characteristics such as unnatural turbidity, color, oil film, floating solids, foams, settleable solids, suspended solids, or deposits - minimum 3 enteries per day) :

Certified Operator or Environmental Inspector Signature: ____

Enbridge Craft Inspector Signature: ____

Contractor Foreman Signature: ____

Enbridge Construction Manager Signature: ____

Appendix E

Emergency Response Contractors/Disposal and Treatment Facilities

The Contractor will dispose of all wastes according to applicable federal, state, and local requirements. A listing of potential Emergency Spill Response Contractors and waste disposal facilities is provided below. This list was developed from state-wide data bases. This list represents firms operating at the time the data base was produced. The Contractor is responsible for verifying if a contractor or facility is currently operating under appropriate permits or licenses. The Contractor is responsible for ensuring wastes are disposed of properly.

Spill Response Contractors

Company	City/State	Phone Number
North Dakota		
Clean Harbors Environmental	Williston, ND	(701) 774-2201 (800) 645-8265
Garner Environmental Services	Williston, ND	(701) 577-1200 (855) 774-1200
Absorbent & Safety Solutions	Watford City, ND	(701) 838-4558
Minnesota Limited	Berthold, ND	(701) 453-3700
Bobs Oilfield Service Inc	Belfield, ND	(701) 575-4666
Keitu Engineers & Consultants, Inc.	Mandan, ND	(701) 667-1800
Minnesota		
Bay West Environmental	St. Paul, MN	(800) 279-0456 (651) 291-0456
West Central Environmental Consultants Inc.	Morris, MN	(800) 422-8356 (888) 923-2778
Minnesota Limited	Bemidji, MN	(218) 755-9595
OSI Environmental	Bemidji, MN	(800) 585-8838
OSI Environmental	Eveleth, MN	(800) 777-8542
Bay West Environmental	Duluth, MN	(800) 279-0456 (218) 740-0110
Wisconsin - *The Contractor should consult with the WDNR Northern Regional Spill Coordinator (John Sager: phone (715) 365-8959) for assistance when selecting a spill response contractor.*		

Waste Disposal/Treatment Facilities

Facility	City/State	Telephone
North Dakota		
Gascoyne Materials Handling & Recycling LLC	Dickinson, ND	701.225.0061
Sawyer Disposal Services LLC*	Sawyer, ND	701.624.5622
Dishon Disposal Inc*	Williston, ND	701.572.3223
Prairie Disposal Inc*	Tioga, ND	800.490.2106
Minnesota		
Pope-Douglas Solid Waste	Alexandria, MN	(320) 762-2381
Northstar Reclamation	Fosston, MN	(800) 422-0817
Polk County Incinerator	Fosston, MN	(218) 435-6501
Wisconsin		
Lake Area Landfill (BFI)	Sarona, WI	(612) 457-2778
Timberline Trail (Waste Mgmt.)	Weyerhaeuser, WI	(800) 504-1067 ext. 7

Please note: Some facilities may have limitations on amounts, types of materials, etc.
*May accept crude oil-impacted soils and/or wastes from oil field exploration and production activities.

Appendix F

Spill Report Form

Spill Report Form

(The Contractor Spill Coordinator must complete this for any spill, regardless of size, and submit the form to the Enbridge Representative within 24 hours of the occurrence)

Date of Spill:________________________________ Date of Spill Discovery:______________

Time of Spill:_________________________ Time of Spill Discovery:______________

Name and Title of Discoverer:____

Type of material spilled and manufacturer's name:____

Legal Description of spill location to the quarter section:____________________________________

Directions from nearest community:____

Estimated volume of spill:____

Weather conditions:____

Topography and surface conditions of spill site:____

Spill medium (pavement, sandy soil, water, etc.):____

Proximity of spill to surface waters: ____

Did the spill reach a waterbody? ________Yes ________No

If so, was a sheen present? ________Yes ________No

Describe the causes and circumstances resulting in the spill:_________________________________

____

____

____

Describe the extent of observed contamination, both horizontal and vertical (i.e., spill-stained soil in a 5-foot radius to a depth of 1 inch): ____

____

____

Describe immediate spill control and/or cleanup methods used and implementation schedule: ______

____

____

____

Current status of cleanup actions:____

Name and Company for the following:

Construction Superintendent:____

Spill Coordinator:____

Enbridge Representative:____

Person Who Reported the Spill:____

Environmental Inspector:____

Form completed by:____Date:______________

Appendix G

Spill Reporting-Agency Contacts

Sandpiper Pipeline Project Spill Reporting Contacts			
Agency	**Reporting Criteria**	**When**	**Phone Number**
Federal Contacts			
National Response Center	Release of a hazardous substance in an amount equal to or greater than its reportable quantity under CERCLA Any quantity of discharged oil that violates state water quality standards, causes a film or sheen on the water's surface, or leaves sludge or emulsion beneath the surface	Immediately	(800) 424-8802
Environmental Protection Agency (EPA) Region V (MN&WI)	Any quantity of discharged oil that violates state water quality standards, causes a film or sheen on the water's surface, or leaves sludge or emulsion beneath the surface	Immediately	1 (312) 353-2000
Environmental Protection Agency (EPA) Region VIII (ND)	Any quantity of discharged oil that violates state water quality standards, causes a film or sheen on the water's surface, or leaves sludge or emulsion beneath the surface	Immediately	1 (303) 312-6312
State Contacts			
North Dakota Industrial Commission, Oil and Gas Division	Must be a leak, spill or other release of fluid that is less than one barrel total volume and remains onsite of a facility.	Immediately	(701) 328-8020
North Dakota Department of Health	Any Amount	Immediately	(701) 328-5210 or 5166
North Dakota Department of Emergency Services (NDDES)	As Needed	Immediately	NDDES Duty Officer System (701) 328-9921 (24 hour, request the Duty Officer be paged) ND Regional Hazardous Materials Teams (800) 472-2121 (Teams requested through State Radio)

Sandpiper Pipeline Project Spill Reporting Contacts			
Agency	**Reporting Criteria**	**When**	**Phone Number**
Minnesota Duty Officer Program	Minnesota has a reporting threshold of greater than five-gallons for petroleum spills. Spills of any quantity of all other chemicals or materials should be reported. If in doubt, report.	Immediately	Duty Officer (651) 649-5451 1 (800) 422-0798
Wisconsin Department of Natural Resources	>one gallon of gasoline on a pervious surface	Immediately	24-hour Toll Free Hotline for Reporting Spills 1 (800) 943-0003
County Contacts – North Dakota			
Williams County Emergency Services County Law Enforcement Center	As Needed		Mike Hallesy (701) 577-7707
Mountrail County Emergency Management Resources	As Needed		Don Longmuir (701) 628-2909
Ward County Emergency Management	As Needed	8:00 a.m.–4:30 p.m. Monday-Friday	Amanda Schooling, Director (701) 857 6560
McHenry County Emergency Management	As Needed		Marvin Sola (815) 338-6400
Pierce County Emergency Management	As Needed	7:30 a.m.-4:30 p.m. Monday-Friday	Kelsey Siegler (253) 798-6595
Benson County Emergency Management	As Needed		Scott Todahl (701) 473-5320
Ramsey County Emergency Management	As Needed		Kristen Nelsen, Local Emergency Manager (701) 662-7001
Nelson County Emergency Management	As Needed		Sharon Young, Local Emergency Manager (701) 247-2472
Grand Forks County Emergency Services	As Needed		Jim Campbell (701) 780-8213
City of Grand Forks Emergency Services	As Needed		John Bernstrom (701) 746-4636
County Contacts – Minnesota			
Polk County Emergency Management	As Needed		Barb Erdman, Director (218) 281-0437

Sandpiper Pipeline Project Spill Reporting Contacts			
Agency	**Reporting Criteria**	**When**	**Phone Number**
Red Lake County Emergency Management	As Needed		Mitch Bernstein (218) 253-2996
Clearwater County Emergency Management	As Needed	8:00 a.m.–4:30 p.m. Monday-Friday	(218) 694-6183
Hubbard County Emergency Management	As Needed		Brian Halbasch (218) 732-2588
Cass County Emergency Management	As Needed		Kerry Swenson, Dispatcher (218) 547-7437
Crow Wing County Emergency Management	As Needed		John Bowen, Director (218) 829-4749
Aitkin County Emergency Management	As Needed		Dispatch (non-emergency) (218) 927-7400
Carlton County Emergency Management	As Needed		Brian Belich, Manager (218) 384-3236
County Contacts – Wisconsin			
Douglas County Emergency Management	As Needed	8:00 a.m.-4:30 p.m. Monday-Friday	Keith Kesler, Director (715) 395-1636

Appendix B

Agricultural Protection Plan





Enbridge (U.S.) Inc.

