



Sandpiper Pipeline and Line 3 Replacement Projects

Water Resources Application for Project Permits	2
Application Form	2
Supplemental Information (February 2014)	4
Detailed Route Maps (May 2014)	31
Environmental Protection Plan	57
Wetland and Waterbody Delineation Report (provided under separate cover)	
Waterbody Crossing Table (May 2014)	178
Wetland Crossing Table (May 2014)	181
Wetland Mitigation Plan	190
Landowner List	379
Supporting Environmental Data	386
Summary	394
Section 1.0 – Project Purpose and Need	397
Section 2.0 – Authorities and Approvals	400
Section 3.0 – Proposed Project Description	402
Section 4.0 – Alternatives	439
Section 5.0 – Existing Environment	457
Section 6.0 – Environmental Effects	475
Section 7.0 – Cumulative Impacts and Conclusions	513
Section 8.0 – References	523
Appendix A – Environmental Protection Plan	526
Appendix B – Agricultural Protection Plan	645
Appendix C – Unanticipated Discoveries Plan	676

*Page number corresponds to full document (PDF) page number.

Notice: Pursuant to chs. 30 and 31, Wis. Stats., ch. 281, Wis. Stats., and s. 283.33, Wis. Stats., this form is used to apply for coverage under the state construction site storm water runoff general permit, and to apply for a state or federal permit or certification for waterway and wetland projects or dam projects. This form and any required attachments constitute the permit application. Failure to complete and submit this application form may result in a fine and/or imprisonment or forfeiture under the provisions of applicable laws including s. 283.91, Wis. Stats. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Public Records Laws (ss. 19.31-19.39, Wis. Stats.).

Use this form for (select all that apply):

- | | |
|--|---|
| <input type="checkbox"/> Waterway General Permit | <input type="checkbox"/> Storm water NOI - New land disturbing construction activity |
| <input checked="" type="checkbox"/> Waterway Individual Permit | <input type="checkbox"/> Storm water NOI - Renewal FIN # _____ |
| <input type="checkbox"/> Wetland General Permit | <input type="checkbox"/> Work in waters of the U.S. (Army Corps of Engineers) |
| <input checked="" type="checkbox"/> Wetland Individual Permit | <input type="checkbox"/> Dam projects (DNR-ch. 31, Wis. Stats., or Army Corps of Engineers) |

Read all instructions provided before completing. If additional space is needed, attach additional pages.

Section 1: Landowner Information

Landowner Name (first and last name, org. or entity) Refer to Supplemental Information	Authorized Representative Paul Meneghini		
Mailing Address 1409 Hammond Avenue, Second Floor	City Superior	State WI	ZIP Code 54880
Email Address paul.meneghini@enbridge.com	Phone Number (include area code) (715) 398-4573	Alternate Phone Number	

Section 2: Applicant Information Select if same as landowner

Applicant Name (first and last name, org. or entity) Enbridge (U.S.) Inc.	Contact Person Rachael Shetka		
Mailing Address 1409 Hammond Avenue, Second Floor	City Superior	State WI	ZIP Code 54880
Email Address rachael.shetka@enbridge.com	Phone Number (include area code) (715) 398-4699	Alternate Phone Number	

Section 3: Primary Project Contact Select if same as landowner

Consultant Contractor Other – Specify: _____

Name (Ind., Org. or Entity) Merjent, Inc.	Contact Person (first and last name) Naomi Christenson		
Mailing Address 800 Washington Avenue North, Suite 315	City Minneapolis	State MN	ZIP Code 55401
Email Address nchristenson@merjent.com	Phone Number (include area code) (612) 746-1616	Alternate Phone Number	

Section 4: Project or Site Location

Project Name Sandpiper Pipeline and Line 3 Replacement Projects	County Douglas	<input checked="" type="radio"/> City <input type="radio"/> Town <input type="radio"/> Village of Superior
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Location Address/Description

See supplemental information.

Public Land Survey System (PLSS) – Provide the section, range, township information and latitude and longitude in decimal degrees, if available.