AGRICULTURAL PROTECTION PLAN

October 2013

TABLE OF CONTENTS

APPENDICES

DEFINITIONS

Agricultural Inspector	On-site inspector retained by Enbridge to verify compliance with requirements of this Plan during construction.
Agricultural Land	Land that is actively managed for agricultural purposes, including: cropland, hayland, or pasture; silvicultural activities (i.e., tree farms); and land in government set-aside programs such as Conservation Reserve Program and Conservation Reserve Enhancement Program. Agricultural Land may also include land that is otherwise fallow but would likely be cultivated within 5 years of construction completion.
Agricultural Monitor	On-site third-party monitor retained and funded by Enbridge, but providing direct reports to the Minnesota Department of Agriculture and/or Wisconsin Department of Agricultural, Trade, and Consumer Protection and responsible for auditing Enbridge's compliance with provisions of this Plan.
APP	Agricultural Protection Plan.
ATWS	Additional Temporary Workspace.
BMP	Best Management Practices.
CFR	Code of Federal Regulations.
Cropland	Land actively managed for growing row crops, small grains, or hay.
Easement	The agreement(s) and/or interest in privately owned Agricultural Land held by Enbridge by virtue of which it has the right to construct and operate together with such other rights and obligations as may be set forth in such agreement.
Enbridge	Enbridge (U.S.) Inc.
EPP	Environmental Protection Plan
Final Cleanup	Pipeline construction activity that occurs after backfill but before restoration of fences and required reseeding. Final Cleanup activities include: replacing Topsoil, removal of construction debris, removal of excess rock, decompaction of soil as required, final grading, and installation of permanent erosion control structures.
Landowner	Person(s) holding legal title to Agricultural Land from whom Enbridge is seeking, or has obtained, a temporary or permanent Easement. The term "Landowner" shall include any person(s) authorized in writing by the actual Landowner to make decisions

	regarding the mitigation or restoration of agricultural impacts to such Landowner's property.
MDA	Minnesota Department of Agriculture
MOC	Management of Change procedure.
MN PUC	Minnesota Public Utilities Commission
Non-Agricultural Land	Any land that is not "Agricultural Land" as defined above.
NDA	North Dakota Department of Agriculture
ND PSC	North Dakota Public Service Commission
Person	An individual or entity, including any partnership, corporation, association, joint stock company, trust, joint venture, limited liability company, unincorporated organization, or governmental entity (or any department, agency, or political subdivision thereof).
Planned Tile	Locations where the proposed Tile installation is made known in writing to Enbridge by the Landowner either: 1) within 60 days after the signing of an Easement; or 2) before the issuance of a Routing Permit to Enbridge; whichever is sooner.
PSCW	Wisconsin Public Service Commission
Right-of-way	The land included in permanent and temporary Easements that Enbridge possess for the purpose of construction and operation.
Routing Permits	Routing permits issued by the ND PSC, MN PUC, and PSCW.
Spoil Storage Side	Non-working side of the construction Right-of-way where ditch spoil and temporary Topsoil are stored (as needed).
Tenant	Any person, other than the Landowner, lawfully residing on or in possession or control of the land that makes up the "right-of-way" as defined in this Plan.
Tile	Subsurface drainage systems and their aboveground appurtenances.
Topsoil	The uppermost horizon (layer) of the soil, typically with the darkest color and highest content of organic matter and nutrients.
Trench Crown	The placement of subsoil and Topsoil in the trench to a finished elevation somewhat above the surrounding ground surface to account for post-construction settling of soil returned to the trench.
TWS	Temporary Workspace
USC	United States Code

USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
WDATCP	Wisconsin Department of Agricultural, Trade, and Consumer Protection

PURPOSE AND APPLICABILITY

This Agricultural Protection Plan ("Plan") was developed by Enbridge (U.S.) Inc. ("Enbridge") in consultation with the Minnesota Department of Agriculture ("MDA") and the Wisconsin Department of Agricultural, Trade, and Consumer Protection ("WDATCP")[1]. Enbridge will include the Plan as part of applications for a Pipeline Routing Permit ("PRP") from the Minnesota Public Utilities Commission ("MN PUC") and a Public Interest Determination ("PID") from the Wisconsin Public Service Commission ("PSCW"). Through the MN PUC and PSCW public notice and review processes associated with the applications, other agencies (including the MDA and WDATCP), local authorities, Landowners, Tenants, and other stakeholders are able to review and provide comments on the Plan. This Plan will be incorporated by reference into the Routing Permits issued by the MN PUC and the Public Interest Determination issued by the PSCW. Once finalized, this Plan may also be incorporated by reference into other federal, state, and local permits.

The objective of the Plan is to identify measures that Enbridge will implement to avoid, mitigate, or provide compensation for negative agricultural impacts that may result from pipeline construction. The construction standards described in this document apply only to construction activities occurring partially or wholly on privately owned Agricultural Land. Furthermore, Best Management Practices ("BMPs") identified in the Enbridge's Environmental Protection Plan ("EPP") may be installed on Agricultural Land in conjunction with mitigation measures outlined in this Plan.

Unless the easement or other agreement, regardless of nature, between Enbridge and the Landowner specifically requires the contrary, the mitigation measures specified in this Plan will be implemented in accordance with the conditions discussed below.

Appendix A sets forth the specific additional mitigation measures that will be applied specifically to Organic Agricultural Lands, such as Organic Certified farms or farms that are in active transition to become Organic Certified. Organic Agricultural Land is defined as farms or portions thereof, as described in the National Organic Program Rules, Title 7 Code of Federal Regulations ("C.F.R.") Parts 205.100, 205.101, and 205.202.

GENERAL PROVISIONS

All mitigation measures are subject to change by Landowners, provided such changes are negotiated in advance of construction and acceptable to Enbridge. If any provision of this Plan is held to be unenforceable, no other provision will be affected by that holding, and the remainder of the Plan will be interpreted as if it did not contain the unenforceable provision.

Enbridge will consider any federal, state, and local permit, including Routing Permits, to be the controlling authority. To the extent a mitigation measure contemplated by this Plan is determined to be unenforceable in the future due to requirements of other permits issued, Enbridge will inform the regulatory authority and will develop reasonable alternative measures. Enbridge will implement the mitigation measures and BMPs described in this Plan to the extent

[1] Enbridge also attempted to engage the North Dakota Department of Agriculture ("NDA") for purposes of Plan development. The NDA has not replied to-date. Nonetheless, Enbridge will apply this Plan to the entire project (including North Dakota Agricultural Lands). State-specific requirements may be referenced within this Plan.

they do not conflict with the requirements of federal and state rules and regulations, and permits and approvals obtained by Enbridge. Certain provisions of this Plan require Enbridge to consult and/or reach agreement with the Landowner of a property. Enbridge will engage in a good faith effort to secure the agreement. Tenants will not be consulted except where a Landowner has designated in writing that a Tenant has decision making authority on their behalf.

Enbridge will retain qualified contractors to perform mitigation measures; however, Enbridge may negotiate with Landowners to implement the mitigation measures that Landowners wish to perform themselves.

Enbridge will employ an Agricultural Inspector whose role is to verify compliance with the requirements of this Plan during construction of the pipeline. The Agricultural Inspector will be employed by and report to Enbridge, and will be a part of Enbridge's environmental inspection team.

The Agricultural Inspector will:

- Be a full-time member of Enbridge's environmental inspection team
- Provide construction personnel with training on provisions of this Plan before construction begins;
- Provide construction personnel with field training on specific topics, such as protocols for Topsoil stripping;
- Observe construction activities on Agricultural Land on a continual basis;
- Be responsible for verifying Enbridge's compliance with provisions of this Plan during construction;
- Work collaboratively with other Enbridge inspectors, right-of-way agents, and the Agricultural Monitor in achieving compliance with this Plan;
- Document instances of noncompliance and work with construction personnel to identify and implement appropriate corrective actions as needed; and
- Have the authority to stop construction activities that are determined to be out of compliance with the provisions of this Plan.

In addition to the Agricultural Inspector, an Agricultural Monitor will also inspect construction work on Agricultural Lands in Minnesota and Wisconsin. The Agricultural Monitor will be retained and funded by Enbridge, but will function as an independent third-party inspector providing direct reports to the MDA and WDATCP, and will be responsible for auditing Enbridge's compliance with the provisions of this Plan in Minnesota and Wisconsin, respectively. Enbridge will provide resumes of candidates who meet the qualifications of an Agricultural Monitor for review and final selection by the MDA and WDATCP.

The Agricultural Monitor will not be a member of Enbridge's environmental inspection team. The Agricultural Monitor will not have the authority to direct construction activities or manage Enbridge employees or contractors. The Agricultural Monitor will work through Enbridge's Agricultural Inspector and the MDA and WDATCP if compliance issues are identified. The Agricultural Monitor will have full access to Agricultural Land crossed in Minnesota and Wisconsin and will have the option to attend meetings where construction on Agricultural Land is discussed. Specific duties of the Agricultural Monitor will include:

- Participate in preconstruction training activities sponsored by Enbridge;
- Monitor construction and restoration activities on Agricultural Land for compliance with provisions of this Plan;

- Review Management of Change (“MOC”) requests;
- Approve MOC Level 1 requests as appropriate;
- Report instances of noncompliance to Enbridge’s Agricultural Inspector;
- Prepare regular compliance reports and submit them to the MDA and WDATCP;
- Act as a liaison between Landowners and the MDA and WDATCP when necessary and requested by the Landowner;
- Serve as a resource to investigate complaints at the direction of the MDA and WDATCP and to explain any proposed changes to this Plan during construction; and
- Maintain a written log of communications from Landowners regarding compliance with this Plan as well as report Landowner complaints to Enbridge’s Agricultural Inspector or right-of-way representative.

Both the Agricultural Inspector and Monitor will have a bachelor’s degree in agronomy, soil science, or equivalent work experience. In addition, the Agricultural inspectors and Agricultural Monitors will have demonstrated practical experience with pipeline construction and restoration on Agricultural Land.

Enbridge will provide each Landowner with a telephone number and address that can be used to contact Enbridge, during and following the completion of construction, regarding the agricultural mitigation work that is performed on their property or other construction-related matters. If the contact information changes following construction, Enbridge will provide the Landowner with updated contact information. Enbridge will respond to Landowner telephone calls and correspondence within a reasonable time.

Mitigation measures identified by Enbridge pursuant to this Plan, unless otherwise specified in this Plan or in an Easement or other agreement with an individual Landowner, will be initiated within forty-five (45) days following completion of Final Cleanup on an affected property, weather permitting or unless otherwise delayed at the request of the Landowner. If implementation of mitigation measures requires additional time, Enbridge will make temporary repairs, as needed, to minimize the risk of additional property damage or interference with the Landowner’s access to or use of the property.

MITIGATION MEASURES

1. Right-of-Way Width

Prior to construction, Enbridge will establish the right-of-way width for construction and temporary workspace (“TWS”) in Agricultural Lands based on prior project experience, engineering and construction requirements or best practices, and safety needs. The construction limits will be shown on alignment sheet drawings provided to the construction contractor, Environmental Inspector, Agricultural Inspector, Agricultural Monitor, and regulatory authorities.

A. The typical construction workspace will be governed by the Routing Permits and other permits, but will typically be 120 feet wide in uplands, of which 50-55 feet will typically be retained in a permanent Easement, and 70-65 feet, respectively, will typically be TWS. The TWS will be used during construction for soil storage and operation of equipment and vehicles along the entire length of the pipeline. At certain select areas where the pipeline crosses natural geographic or larger man-made features such as roads, railroads, streams, or wetland crossings, a defined area of additional temporary workspace ("ATWS") will be required on each side of the feature.

B. The construction boundaries of ATWS will be staked prior to the work at each location.

C. If the area of the ATWS is not sufficient to perform the work and implement BMPs, Enbridge will refrain from construction in that area until an adequate work area is available and approved. Enbridge will discuss the need for ATWS with the construction contractor, construction inspection team, Agricultural Inspector, Agricultural Monitor, and the Landowner, and will not use any additional workspace until approved by the Landowner, Agricultural Monitor, and regulatory authorities, as applicable.

2. Pipeline Depth of Cover

A. Except for aboveground facilities, such as mainline block valves, and except as otherwise stated in this Plan, the pipeline will be buried with the following depths of cover on Agricultural Land:

1) The pipeline will be constructed with a minimum depth of cover of 30 inches as required by U.S. Department of Transportation ("USDOT") regulations in 49 CFR Part 195.248. Section 216G.07 of the Minnesota Statutes further requires a minimum depth of cover of 54 inches unless waived by the Landowner. However, Enbridge will ask Landowners to waive the 54-inch-deep minimum cover requirement, as allowed by Minn. Stat. § 216G.07 and consistent with Enbridge's expansion projects in 1994, 1998, 2002, 2008, and 2009-2010.

2) Where existing or planned Tile systems are present, the pipeline will be installed at a depth that will achieve at least a 12-inch-wide separation between the pipeline and overlying Tiles as described in Section 2.C. of this Plan.

B. Enbridge will construct the pipeline under existing non-abandoned Tile and Planned Tile within six (6) feet of the surface, unless the Landowner determines otherwise in writing. Enbridge may install the pipeline over Tile buried deeper than six (6) feet. If the Landowner plans to install a new Tile system, the Landowner must provide to Enbridge plans drawn by a qualified professional with experience in Tile design and installation. In determining the proper depth of the pipeline, Enbridge will accommodate the depth and grade needed for both existing and Planned Tile to function properly. Enbridge will not change the grade of existing Tile to accommodate the pipeline without the Landowner's advance written consent.

C. A minimum of twelve (12) inches of separation will be maintained between the pipeline and Tile unless the Landowner agrees in writing to a lesser separation. If unforeseen physical conditions are discovered during construction that prevents minimum separation, the Landowner will be informed of the situation prior to the installation of the pipeline over the Tile. If a good faith effort is made and the Landowner is unavailable, the Agricultural Monitor will be informed and construction will continue.

3. Winter Construction

Enbridge intends on avoiding construction in Agricultural Lands in the winter season. However, to protect the productivity of Agricultural Lands in the event that winter construction is unavoidable as a result of weather, permit acquisition, or any other unforeseen delays, the following mitigation measures are proposed:

A. *Minimize Topsoil Stripping in frozen conditions.* Frozen conditions can preclude effective Topsoil stripping. When soil is frozen to a depth greater than the depth of the Topsoil, Topsoil cannot be efficiently stripped from the subsoil. If Topsoil stripping must proceed under these conditions, it will only be removed from the area of the trench. A ripper will be used to break up the frozen Topsoil over the trenchline and a backhoe will remove the Topsoil layer and store the material in a separate pile. The ripper will extend to the depth of Topsoil or to a maximum depth of eighteen (18) inches in the Red River Valley (In Minnesota) and twelve (12) inches elsewhere, whichever is less.

B. *Minimize Final Clean-up activities in frozen conditions*. Frozen conditions can preclude effective Topsoil replacement, removal of construction debris, removal of excess rock, decompaction of soil as required, final grading, and installation of permanent erosion control structures. If seasonal or other weather conditions preclude Final Clean-up activities, the trench and temporary workspace areas will be backfilled, stabilized, and temporary erosion control measures will be installed until restoration can be completed. If Topsoil/spoil piles remain throughout the winter, the Topsoil/spoil piles will be stabilized by an application of mulch and a tackifier or other methods approved by the regulatory authority. To prevent subsidence, backfill operations will resume when the ground is thawed and the subsoil will be compacted (as needed) prior to Final Clean-up activities. The construction contractor must monitor these areas until final restoration is complete.

C. Topsoil Stripping and Final Clean-up activities proposed in Agricultural Lands in frozen conditions in Minnesota and Wisconsin will be discussed with the MDA and WDATCP, respectively prior to commencement of these activities.

4. Temporary Erosion and Sediment Control

Temporary erosion and sediment controls will be implemented as required and are described in the EPP.

5. Topsoil Stripping, Trenching, Soil Storage, and Replacement

A. Full and partial Topsoil stripping methods are similar except for the area where the Topsoil is removed. With full Topsoil stripping, the Topsoil is removed from the entire working side (traffic lane, trench spoil storage, and trench area) of the right-of-way. Under partial Topsoil stripping, the Topsoil will not be removed from under the Topsoil storage piles. Topsoil will also be removed and segregated in other areas, such as bore pits at road and railroad crossings, where the footprint may be larger and/or irregularly shaped. Topsoil is typically stored on the outer most edge of the working side of the construction right-of-way, however, Enbridge may also store Topsoil on the spoil storage side of the construction workspace where there are workspace constraints. Typical details for each Topsoil stripping method are presented in the EPP.

Enbridge will use the following Topsoil segregation methods during construction on Agricultural lands. The method selected will be dependent on specific Landowner approvals or agreements, field conditions, regulatory authority or permit requirements and/or other factors.

- Modified Ditch-Plus-Spoil-Side Method – This method involves stripping Topsoil horizon from the spoil storage area, the pipeline trench, and the primary portion of the travel lane. The modified ditch-plus-spoil-side method would typically be used in active cropland in the Red River Valley (in Minnesota).

- Full Right-of-Way Method – This method involves stripping Topsoil from the entire width of the construction right-of-way. On most Agricultural Land located outside of the Red River Valley (in Minnesota), Topsoil will be removed from the full right-of-way because this method typically results in less soil mixing between Topsoil and subsoil caused by equipment rutting over areas where Topsoil was not stripped. A larger volume of Topsoil will be generated using this method and, consequently, may warrant the need for Topsoil to also be stored on both sides of the construction right-of-way.

- Trenchline-Only Method – This method involves removing Topsoil from over the proposed trench only, and may be used where Enbridge determines that the width of the construction right-of-way is insufficient for storing Topsoil and maintaining a sufficient width to perform construction activities and allow equipment to pass.

B. The maximum depth of Topsoil stripping will be twelve (12) inches, except in the Red River Valley in Minnesota from the Red River to the Red Lake River where up to eighteen (18) inches of Topsoil may be stripped when present, unless otherwise agreed to with MDA. In the Red River Valley, Enbridge will work with MDA to identify a suitable protocol for communicating the appropriate depth of Topsoil stripping to construction personnel. The Agricultural Inspector or the designated Enbridge inspector will observe Topsoil operations so that appropriate depths are removed.

C. Equipment operators will be trained to discriminate between Topsoil and subsoil based on obvious color changes. In locations where the Topsoil/subsoil color changes are not easily distinguishable or variable, the Agricultural Inspector will determine the depth.

D. Before removing Topsoil during wet soil conditions, the Agricultural Inspector will assess whether the moisture content in the surface horizon is suitable for grading. If the soil is considered too wet to segregate, stripping may be postponed. Based on the Agricultural Inspector's recommendation, Enbridge may allow Topsoil removal in areas where soils are persistently wet.

E. Enbridge may also remove Topsoil from ATWS as dictated by site-specific conditions and Landowner agreements. Topsoil will be removed in all "cut and fill" areas prior to grading.

F. In specific areas of deep Topsoil and as determined in consultation with the Agricultural Inspector and/or the Agricultural Monitor, the modified ditch-plus-spoil method will be used. However, the area requiring Topsoil stripping may be adjusted from the modified ditch-plus-spoil method where the Agricultural Inspector determines that such modification is necessary for safety or would be more protective of the soil resource. The adjusted method may include trenchline-only Topsoil segregation, such as in instances where Topsoil is removed under frozen conditions (i.e., winter construction). In all cases where modifications are proposed, approval from Enbridge, the MDA, the WDATCP, or other regulatory authority is required.

G. If the Agricultural Monitor and the Agricultural Inspector cannot agree on the proposed adjustment in the Topsoil segregation method, the Agricultural Monitor will document the objection and provide documentation to the MDA and/or WDATCP and Enbridge.

H. Trench spoil will be placed in a stockpile that is separate from Topsoil. Enbridge will maintain a minimum one (1)-foot-wide separation or place a barrier between Topsoil and subsoil piles to avoid mixing. In areas where the Topsoil has not been stripped from the subsoil storage area, subsoil can be stored on a thick layer of mulch or another physical barrier that identifies and protects the unstripped Topsoil.

J. Backfilling will follow lowering the pipe into the trench. During trench backfilling, subsoil material will be replaced first, followed by Topsoil. To prevent subsidence, subsoil will be backfilled and compacted. Compaction by operating construction equipment along the trench is acceptable.