_____ ¼ of _____ ¼ of Section _____, Township _____ N, Range _____ E W _____ Latitude _____ Longitude

If this site is not wholly contained in the quarter-quarter section, more description:
 Refer to supplemental information.

Section 5: Pre-Application Resource Screening

Screening your project site for the presence of sensitive natural or cultural resources before applying for a permit can assist you in planning and designing your project to avoid or minimize impacts to these resources. Please identify any screening you have already completed and attach any supporting documentation to your application. If sensitive resources are identified during the permit review, it may result in delays in processing your application and/or project re-design.

Waterways: Provide the name(s) of closest waterbodies:

Refer to supplemental information.

Wetlands: Has the project site been assessed for the presence of wetlands? Yes No

If yes, select all sources of information used and attach supporting report or documentation:

- Wisconsin Wetland Inventory
Wetland Locator Tool - http://dnr.wi.gov/topic/wetlands/locating.html
Wetland Delineation by consultant
NRCS Soils Map
DNR Wetland Identification letter - http://dnr.wi.gov/topic/wetlands/identification.html
DNR Wetland Confirmation letter - http://dnr.wi.gov/topic/wetlands/identification.html
Army Corps of Engineers Concurrence letter
Other:

Are wetlands proposed to be filled, excavated or disturbed during construction or as part of this project? Yes No

Endangered or Threatened Resources:

Has the presence of endangered or threatened resources been evaluated by the DNR Bureau of Natural Heritage Conservation? Yes No

If yes, select how review was completed and attach supporting report or documentation:

- DNR Bureau of Natural Heritage Conservation Letter
Certified Consultant

Section 6: Project Information (attach additional sheets as necessary)

Duration: 01/01/2015 01/01/2016
Anticipated Project Start Date (mm/dd/yyyy) Anticipated Project End Date (mm/dd/yyyy)

Photos: Provide photographs of the "before" condition. Refer to supplement (Appendix C)
Date of Photographs

Project Purpose and Need: Provide a one to two paragraph description of the proposed project, including land and water alterations and intended use(s) of the project.

Please refer to supplemental information.

Section 7: Certification and Permission

Certification: I hereby certify that I am the owner or authorized representative of the owner of the property which is the subject of this Permit Application. I certify that the information contained in this form and attachments is true and accurate. I certify that the project will be in compliance with all permit conditions. I understand that failure to comply with any or all of the provisions of the permit may result in permit revocation and a fine and/or imprisonment or forfeiture under the provisions of applicable laws.

Permission: I hereby give the Department permission to enter and inspect the property at reasonable times, to evaluate this notice and application, and to determine compliance with any resulting permit coverage.

Signature of Landowner / Authorized Representative - For Stormwater applications, signature of landowner is required. Authorized representative is not sufficient.

2/25/2014
Date Signed

Paul Meneghini
Printed Name of Landowner / Authorized Representative

Manager, Major Projects Execution
Title



**Enbridge (U.S.) Inc. and Enbridge Energy, Limited
Partnership
Sandpiper Pipeline and Line 3 Replacement Projects
Douglas County, Wisconsin**

Water Resources Application for Project Permits

Supplemental Information

February 24, 2014



TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	PIPELINE FACILITIES	1
1.2	PROJECT PURPOSE AND NEED	1
1.2.1	Sandpiper Pipeline Project	1
1.2.2	Line 3 Replacement Project	2
1.3	PROJECT LOCATION AND LAND REQUIREMENTS	2
1.3.1	Construction Right-of-Way	4
1.3.2	Additional Temporary Workspace Areas	4
1.3.3	Access Roads	7
1.3.4	Pipe Storage and Contractor Yards	7
1.3.5	Aboveground Facilities	8
2.0	ALTERNATIVES	8
2.1	ROUTE ALTERNATIVES A1 AND A2	11
2.2	ROUTE ALTERNATIVES B1 AND B2	14
2.3	ROUTE ALTERNATIVES C1 AND C2	17
3.0	WATERBODIES AND WETLANDS	20
3.1	WATERBODY CROSSINGS	20
3.1.1	General Impacts and Mitigation	20
3.2	WETLAND CROSSINGS	21
3.2.1	General Impacts and Mitigation	21
3.2.2	Wetland Mitigation	22
4.0	LAND OWNERSHIP	22
5.0	PERMITTING REQUIREMENTS	23