K. Rock excavated from the trench may be included with backfill provided the rock content of the pre-construction soils is not significantly increased. In the event excess rock cannot be returned to the trench without substantially increasing pre-existing rock content, rocks will be considered construction debris and removed (see Section 8 of this Plan).

L. Replacing Topsoil will be initiated within fourteen (14) days after backfilling the trench. If seasonal or other weather conditions prevent compliance with this timeframe, temporary erosion control measures must be implemented and maintained until conditions allow completion of cleanup. Topsoil will be replaced across the stripped area as near as practicable to its original depth. A Trench Crown over the trenchline is permissible to offset potential settling. Following placement of the subsoil crown, Topsoil would be uniformly returned across the stripped area. The height of the crown will generally be equal to, or less than, twelve (12) inches at the center. Breaks in the crown may be cut to accommodate overland water flow across the right-of-way.

6. Repair of Damaged and Adversely Affected Tile

If Tile is damaged during installation of the pipeline, the Tile will be repaired in a manner that restores operating condition. If Tile lines immediately adjacent to the construction area are adversely affected by the pipeline installation, Enbridge will restore the Tile, including the relocation, reconfiguration, or replacement of the Tile. The affected Landowner may settle with Enbridge for payment to repair, relocate, reconfigure, or replace the damaged Tile. In the event the Landowner chooses to perform the repair, relocation, reconfiguration, or replacement of the damaged Tile, Enbridge will not be responsible for correcting Tile repairs after completion of the pipeline and the Landowner's repairs. Enbridge is only responsible for correcting Tile repairs if the repairs were made by Enbridge or its agents or designees.

Prior to pipeline installation, Enbridge will contact Landowners to determine if Tile systems will be affected. Tile systems that will be damaged, cut, or removed during construction will be marked by placing a highly visible flag at the edge of the construction right-of-way directly over the Tile lines. These markers will not be removed until the Tile has been permanently repaired and approved and accepted by the Landowner, or the Agricultural Monitor.

The pipeline trench shall provide a minimum of twelve (12) inches of clearance, where practicable, between the pipe and drainage Tiles. In most situations, the pipe will be installed under the drainage Tile; however, where drain Tiles are deeper than six (6) feet Enbridge may elect to install the pipe above the Tile lines.

Enbridge will ensure that the construction contractor repairs damaged Tile in a manner consistent with industry-accepted methods. At the Landowner's request and with Enbridge's approval, local contractors may perform the repair, replacement, or reconfiguration of the Tiles damaged or cut during pipeline construction.

Where damaged Tile is repaired by Enbridge, the following procedures will apply:

A. Before completing permanent repairs, Tiles will be examined on both sides of the trench for their entire length within the work area to check for damage by construction equipment. If Tiles are found to be damaged, they will be repaired to preconstruction conditions.

B. Tiles will be repaired with material of the same or better quality as that which was damaged.

C. Filter-covered drain Tiles will be replaced with filter-covered drain Tiles.

D. If the Tile is clay, ceramic, or concrete, any connection made with new material must be made with commercially available connectors, wrapped in plastic, or sealed with Sakrete to prevent soil intrusion.

E. If water is flowing through a damaged Tile, temporary repairs will be promptly completed and maintained until permanent repairs can be made.

F. Where Tiles are damaged or severed by the pipeline trench, repairs will be made according to the following procedures:

   1) Where Tiles are severed by the pipeline trench, double-walled drain Tile pipe, or its equivalent material, will be used for Tile repairs.

   2) Within the trench, one and one-half (1.5) inch river gravel, four (4) inch crushed stone, sandbags, bags of Sakrete (or an equivalent), or poured concrete will be backfilled under Tiles, as needed, to provide support and prevent settling.

Concrete blocks are also acceptable forms of support as are protective pads on the pipeline.

3) The support member will be of sufficient strength to support loads expected from normal farming practices (i.e., loads up to a ten (10) ton point load) on the surface directly above the repaired Tile.

4) The support member will extend a minimum of two (2) feet into the soil on both sides of the trench and will be installed in a manner that will prevent it from overturning. If the repairs involve clay Tile, the support member will extend to the first Tile joint beyond the minimum two (2) -foot-wide distance.

5) There will be a minimum clearance as required by Section 2.C. of this APP.

6) The grade of the Tile will not be changed.

G. Enbridge will initiate efforts to complete permanent Tile repairs within a reasonable timeframe after Final Cleanup, weather and soil conditions permitting.

H. Following completion of the Final Cleanup, Enbridge will be responsible for correcting repairs to Tile that fail, but only if Enbridge or its agents or designees made the initial repairs. Enbridge will not be responsible for Tile repairs that Enbridge has paid the Landowner to perform.

I. Any necessary modifications to the configuration of existing Tile systems must be consistent with the U.S. Department of Agriculture ("USDA"), Natural Resources Conservation Service, and Minnesota Wetland Conservation Act restrictions, and other regulatory authorities on wetland drainage.

7. Agricultural Drainage Ditches

Where the pipeline route crosses agricultural drainage ditches that are operated by the Landowner, pipeline will be installed at a depth that is sufficient to allow for ongoing maintenance of the ditch. After the pipeline is installed, the ditch will be restored to its preconstruction contours with erosion controls as needed. Ditches that are operated and maintained by a public entity will be crossed in accordance with applicable permits.

8. Rock Removal

The following conditions will apply on Agricultural Land:

A. If trenching, blasting, or boring operations are required in bedrock, suitable precautions will be taken to minimize the potential for rocks to become mixed with the backfill.

B. After the construction right-of-way has been decompacted as required in Section 10 of this Plan and the Topsoil replaced, Enbridge will remove rocks from the surface of the entire construction area so that the size, density, and distribution of rock on the right-of-way is similar to that on adjacent off-right-of-way areas. Enbridge will consult with the Landowner to identify suitable rock disposal locations on the construction right-of-way, or the rocks will be removed for disposal at another approved disposal location. Written authorization from the Landowner is required for disposal on the Landowner's property. Rock disposal will comply with any federal, state, or local regulations involving fill and disposal of construction debris.

9. Removal of Construction Debris

Construction-related debris, material, and litter will be removed from the Landowner's property at Enbridge's expense. The Landowner or land-managing agency may approve leaving specific materials onsite that may provide for beneficial uses for stabilization or habitat restoration.

10. Compaction, Rutting, and Soil Restoration

A. In an effort to minimize soil compaction prior to trenching activities, Enbridge will, where practical, transport pipe joints (i.e., "stringing trucks") as closely as possible along the pipeline centerline.

B. After construction, compaction of the subsoil will be alleviated on Cropland using deep-tillage equipment, as needed. Decompaction of the topsoil, if necessary, will be performed during favorable soil conditions. If the Agricultural Inspector and/or Agricultural Monitor determine that the soil is too wet, decompaction will be delayed until the subsoil is friable/tillable in the top eighteen (18) inches.

C. Deep subsoil ripping in cropland will occur in all traffic and work areas of the pipeline right-of-way where there was full right-of-way Topsoil stripping, unless the Agricultural Inspector determines compaction has not occurred. This includes ATWS.

D. Subsoil ripping equipment may include v-rippers, chisel plows, or equivalents.

E. If the Landowner makes a written claim for damages related to soil compaction greater than that of immediately adjacent Agricultural Land owned by the Landowner but unaffected by pipeline construction, Enbridge will retain a Professional Licensed Soil Scientist, or an appropriately qualified professional engineer. The Professional Soil Scientist or engineer will perform a survey of the construction right-of-way, ATWS, and adjacent unaffected land owned by the Landowner for soil compaction using field equipment such as a soil penetrometer. In addition, where there are row crops, samples will be taken in the middle of the row, but not in rows where the drive wheels of farm equipment normally travel. Copies of the results of the survey will be provided to the Landowners making such claim within thirty (30) days of completion of the soil survey. These surveys for soil compaction will be completed at Enbridge's expense.

F. Enbridge will restore rutted land as near as practical to its preconstruction condition.

G. Enbridge will compensate Landowners, as appropriate, for damages caused by Enbridge during construction. Damages will be paid for the cost of soil restoration on the construction right-of-way and ATWS to the extent such restoration work is not performed by Enbridge.

H. In the event of a dispute between the Landowner and Enbridge regarding what areas need to be deep tilled (i.e., “ripped”) or chiseled, or the depth at which compacted areas should be ripped or chiseled, Enbridge will determine the appropriate actions based on the Agricultural Monitor’s opinion.

11. Fertilization and Liming

Fertilizers and lime will be applied based on Landowner requirements.

12. Land Leveling

Following completion of the construction, Enbridge will restore the construction work areas as practicable to the original preconstruction contours. If uneven settling occurs or surface drainage problems develop as a result of pipeline construction, Enbridge will provide additional land leveling services within forty-five (45) days of receiving a Landowner's written notice, weather and soil conditions permitting. Alternatively, Enbridge will negotiate with the Landowner for reasonable compensation in lieu of restoration.

13. Prevention of Soil Erosion

Enbridge will install permanent erosion control devices during restoration to prevent erosion as described in Enbridge’s EPP.

14. Repair of Damaged Soil Conservation Practices

Soil conservation practices (e.g., terraces, grassed waterways) that are damaged by pipeline construction will be restored to their preconstruction condition.

15. Interference with Irrigation Systems

A. If it is feasible and mutually acceptable to Enbridge and the Landowner, temporary measures will be implemented to allow an irrigation system to continue to operate across land on which the pipeline is being constructed.

B. If the pipeline right-of-way and/or ATWS interfere with an operational (or soon-to-be operational) spray irrigation system, Enbridge will inform the Landowner of the need to take the Irrigation system out of service. Enbridge and the Landowner will agree upon an acceptable amount of time the irrigation system may be out of service. If Enbridge and the Landowner are unable to agree on the amount of time within ten (10) days of Enbridge informing the Landowner of the need to take the irrigation system out of service, construction will proceed and the Landowner will be asked to take the irrigation system out of service.

C. If, as a result of pipeline construction, interruption of an irrigation system results in crop damages, either on the right-of-way or off-right-of-way, compensation of Landowners will be determined as described in Section 21 of this Plan.

16. Ingress and Egress

Prior to pipeline construction, Enbridge will identify the means of entering and exiting the right-of-way should access to the right-of-way not be practical or feasible from adjacent tracts or from public highway or railroad rights-of-way, consistent with Enbridge's Easement rights. Temporary access ramps may be constructed using locally obtained Topsoil as needed to facilitate the movement of equipment between public highways and the right-of-way.

17. Temporary Roads

A. If public roads do not provide sufficient access, Enbridge will attempt to use existing farms roads for access to and from the right-of-way, subject to approval from the Landowner or Enbridge's Easement rights. If Enbridge needs to construct a new temporary access road across Agricultural Land, the location will be made in collaboration with the Landowner. Temporary roads that are needed during construction will be located to minimize impacts on the landowner's or tenant's use of the agricultural land. If temporary roads in Agricultural Lands require gravel stabilization, geotextile construction fabric will be placed beneath the rock to add stability and to provide a distinctive barrier between the rock and soil surface. During restoration of the right-of-way, temporary access roads will be removed or restored to preconstruction conditions, except as described in Section 17C of this Plan.

B. Temporary roads will be designed so as not to impede drainage and will be constructed to minimize soil erosion.

C. Following construction, new temporary roads may be left intact through mutual agreement of the Landowner and Enbridge unless otherwise restricted by federal, state, or local regulations.

D. If the temporary roads are to be removed, the Agricultural Land on which the temporary roads are constructed will be returned to its previous use and restored to a condition equivalent to what existed prior to construction. Restoration techniques for temporary roads will be similar to those used in restoring the construction right-of-way (e.g., decompaction).

18. Weed Control

Enbridge has identified and will implement weed control measures as described in the EPP.

Enbridge will provide weed control at its aboveground facility sites (e.g., mainline block valve sites, pump stations) to avoid the spread of weeds onto adjacent Agricultural Land during operation activities. Weed control spraying, will be conducted in accordance with applicable regulatory authorities.

19. Pumping of Water from Open Trenches

A. Enbridge will identify locations for discharging water pumped out of trenches in consultation with the Agricultural Inspector and Landowner, to the extent practicable.

B. When dewatering trenches, Enbridge will discharge the water in a manner that will minimize damaging adjacent Agricultural Land, crops, and/or pasture. Such damages may include, but are not limited to, inundation of crops for more than twenty-four (24) hours and deposition of sediment in cropland and drainage ditches. If water-related damage during discharge from trenches results in a loss of yield, compensation of Landowners will be determined as described in Section 21 of this Plan.

C. Discharge of water will be conducted in accordance with the EPP, federal and state regulations, and permit conditions.

20. Construction in Wet Conditions

A. Should the Agricultural Monitor determine that continued construction in wet conditions could result in damage to soil structure and compromise future cropland productivity, the Agricultural Monitor may request Enbridge's Agricultural Inspector to temporarily halt the activity on a Landowner's property until the Agricultural Monitor consults with Enbridge's Environmental Inspector and Construction Manager. Should Enbridge elect to continue construction activities over the objection of the Agricultural Monitor, Enbridge will retain a Professional Licensed Soil Scientist or an appropriately qualified professional engineer, at its own expense, to perform a survey of the construction right-of-way, ATWS, and adjacent unaffected land owned by the Landowner for soil compaction, prior to final restoration and using the procedures described above.

21. Procedures for Determining Construction-Related Damages

A. Enbridge will negotiate in good faith with Landowners who assert claims for construction-related damages. The procedure for resolution of these claims will be in accordance with the terms of the Easements.

B. Negotiations between Enbridge and any affected Landowner will be voluntary in nature and no party is obligated to follow a specific procedure or method for computing the amount of loss for which compensation is sought or paid, except as otherwise specifically provided in the Easements. In the event a Landowner should decide not to accept compensation offered by Enbridge, the compensation offered is only an offer to settle, and the offer shall not be introduced in any proceeding brought by the Landowner to establish the amount of damages Enbridge must pay. In the event that Enbridge and a Landowner are unable to reach an agreement on the amount of compensation, any such Landowner may seek further recourse as provided in the Easement.

22. Advance Notice of Access to Private Property

A. Enbridge or its agents will provide the Landowner with a minimum of twenty-four (24) hours' notice before accessing his/her property for construction, in addition to any regulatory notifications.

B. Prior notice will consist of a personal or telephone contact, whereby the Landowner is informed of Enbridge's intent to access the land. If the Landowner cannot be reached in person or by telephone, Enbridge will mail or hand-deliver to the

Landowner's home a dated, written notice of Enbridge's intent. The Landowner need not acknowledge receipt of the written notice before Enbridge enters the property.

23. Indemnification

Indemnification obligations relating to the pipeline installation covered by this Plan shall be determined in accordance with the terms of the Easements and applicable law.

24. Tile Repair Following Pipeline Installation

A. If, after pipeline installation, the Landowner must make repairs to the Tile system within the right-of-way, or plans to install a new Tile system, the Landowner must obtain Enbridge approval of the work plan prior to commencing any activities within the right-of-way. Enbridge may impose such requirements and limitations on the work as necessary to protect the safety and integrity of Enbridge's facilities. The Landowner will be responsible for contacting 811 or the local one call center prior to any excavation near the pipeline and complying with all necessary requirements imposed by Enbridge to protect the safety and integrity of Enbridge's facilities.

Enbridge will, at its own expense, follow the procedures below.

B. An Enbridge representative will be present while the excavation work is being performed, but will not perform the excavation work. If the pipeline is above the Tile system, Enbridge will be responsible for reasonable extra costs incurred by the Landowner to excavate and expose the pipeline in accordance with Enbridge's requirements for protection of the pipeline.

MANAGEMENT OF CHANGE PROCEDURE

As a result of variable field conditions during construction, Enbridge established a MOC procedure to allow this Plan to be modified as needed during construction. The MOC procedure allows for modifications to mitigation measures, construction alignments, plans, designs, methods, and construction work areas governed by this Plan. These modifications will involve representatives of Enbridge, the Agricultural Inspector, the Agricultural Monitor, and the MDA and/or WDATCP, or other regulatory authorities. Some authority for approval/denial may be delegated to the Agricultural Monitor by the MDA and/or WDATCP, or other regulatory authorities. The MOC process can also be used to clarify discrepancies discovered in project documents and/or to distribute information to team members. Three MOC levels (Levels 1, 2, and 3) will be used to categorize and process requests. Enbridge will not conduct activities that deviate from approved activities without prior authorization by the MDA and/or WDATCP, or other regulatory authorities.

Enbridge anticipates that two types of minor route field realignments/modifications may be required after issuance of the routing permits that would not require approval of the Agricultural Monitor, the MDA and/or WDATCP, or other regulatory authorities: 1) minor realignments that are requested by the Landowner; and 2) minor realignments required due to site-specific conditions (e.g., steep slopes and other constructability concerns).

When these modifications are requested by Landowners or determined necessary for constructability and they do not affect other Landowners or sensitive environmental areas, such as wetlands, Enbridge will review all of the preconstruction surveys, documentation/collection, and mitigation, but will not request written approval of the Agricultural Monitor, MDA and/or WDATCP, or other regulatory authorities unless required by the terms of applicable permit(s). However, the Agricultural Inspector will inform the Agricultural Monitor of these minor adjustments.

Enbridge will request written approval from the Agricultural Monitor for all other modifications that would affect additional Landowners, or change construction procedures or methods, before commencing construction in or near any of these areas.

Level 1 Modification

Level 1 modifications are site-specific, minor changes to project specifications or mitigation measures that provide equal or better protection to environmental and agricultural resources. These minor modification requests can be reviewed and either approved or denied by the Agricultural Monitor in the field during normal construction operations.

Examples of Level 1 modifications include:

- Modifying the Topsoil segregation methods based on site-specific conditions;
- Using alternative soil stockpile locations (i.e., along the non-working (spoil) side of the right-of-way);
- Allowing the use of existing access roads that have not been previously approved, provided adequate cultural, wetland, and biological survey coverage is documented, if the use would be considered "like-use;" and
- Shifting extra workspace along the right-of-way a short distance where the overall disturbance remains the same, surveys have been completed, no sensitive resources would be affected, the workspace remains within the area permitted by the routing permits, and property access is available.

A Level 1 modification may also be used to document and disseminate agency-directed changes to mitigation measures. To initiate a Level 1 modification request, the Agricultural Inspector or other designated Enbridge representative will complete a modification request form (see Appendix B) and obtain the appropriate signatures (to be determined by Enbridge). Landowner approval will be obtained by Enbridge for those modifications requiring such approval. The Agricultural Inspector will contact the Agricultural Monitor to review the proposed change. The Agricultural Inspector and the Agricultural Monitor will collaborate to evaluate the site-specific situation and determine if the modification is appropriate, feasible, and justified.

The Agricultural Monitor may approve a reasonable Level 1 modification request if, in the Agricultural Monitor's opinion, the results of implementing the change will provide equal or better protection for the resource than the original mitigation measure or if the original mitigation measure is not applicable to that specific site. If a Level 1 modification request is approved in the field, the Agricultural Monitor will sign the modification form.

The Agricultural Monitor will document the modification approval and transmit the approved form to the MDA and/or WDATCP, or other regulatory authority. If the modification exceeds the Agricultural Monitor's authority level, the Agricultural Monitor will inform the Agricultural Inspector that a Level 2 or Level 3 modification request is required.