TABLES

Table 1.3-1	Township, Range, and Sections Crossed	4
Table 1.3.3-1	Proposed Access Roads for the Project	7
Table 2.1-1	Environmental Features Comparison – Route Alternatives A1 and A2	11
Table 2.2-1	Environmental Features Comparison – Route Alternatives B1 and B2	14
Table 2.3-1	Environmental Features Comparison – Route Alternatives C1 and C2	17
Table 5.1-1	Agency Permits/Approvals in Wisconsin	23

FIGURES

Figure 1.3-1	Route Overview Map	3
Figure 1.3-2	Typical Right-of-Way Configuration Co-located with Existing Right-of-Way	5
Figure 1.3-3	Typical Greenfield Right-of-Way Configuration	6
Figure 2-1	Overview of Alternatives	9
Figure 2.1-1	Route Alternatives A1 and A2	13
Figure 2.2-1	Route Alternatives B1 and B2	16
Figure 2.3-1	Route Alternatives C1 and C2	19

APPENDICES

- Appendix A – Detailed Route Maps
- Appendix B – Environmental Protection Plan
- Appendix C – Waterbody and Wetland Delineation Report, Forms, and Representative Photos
- Appendix D – Waterbody Crossing Table
- Appendix E – Wetland Crossing Table
- Appendix F – Wetland Mitigation Plan
- Appendix G – Landowner List

ENCLOSURE

Wisconsin Supporting Environmental Data

1.0 INTRODUCTION

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

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

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. 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.

1.1 PIPELINE FACILITIES

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

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

Enbridge prepared this document as a supplement to its Wisconsin Department of Natural Resources (WDNR) Water Resources Application for Project Permits. Enbridge also enclosed a document containing additional environmental data in support of all WDNR permit application submittals for construction and operation of the Projects in Wisconsin (refer to enclosed).

1.2 PROJECT PURPOSE AND NEED

1.2.1 Sandpiper Pipeline Project

The Sandpiper Pipeline Project is a new crude oil pipeline and associated facilities to increase crude oil transportation services from North Dakota to refineries in the Midwest and the East Coast.

The pipeline will deliver an annual capacity of:

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

- 375,000 bpd of crude oil from Clearbrook, Minnesota to Superior, Wisconsin.

The pipeline’s purpose is to transport the growing production of domestic crude oil from the Bakken and Three Forks formations in the Williston Basin¹ of eastern Montana and western North Dakota to meet the increased demands of refineries and markets in the Midwest and the East Coast. Shippers will use the pipeline to transport crude oil to an Enbridge terminal in Superior, Wisconsin. From there, the crude oil can be delivered to various other pipelines and refineries. The pipeline is a positive step toward North American energy security and independence that will increase access to a growing, long-term, and reliable domestic source of energy and decrease reliance on crude oil imports from countries that are often unstable to the United States’ interests.

1.2.2 Line 3 Replacement Project

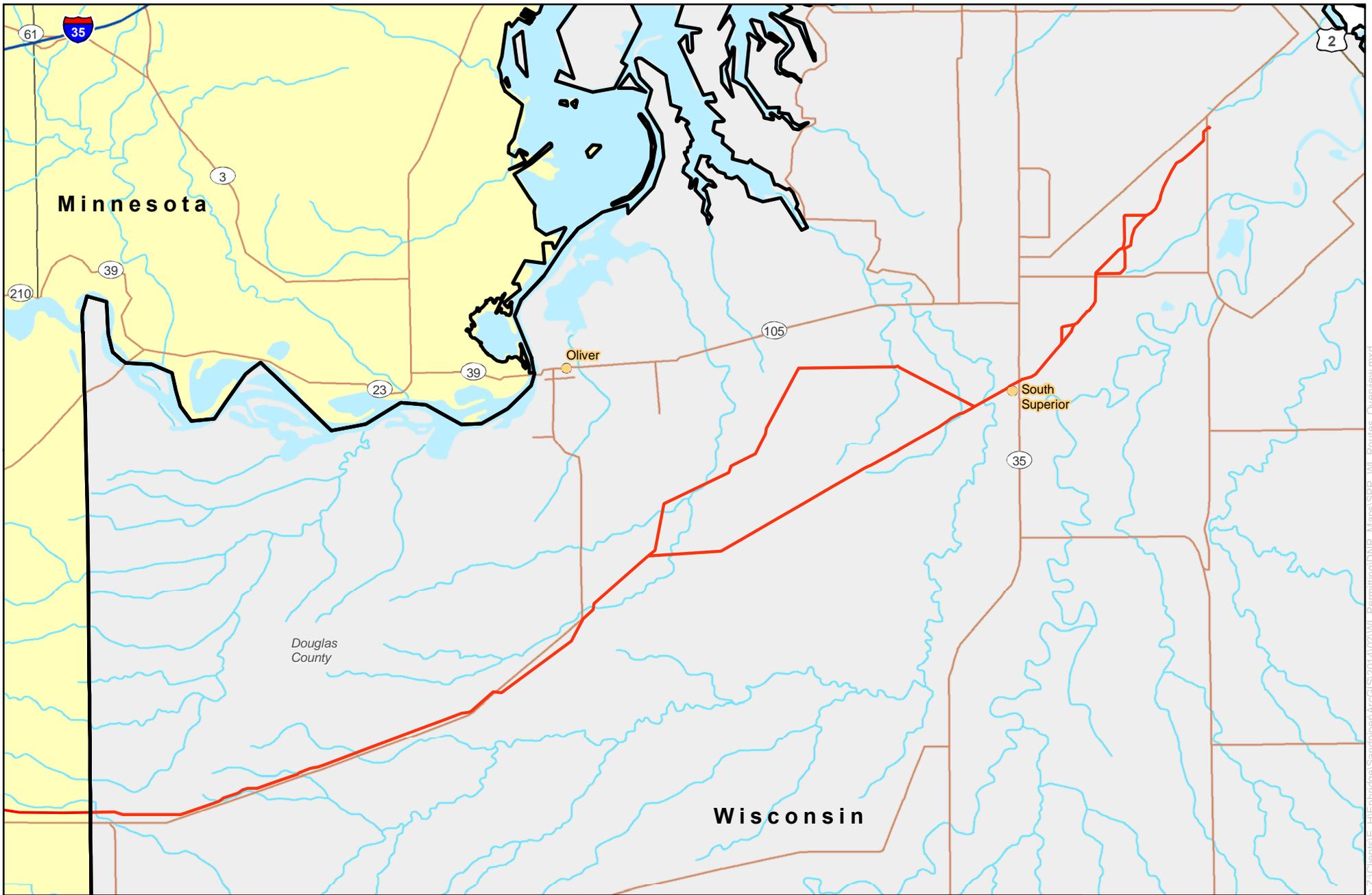
Enbridge owns and operates the 324-mile-long Line 3, originally installed in 1968, as part of its U.S. mainline system. Enbridge conducted thorough internal inspections of Line 3 as part of its ongoing system-wide pipeline integrity program and is electing to replace all of Line 3 in Wisconsin. Replacing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

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

1.3 PROJECT LOCATION AND LAND REQUIREMENTS

The Sandpiper Pipeline and Line 3 Replacement Projects (collectively referred to herein as the “Project” or “Projects”) are located in Douglas County, Wisconsin, as shown on Figure 1.3-1 and on the Detailed Route Maps (refer to Appendix A). Table 1.3-1 includes a list of township, range, and sections the Project crosses.

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.