Level 2 Modification

A Level 2 modification request exceeds the field decision authority of the Agricultural Monitor and requires review and final approval by the MDA and/or WDATCP, or other regulatory authority. Level 2 modification requests generally involve project changes that would affect an area outside of the previously approved work area, but are still within the corridor previously surveyed for cultural, wetland, and biological resources. Level 2 modification requests typically require the review of supplemental documents, correspondence, and records, and may require applicable agency approval.

Examples of Level 2 modifications include:

- Reducing the width or depth of Topsoil segregation in agricultural fields;
- Reducing the area to be decompacted or using an alternative method to decompact subsoil;
- Use of ATWS outside of the previously approved work area but within the previously surveyed corridor;
- The use of existing access roads that have not been previously approved if the use would not be considered “like-use” that could be approved as a Level 1 modification;
- Modifying a previously approved access road in ways not previously identified; and
- Increasing the width of the construction right-of-way at locations other than those allowed by Routing Permits, Enbridge Construction Alignment Sheets, and Enbridge’s EPP.

To initiate a Level 2 modification request with the MDA and/or WDATCP, and other regulatory authority, the Agricultural Inspector or other designated Enbridge representative will fill out a modification request form, prepare the appropriate supporting documentation, and obtain the required signatures. The designated Enbridge representative will complete and submit the modification request form and supporting documentation by e-mail (scanned copy) or fax to the regulatory authority. The regulatory authority will review the request and supporting documentation. Landowner approval will be obtained by Enbridge for those modifications requiring approval. The regulatory authority will also discuss the request with the Agricultural Monitor.

If the Level 2 modification request is approved, the regulatory authority will sign the modification request and e-mail the approved form (scanned copy) to the designated Enbridge representatives and the Agricultural Monitor. The modification may be implemented in the field as soon as the regulatory authority and all other applicable agencies have approved the modification.

Level 3 Modification

Level 3 modification requests generally involve project changes that would affect an area outside of the previously approved work area, and that are outside the corridor previously surveyed for cultural resources, wetlands, and biological resources.

Examples of Level 3 modifications include:

- Extra workspaces, access roads, or route realignments for which landowner approval has not been obtained (i.e., condemnation tracks);
- Certain changes to mitigation measures or construction/restoration procedures; and
- Extra workspaces, access roads, or route realignments outside the previously surveyed corridor that require additional surveys and agency approvals that affect resources of sufficient sensitivity to require a formal letter approval from other regulatory authorities.

To initiate a Level 3 modification request, the Agricultural Inspector or other designated Enbridge representative will fill out a modification request form, prepare the appropriate supporting documentation, ensure the required environmental surveys have been completed, and obtain the required signatures. The designated Enbridge representative will submit the modification request form and supporting documentation by e-mail (scanned copy) or fax to the all applicable regulatory authorities. The regulatory authorities will review the request and supporting documentation and consult with other agencies as necessary. The MDA and/or WDATCP may also discuss the request with the Agricultural Monitor. If sensitive biological species and/or habitat are encountered during the additional surveys, documentation of consultation with applicable agencies will be provided with the modification request. The MDA and/or WDATCP will consult with the regulatory authorities and receive appropriate agency approvals before authorizing the modification.

If the Level 3 modification request is approved, the MDA and/or WDATCP will sign the modification request and e-mail the approved form (scanned copy) to the designated Enbridge representatives and the Agricultural Monitor. The modification may be implemented in the field as soon as the approved modification is received. All agency-approved mitigation measures will adhere to the modification if it is approved by the MDA and/or WDATCP.

Appendix A
Mitigation Measures for Organic Agricultural Land

INTRODUCTION

This appendix identifies mitigation measures that apply specifically to farms that are Certified Organic or farms in Minnesota that are in active transition to become Certified Organic, and is intended to address the unique management and certification requirements of these operations. All protections provided in the Plan must also be applied to Organic Agricultural Land in addition to the provisions of this appendix.

The provisions of this appendix will apply to Organic Agricultural Land for which the Landowner has provided to Enbridge a true, correct, and current version of the Organic System Plan within sixty (60) days after the signing of the Easement for such land or sixty (60) days after the issuance of a PRP to Enbridge by the MN PUC, whichever is sooner. In the event the Easement is signed later than sixty (60) days after the issuance of the PRP, the provisions of this appendix are applicable when the Organic System Plan is provided to Enbridge at the time of the signing of the Easement. In instances where Enbridge is in possession of the Easement prior to submitting its MN PUC application, the Landowner must provide the Organic System Plan to Enbridge no later than sixty (60) days after the issuance of the PRP. Enbridge recognizes that Organic Agricultural Land is a unique feature of the landscape and will treat this land with the same level of care as other sensitive environmental features.

DEFINITIONS

Unless otherwise provided to the contrary in this appendix, capitalized terms used in this appendix shall have the meanings provided below and in the Plan. In the event of a conflict between this appendix and the Plan with respect to definitions, the definition provided in this appendix will prevail but only to the extent such conflicting terms are used in this appendix. The definition provided for the defined words used herein shall apply to all forms of the words.

Apply	To intentionally or inadvertently spread or distribute any substance onto the exposed surface of the soil.
Certifying Agent	As defined by the National Organic Program Standards, 7 C.F.R. Part 205.2.
Decertified or Decertification	Loss of Organic Certification.
Organic Agricultural Land	Farms or portions thereof described in 7 C.F.R. Parts 205.100, 205.101, and 205.202.
Certified Organic	As defined by the National Organic Program Standards, 7 C.F.R. Part 205.100 and 7 C.F.R. Part 205.101.
Organic System Plan	As defined by the National Organic Program Standards, 7 C.F.R. Part 205.2.
Prohibited Substance	As defined by the National Organic Program Standards, 7 C.F.R. Parts 205.600 through 205.605 using the criteria provided in 7 United States Code ("U.S.C.") 6517 and 7 USC 6518.

ORGANIC SYSTEM PLAN

Enbridge recognizes the importance of the individualized Organic System Plan to the Organic Certification process. Enbridge will work with the Landowner, the Landowner's Certifying Agent, and/or a USDA-approved organic consultant to identify site-specific construction practices and develop an organic construction plan that will minimize the potential for Decertification as a result of construction activities. Enbridge also recognizes that Organic System Plans are proprietary in nature and confidentiality will be respected.

PROHIBITED SUBSTANCES

Enbridge will avoid the application of Prohibited Substances onto Organic Agricultural Land. No herbicides, pesticides, fertilizers, or seed will be applied unless requested and approved by the Landowner. Likewise, no refueling, fuel, or lubricant storage or routine equipment maintenance will be allowed on Organic Agricultural Land. Equipment will be checked prior to entry to make sure that fuel, hydraulic, and lubrication systems are in good working order before working on Organic Agricultural Land. If Prohibited Substances are used on land adjacent to Organic Agricultural Land, these substances will be used in such a way as to prevent them from entering Organic Agricultural Land.

SOIL HANDLING

Topsoil and subsoil layers that are removed during construction will be stored separately and replaced in the proper sequence after the pipeline is installed. Unless otherwise specified in the site-specific plan described above, Enbridge will not use this soil for other purposes, including creating access ramps at road crossings. No Topsoil or subsoil (other than incidental amounts) may be removed from Organic Agricultural Land. Likewise, Organic Agricultural Land will not be used for storage of soil from non-Organic Agricultural Land.

EROSION CONTROL

On Organic Agricultural Land, Enbridge will, to the extent feasible, implement erosion control methods consistent with the Landowner's Organic System Plan. On land adjacent to Organic Agricultural Land, Enbridge's erosion control procedures will be designed so that sediment from adjacent non-Organic Agricultural Land will not flow along the right-of-way and be deposited on Organic Agricultural Land. Treated lumber will not be used in erosion control measures on Organic Agricultural Land.

WATER IN TRENCHES

During construction, Enbridge will leave an earthen plug in the trench at the boundary of Organic Agricultural Land to prevent trench water from adjacent land from flowing into the trench on Organic Agricultural Land. Likewise, Enbridge will not allow trench water from adjacent land to be pumped onto Organic Agricultural Land.

WEED CONTROL

On Organic Agricultural Land, Enbridge will, to the extent feasible, implement weed control methods consistent with the Landowner's Organic System Plan. Prohibited Substances will not be used for weed control on Organic Agricultural Land. In addition, Enbridge will not use

Prohibited Substances for weed control on land adjacent to Organic Agricultural Land in such a way as to allow these materials to drift onto Organic Agricultural Land.

MITIGATION OF NATURAL RESOURCE IMPACTS

Enbridge will not use Organic Agricultural Land for the purpose of required compensatory mitigation of impacts on natural resources such as wetlands or woodlands unless approved by the Landowner.

MONITORING

In addition to the responsibilities of the Agricultural Monitor described in the Plan, the following will apply:

- The Agricultural Monitor or a trained Organic Inspector (trained through a USDA-approved Organic Inspection Program and retained by Enbridge) will routinely monitor construction and restoration activities on Organic Agricultural Land for compliance with the provisions of this appendix and will document activities that could result in Decertification; and

- Instances of noncompliance will be documented according to International Organic Inspectors Association protocol consistent with the Landowner's Organic System Plan, and will be made available to the MDA, the Landowner, the Landowner's Certifying Agent, and to Enbridge.

If the Agricultural Monitor is responsible for routinely monitoring activities on Organic Agricultural Land, he or she will have been trained in such activities by the International Organic Inspectors Association, at Enbridge's expense if necessary.

COMPENSATION FOR CONSTRUCTION DAMAGES

The settlement of damages will be based on crop yield and/or crop quality determination and the need for additional restoration measures, and will proceed in accordance with the terms of the Easement. Unless the Landowner of Organic Agricultural Land and Enbridge agree otherwise, at Enbridge's expense, a mutually agreed upon professional agronomist will make crop yield determinations, and the MDA Fruit and Vegetable Inspection Unit will make crop quality determinations. If the crop yield and/or crop quality determinations indicate the need for soil testing, the testing will be conducted by a commercial laboratory that is properly certified to conduct the necessary tests and is mutually agreeable to Enbridge and the Landowner. Fieldwork for soil testing will be conducted by a Professional Soil Scientist or Professional Engineer licensed by the State of Minnesota. Enbridge will be responsible for the cost of sampling, testing, and additional restoration activities, if needed. Landowners may elect to settle damages with Enbridge in advance of construction on a mutually acceptable basis or to settle after construction based on a mutually agreeable determination of actual damages.

COMPENSATION FOR DAMAGES DUE TO DECERTIFICATION

Should any portion of Organic Agricultural Land be Decertified as a result of construction activities, the settlement of damages will be based on the difference between revenue generated from the land affected before Decertification and after Decertification, for the entire period of time the land is Decertified, so long as a good faith effort is made by the Landowner to regain certification.

Appendix B
Management of Change Onsite Modification Request Form

ON-SITE MODIFICATION REQUEST FORM

Change Request No.: ______________________ Approval Reference No.: __________________

Date Approval Required: ____________________ Date Submitted: _________________________

Spread/Location: _________________________ Time Submitted: ________________________

Land Owner: ______________________ Current Land Use: ____________________________

Alignment Sheet Station No.: _______________ Tract No.: _____________________________

Change From (check one): ☐ Permit ☐ Plan/Procedure ☐ Drawing ☐ Specification ☐ Other

Specify Source (e.g., Detail Drawing 1): ____

Detailed Description of Change: Attachments? ☐ Yes ☐ No Photos? ☐ Yes ☐ No

Change Justification:

Environmental Review – Describe Potential to Affect Each of the Following (including area and agency consultation as appropriate):

Wetlands:

Endangered and Threatened Species:

Archeological Sites:

Closest Residence:

Closest Drinking Water Supply Well:

Other Conditions:

Prepared by: ___________________________________ Date: ___________

Reviewed by: ___________________________________ Date: ___________

Attachment ☐ Yes ☐ No

For Agency or Enbridge Environment Management Use Only

Check one:

☐ Modification Approved ☐ Modification Denied ☐ Point of Contact

Signature: _____________________________________ Date: ___________

CONDITIONAL APPROVAL

☐ Yes ☐ No

(If yes, list conditions below)

Conditions:

Distribution (note all that apply):

Appendix #

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Enbridge (U.S.) Inc.

UNANTICIPATED DISCOVERIES PLAN

October 2013

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APPENDICES

1.0 INTRODUCTION

This Unanticipated Discoveries Plan ("UDP") sets forth the guidelines to be used in the event archaeological resources or human skeletal remains are discovered during construction activities. These measures were developed by Enbridge (U.S.) Inc. ("Enbridge") in accordance with applicable state and federal guidelines. Early and frequent communications are essential in meeting both the spirit and law of those guidelines; therefore, Appendix A shows the most current list of relevant contacts in the event of an unanticipated discovery during construction.

2.0 UNANTICIPATED DISCOVERY CONDITIONS

Pipeline construction excavations have potential to uncover previously unknown archaeological sites and human skeletal remains, as well as many other cultural and natural elements such as modern refuse and faunal remains. While extensive environmental surveys can effectively eliminate most discoveries during construction, Enbridge is aware that project planning should anticipate even the remote possibility of a discovery.

Enbridge will have the primary responsibility of distinguishing discoveries of significant archaeological sites or human skeletal remains from those that are neither. The former would require ceasing construction activities at the find location followed by a coordinated consultation effort among Enbridge, permitting agencies, landowners, and other interested parties. Identification of the latter (neither significant archaeological sites nor human skeletal remains) would not mean initiation of the consultation process; however documentation of the event must be made.

When possible archaeological materials or suspected human skeletal remains are identified during ground disturbing activities within the construction corridor, the construction contractor ("Contractor") will immediately notify Enbridge's lead onsite Environmental Inspector ("EI") of the discovery.

1. Immediately following notification of the discovery, the lead EI shall:

    (a) Establish and delineate a 25 foot buffer around the edge of the discovery (using flagging and/or fencing), advise the on-site construction manager to halt all ground-disturbing activities within the buffered area until otherwise notified by Enbridge Environment, and implement measures to protect the discovery from looting and vandalism, including a 24-hour watch, if necessary; and

    (b) Contact a qualified Professional Archaeologist (possible archaeological materials) and/or Physical Anthropologist (suspected human skeletal remains) to conduct an assessment of the discovery. The Professional Archaeologist should meet the qualification standards outlined in 36 Code of Federal Regulations ("CFR") Part 61 in order to conduct the assessment. The Physical Anthropologist must be acknowledged as competent to positively identify human skeletal remains.

2. When contacted by the lead EI, the Professional Archaeologist shall gather additional information from the discovery area and assess the potential significance and condition and integrity of the discovery according to the guidelines established by the National Park Service ("NPS") in Bulletin 15 and its amendments:

   (a) The Professional Archaeologist will determine whether or not the discovery is an archaeological site or cultural resource over 45 years of age. If the discovery is an archaeological site or cultural resource greater than 45 years of age, the Professional Archaeologist will record as much information as possible to secure a Smithsonian Trinomial Number from the appropriate state agency. The lead EI would then notify Enbridge Environment to initiate the process outlined in *3.0 Discovery of Historic Properties* below.

   (b) If the discovery is not an archaeological site or cultural resource greater than forty-five years of age, the Professional Archaeologist will document the discovery for the record and Enbridge's lead EI will advise the on-site construction manager to restart ground-disturbing activities.

3. When contacted by the lead EI, the Physical Anthropologist shall investigate the site to make an assessment of the likely nature of the remains:
   (a) If the remains are likely human then the lead EI would notify Enbridge Environment to initiate the process outlined in *4.0 Discovery of Human Skeletal Remains* below.
   (b) If the discovery does not represent human skeletal remains, the Physical Anthropologist will document the discovery for the record and Enbridge's lead EI will advise the on-site construction manager to restart ground-disturbing activities.

3.0 DISCOVERY OF HISTORIC PROPERTIES

Upon the discovery of an archaeological site or cultural resource greater than 45 years of age, the Professional Archaeologist will advise Enbridge Environment of the proper agency notification procedure and recommend a plan of action for the discovery area.

(a) If the discovery area is under the jurisdiction of a federal permit and/or approval, or otherwise subject to federally-mandated conditions, Enbridge Environment will advise the Responsible Federal Agency ("RFA") of the resource and provide information regarding its significance and condition and integrity (see *3.1 Federal Agency Jurisdiction* below).

(b) If the discovery is on state land, Enbridge Environment will first advise the land-managing agency of the resource and provide information regarding its significance and condition and integrity and, if directed by the land-managing agency, advise the appropriate State Archaeologist (see *3.2 State Lands* below).

(c) If the discovery is on private land, its disposition will still be subject to the authority of the appropriate state routing agency. Enbridge Environment will advise the state routing agency of the resource and provide information regarding its significance and condition and integrity (see *3.3 Public Lands Subject to State Routing Authority* below).

3.1 FEDERAL AGENCY JURISDICTION

(a) Enbridge Environment will notify the RFA of the resource and provide information regarding its significance and condition and integrity.

(b) Within 24 hours of notification, the RFA shall provide notice of the discovery to other parties who may wish to participate in consultation, including but not limited to the appropriate State Historic Preservation Office ("SHPO"), Native American tribal officials (as applicable), and private landowner(s).

(c) The RFA shall have 5 calendar days following notification to determine the discovery's eligibility for listing on the National Register of Historic Places ("NRHP") in consultation with the appropriate SHPO and other consulting parties. The RFA may extend the review period by an additional 7 calendar days by providing written notice to consulting parties prior to the expiration of the 5 day calendar period.

(d) For properties determined eligible for listing on the NRHP pursuant to (c) above, Enbridge Environment shall notify the RFA and other consulting parties of Enbridge's proposed treatment measures to resolve adverse effects to the discovered resource. The consulting parties shall comment on the proposed treatment measures within 48 hours. The RFA shall ensure that the recommendations of the consulting parties are considered prior to granting approval of Enbridge-proposed treatment measures. Once approval has been granted by the RFA, Enbridge Environment shall carry out the approved treatment measures and, after doing so, Enbridge may resume construction.

(e) In the event of any disagreements between the consulting parties regarding the NRHP eligibility of the newly discovered property or the treatment measures proposed to mitigate adverse effects to the property, the RFA shall seek and take into account the recommendations of the Advisory Council on Historic Preservation ("ACHP"). Within 48 hours of receipt of a request, ACHP shall provide the RFA with recommendations on how to resolve the dispute.

(f) If, after consultation, the RFA determines that the discovery does not represent an NRHP-eligible resource, the RFA will direct Enbridge Environment to resume ground-disturbing activities at the discovery location at its discretion.

3.2 STATE LANDS

(a) Enbridge Environment will notify the land-managing agency of the resource and provide information regarding its significance and integrity. If directed by the land-managing agency to do so, Enbridge Environment will advise the appropriate State Archaeologist.

(b) The land-managing agency will have 5 calendar days following notification to consult with the appropriate state archaeologist and other consulting parties, as necessary, about the assessment of the discovery. NPS criteria of eligibility for listing on the NRHP may be considered as a guideline to determine the significance of the find and SHPO may be consulted during the assessment, but the state agency is not obliged to apply NPS standards in making its decision. The land-managing agency may assume the resource is eligible for listing on the NRHP while consultation occurs and may require avoidance, impact minimization, or mitigation.