0 0.5 1
Miles
1 inch = 1.3 miles



Figure 1.3-1
Sandpiper Pipeline and Line 3 Replacement Projects
Route Overview Map

— Route Overview Map



Source: z:\Clients\E_H\Enbridge\Sandpiper\ArcGIS\2014\02\WIL_Permitting\DNR_Maps\SPP_WI_Routes_Overview.mxd
Date: (2/19/2014)

TABLE 1.3-1		
Township, Range, and Sections Crossed		
Township	Range	Sections
T48N	R14W	2, 8, 9, 10, 11, 16, 17, 18, 19, 20
T48N	R15W	24, 25, 26, 27, 31, 32, 33, 34
T49N	R15W	35, 36

1.3.1 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 proposes a 120-foot-wide construction right-of-way for the portions of Route Alternatives A1 and A2 between Irondale Road and the railroad tracks/facility (refer to Section 2.0). Regardless of the selected route in this location, no feasible access road exists to allow for construction traffic to exit the right-of-way at the railroad tracks/facility or to cross the tracks/railyard. Therefore, all traffic must turn around at this point and travel back to the west. In order to facilitate efficient access in the event of an emergency during construction, Enbridge designed the additional 10 feet of workspace to include two lanes of traffic.

When collocated with Enbridge’s existing right-of-way, the spoil side is located within the current permanently maintained right-of-way and the working side is generally located outside of Enbridge’s existing maintained right-of-way. An additional 35 feet of temporary workspace will be required outside of the edge of the new permanent right-of-way (refer to Figures 1.3-2 and 1.3-3).

1.3.2 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 of the typical construction right-of-way to stage equipment, stockpile spoil material, and conduct material fabrication and assembly. Enbridge identified known ATWS areas on its Detailed Route Maps (Appendix A). In some cases, due to site-specific conditions, ATWS may be sited within wetland boundaries.

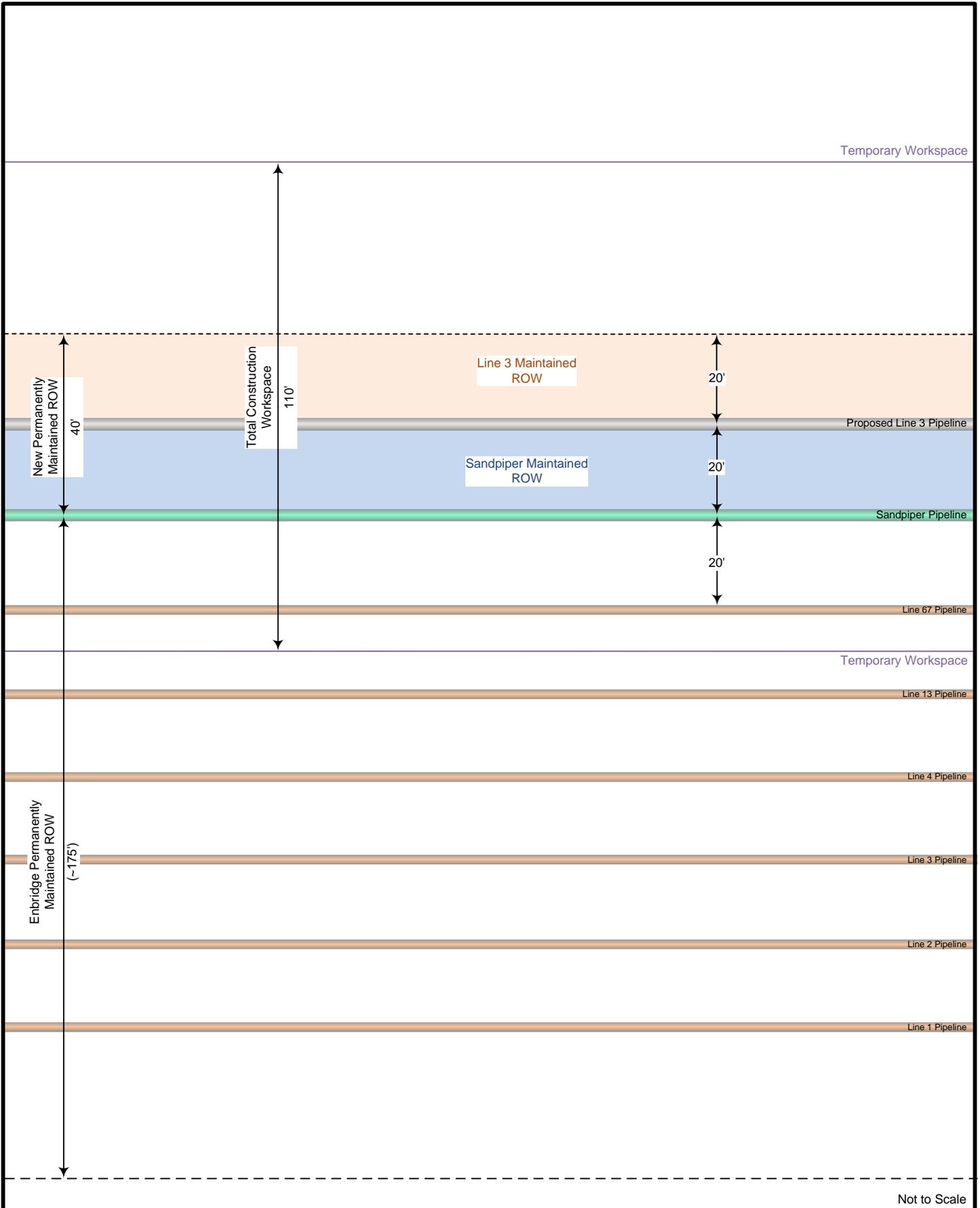
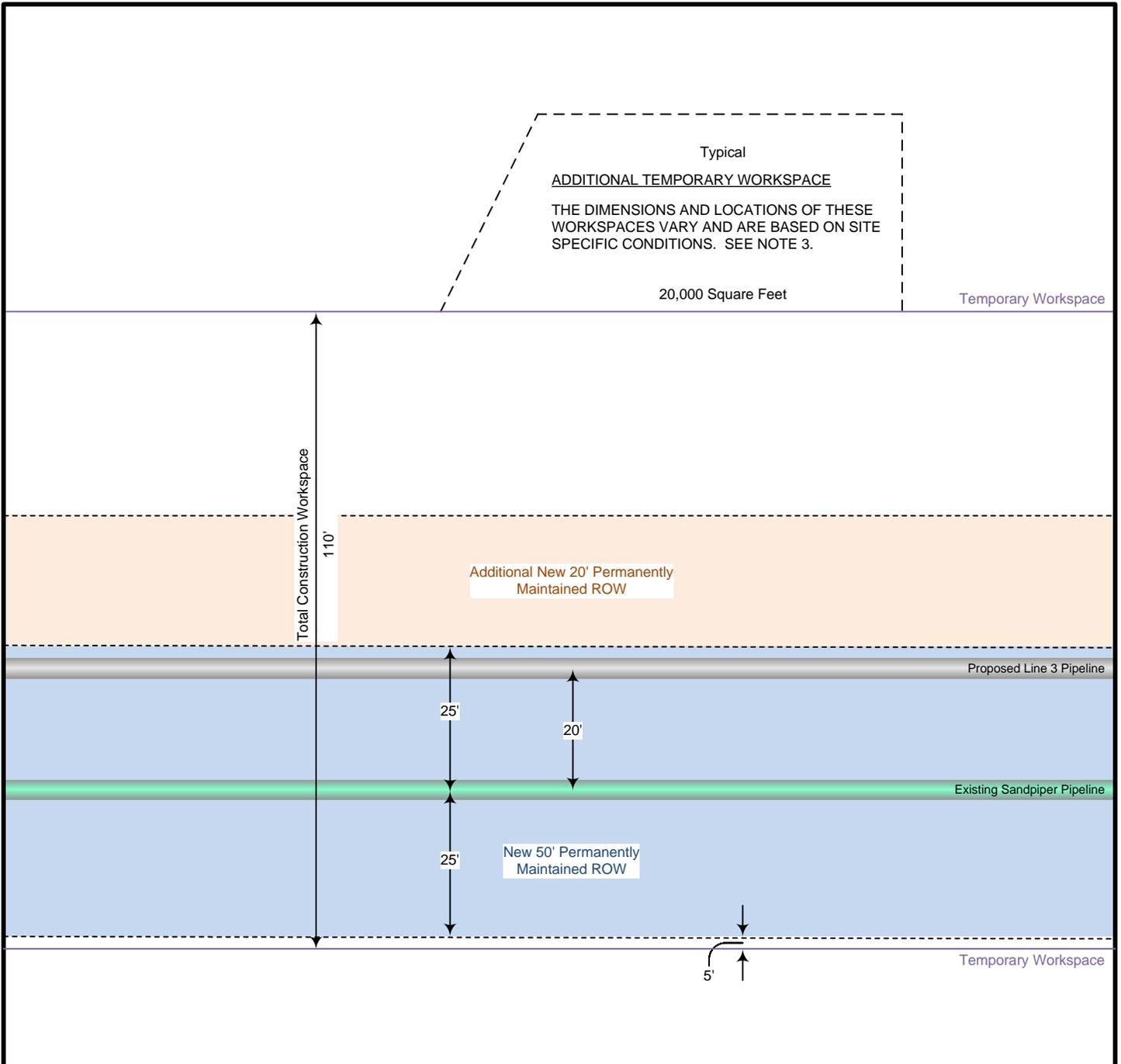