(c) For properties determined eligible for listing on the NRHP, Enbridge Environment shall notify the land-managing agency and other consulting parties of the treatment measures it proposes for resolving adverse effects to the resource. The consulting parties shall provide their views on the proposed treatment measures to Enbridge Environment, the land-managing agency and other consulting parties within 48 hours. The land-managing agency shall ensure that the recommendations of the consulting parties are considered prior to granting approval of Enbridge's proposed treatment measures. Once approval has been granted by the land-managing agency, Enbridge Environment shall carry out the approved treatment measures and, after doing so, Enbridge may resume construction.

(d) If, after consultation, the land-managing agency determines that the discovery does not represent an NRHP-eligible or otherwise important resource, the land-managing agency will direct Enbridge Environment to resume ground-disturbing activities, at its discretion, at the discovery location.

3.3 PRIVATE LANDS SUBJECT TO STATE ROUTING AUTHORITY JURISDICTION

(a) Enbridge Environment will notify the state routing authority of the resource and provide information regarding its significance and integrity.

(b) Within 24 hours of notification, the state routing authority shall provide notice of the resource to other parties, including, but not limited to, the appropriate SHPO, the appropriate State Archaeologist, Native American tribal officials (as applicable), and private landowner(s).

(c) The state routing authority will have 5 calendar days following notification to consult with the appropriate SHPO and other consulting parties, as necessary, about assessing the discovery. Criteria for eligibility for listing on the NRHP may be considered as a guideline to determine the significance of the find and SHPO may be consulted during the assessment, but the state routing authority is not obliged to apply the standards in making its decision. The state routing authority may assume the resource is eligible for listing on the NRHP while consultation occurs and may require avoidance, impact minimization, or mitigation.

(d) For properties eligible for listing on the NRHP, Enbridge Environment shall notify the state routing authority and other consulting parties of the treatment measures it proposes to resolve impacts to the resource. The consulting parties shall provide their views on the proposed treatment measures within 48 hours. The state routing authority shall ensure that the recommendations of the consulting parties are considered prior to granting approval of Enbridge's proposed treatment measures. Once approval has been granted by the state routing authority, Enbridge Environment shall carry out the approved treatment measures and, after doing so, Enbridge may resume construction.

(e) If, after consultation, the state routing authority determines that the discovery does not represent an NRHP-eligible or otherwise important resource, the state routing authority will direct Enbridge Environment to resume ground-disturbing activities, at its discretion, at the discovery location.

4.0 DISCOVERY OF HUMAN SKELETAL REMAINS

1. When unmarked human burial or skeletal remains are encountered during construction activities, Enbridge will comply with all applicable laws, specifically:

   a) North Dakota's "Protection of human remains and burial goods – Unlawful acts – Penalties – Exceptions" law (North Dakota Century Code ["NDCC"] §23-06-27) and its accompanying administrative rules (North Dakota Administrative Code ["NDAC"] §40-02-03);

   b) Minnesota's "Private Cemeteries Act" (Minnesota Statute ["MS"] §307.08); and

   c) Wisconsin Statute §157.70. In Wisconsin, in the case of accidental discoveries, state law does not distinguish between historic or prehistoric burials in the requirements for initial notifications or disinterment.

2. In the event a human burial or skeletal remains are encountered during ground-disturbing construction activity, Enbridge Environment will implement the following notification procedures:

   a) North Dakota – notify the local law enforcement agency (county sheriff) and the State Historical Society of North Dakota as required by NDCC §23-06-27. Pursuant to NDAC §40-02-03-03, upon receiving notification of the discovery of human skeletal remains, a human burial, or burial goods, the local law enforcement agency shall, as soon as practicable, report the receipt of such notification to State Historical Society of North Dakota and the North Dakota State Department of Health and Consolidated Laboratories. These two state agencies shall commence the initial examination of the discovery within 24 hours of notification.

   b) Minnesota – notify the local law enforcement agency (county sheriff). As required by MS §307.08 Enbridge Environment will also notify the Office of the State Archaeologist of the find.

   c) Wisconsin – notify the local law enforcement agency (county sheriff) and SHPO as stipulated by Wisconsin Statute §157.70.

3. Enbridge Environment also shall promptly notify the RFA, land-managing agency, or state routing authority of the find and consult regarding the appropriate measures to handle the discovery.

After permission to resume construction has been issued by the RFA, land-managing agency, or state routing authority, Enbridge's lead EI will advise the on-site construction manager to restart ground-disturbing activities.

Appendix A
Contact Lists – North Dakota, Minnesota, and Wisconsin

Contact Lists North Dakota, Minnesota, and Wisconsin		
State/County	Contact	Address/Telephone
NORTH DAKOTA	TBD, Lead Environmental Inspector	Cellphone: TBD E-mail: TBD
	Merlan E. Paaverud, Jr., Director/SHPO	State Historical Society of North Dakota 612 East Boulevard Avenue Bismarck, ND 58505-0830 Telephone: (701) 328-2672 Fax: (701) 328-3710 E-mail: mpaaverud@nd.gov
	Edward C. Murphy, State Geologist	North Dakota Industrial Commission, Department of Mineral Resources, North Dakota Geological Survey 1016 East Calgary Ave. Bismarck, ND 58503 Telephone: (701) 328-8000
Williams County	Scott Busching, County Sheriff	223 East Broadway, Suite 301 Williston, ND 58801 Telephone: (701) 577-7700
Mountrail County	Kenneth Halvorson, County Sheriff	101 N Main St Stanley, ND 58784 Telephone: (701) 628-2975
Ward County	Steve Kukowski, County Sheriff	315 SE 3rd Street PO Box 907 Minot, ND 58702 Telephone: (701) 857-6500
McHenry County	Marvin Sola, County Sheriff	407 Main Street South, Room 303 Towner, ND 58788 Telephone: (701) 537-5633
Pierce County	Matt Lunde, County Sheriff	110 Industrial Park Road Rugby, ND 58368-0226 Telephone: (701) 776-5245
Towner County	Vaughn Klier, County Sheriff	315 2nd Street PO Box 366 Cando, ND 58324-0603 Telephone: (701) 968-4350
Ramsey County	Steve Nelson, County Sheriff	222 W Walnut Devils Lake, ND 58301-3596 Telephone: (701) 662-0708
Nelson County	Kelly Janke, County Sheriff	210 B Ave W Ste 102 Lakota, ND 58344-7410 Telephone: (701) 247-2475
Grand Forks County	Bob Rost, County Sheriff	122 South 5th Street Suite 210 PO Box 12608 Grand Forks, ND 58208-2608 Telephone: (701) 780-8280

Contact Lists North Dakota, Minnesota, and Wisconsin		
State/County	Contact	Address/Telephone
MINNESOTA	TBD, Lead Environmental Inspector	Cellphone: TBD E-mail: TBD
	TBD, SHPO	Minnesota State Historic Preservation Office Minnesota Historical Society 345 Kellogg Boulevard West St. Paul, MN 55102-1903 Telephone: TBD E-mail: TBD
	Scott Anfinson, Minnesota State Archaeologist	Office of the State Archaeologist Fort Snelling History Center 200 Tower Avenue St. Paul, MN 55111 Telephone: (612) 725-2411 E-mail: scott.anfinson@state.mn.us
	Jim L. Jones, Jr., Cultural Resource Director	Minnesota Indian Affairs Council 3801 Bemidji Avenue, Suite 5 Bemidji, MN 56601 Telephone: (218) 755-3825
	Harvey Thorleifson, Director	Minnesota Geological Survey 2642 University Ave. St. Paul, MN 55114-1057 Telephone: (612) 627-4780, ext. 224
Polk County	Barb Erdman, County Sheriff	600 Bruce Street P.O. Box 416 Crookston, MN 56716 Telephone: (218) 281-0431
Red Lake County	Mitch Bernstein, County Sheriff	124 Langevin Avenue, PO Box 367 Red Lake Falls, MN 56750 Telephone: (218) 253-2996
Clearwater County	Mike Erickson, County Sheriff	213 Main Avenue North Bagley, MN 56621 Telephone: (218) 694-6226
Hubbard County	Cory Aukes, County Sheriff	301 Court Ave. Park Rapids, MN 56470 Telephone: (218) 737-3331
Becker County	Kelly Shannon, County Sheriff	925 Lake Ave. Detroit Lakes, MN 56501 Telephone: (218) 847-2661
Wadena County	Mike Carr, County Sheriff	415 So Jefferson St Wadena, MN 56482 Telephone: (218) 631-7600
Cass County	Tom Burch, County Sheriff	303 Minnesota Avenue Walker, MN 56484 Telephone: (218) 547-1424, ext. 309
Crow Wing County	Todd Dahl, County Sheriff	304 Laurel St. Brainerd, MN 56401 Telephone: (218) 829-4749
Aitkin County	Scott Turner, County Sheriff	217 2nd St. NW, Room 185 Aitkin, MN 56431 Telephone: (218) 927-7435
Carlton County	Kelly Lake, County Sheriff	317 Walnut Avenue Carlton, MN 55718 Telephone: (218) 384-3236

Contact Lists North Dakota, Minnesota, and Wisconsin		
State/County	Contact	Address/Telephone
WISCONSIN	TBD, Lead Environmental Inspector	Cellphone: TBD E-mail: TBD
	Sherman Banker, SHPO	Wisconsin Historical Society, Division of Historic Preservation 816 State Street Madison, WI 53706-1488 Telephone: (608) 264-6500
	James M. Robertson, State Geologist	Wisconsin Geological and Natural History Survey 3817 Mineral Point Road Madison, WI 53705-5100 Telephone: (608) 262-1705
Douglas County	Tom Dalbec, County Sheriff	1316 North 14th Street Superior, WI 54880 Telephone: (715) 395-1371