Figure 1.3-2
Line 3 Replacement and Sandpiper Pipeline Projects
 Typical Right-of-Way Configuration Co-Located with Existing Right-of-Way
 (Wisconsin Only)



NOTES:

1. ENBRIDGE WILL TYPICALLY UTILIZE A 110-FOOT-WIDE CONSTRUCTION WORKSPACE TO INSTALL THE PIPELINES AND WILL HAVE A 20-FOOT OFFSET FROM EXISTING PIPELINE.
2. OF THE 110-FOOT-WIDE CONSTRUCTION FOOTPRINT, THE SANDPIPER PIPELINE WILL HAVE A NEW 50-FOOT-WIDE PERMANENTLY MAINTAINED RIGHT-OF-WAY AND THE LINE 3 REPLACEMENT PIPELINE WILL HAVE A NEW 20-FOOT-WIDE PERMANENTLY MAINTAINED RIGHT-OF-WAY. THE REMAINING 40 FEET WILL BE USED AS TEMPORARY WORKSPACE.
3. ADDITIONAL TEMPORARY WORKSPACE MAY BE REQUIRED AT CIVIL AND ENVIRONMENTAL CROSSINGS OF UP TO 20,000 SQUARE FEET ON EACH SIDE OF THE CROSSING. THESE ADDITIONAL TEMPORARY WORKSPACES ARE GENERALLY USED AT ROAD, RAILROAD, WATERBODY, WETLAND CROSSING, AND UTILITY CROSSINGS. ADDITIONAL TEMPORARY WORKSPACE REQUIREMENTS WILL VARY PENDING TYPE OF CROSSING AND ANY SPECIAL CONDITIONS OR ENVIRONMENTAL FEATURES.

Not to Scale



Figure 1.3-3
Line 3 Replacement and Sandpiper Pipeline Projects
 Typical Greenfield Right-of-Way Configuration
 (Wisconsin Only)

1.3.3 Access Roads

Enbridge proposes to use existing public and private roads to access the right-of-way and facilities to the extent practicable. Enbridge will limit access to either the construction right-of-way, or existing roads that require no modifications or impacts on wetlands. In the event a new temporary road is necessary, Enbridge will obtain applicable regulatory approvals prior to using the new access. A list of currently proposed access roads is included in Table 1.3.3-1.

TABLE 1.3.3-1		
Proposed Access Roads for the Project		
Access Road ID	Approximate Milepost (Intersects with Pipeline)	Public/Private Road
A-456	601.12	Private
A-457	602.03	Private
A-458	602.30	Private
A-459	602.63	Private
A-460	603.07	Private
A-461	603.34	Private
A-462	603.60	Private
A-463	604.61	Private
A-464	604.76	Private
A-465	605.89	Private
A-466	606.32	Private
A-466.1	607.53	Private
A-467	610.61	Private
A-468	610.91	Public

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

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

1.3.4 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.

1.3.5 Aboveground Facilities

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

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

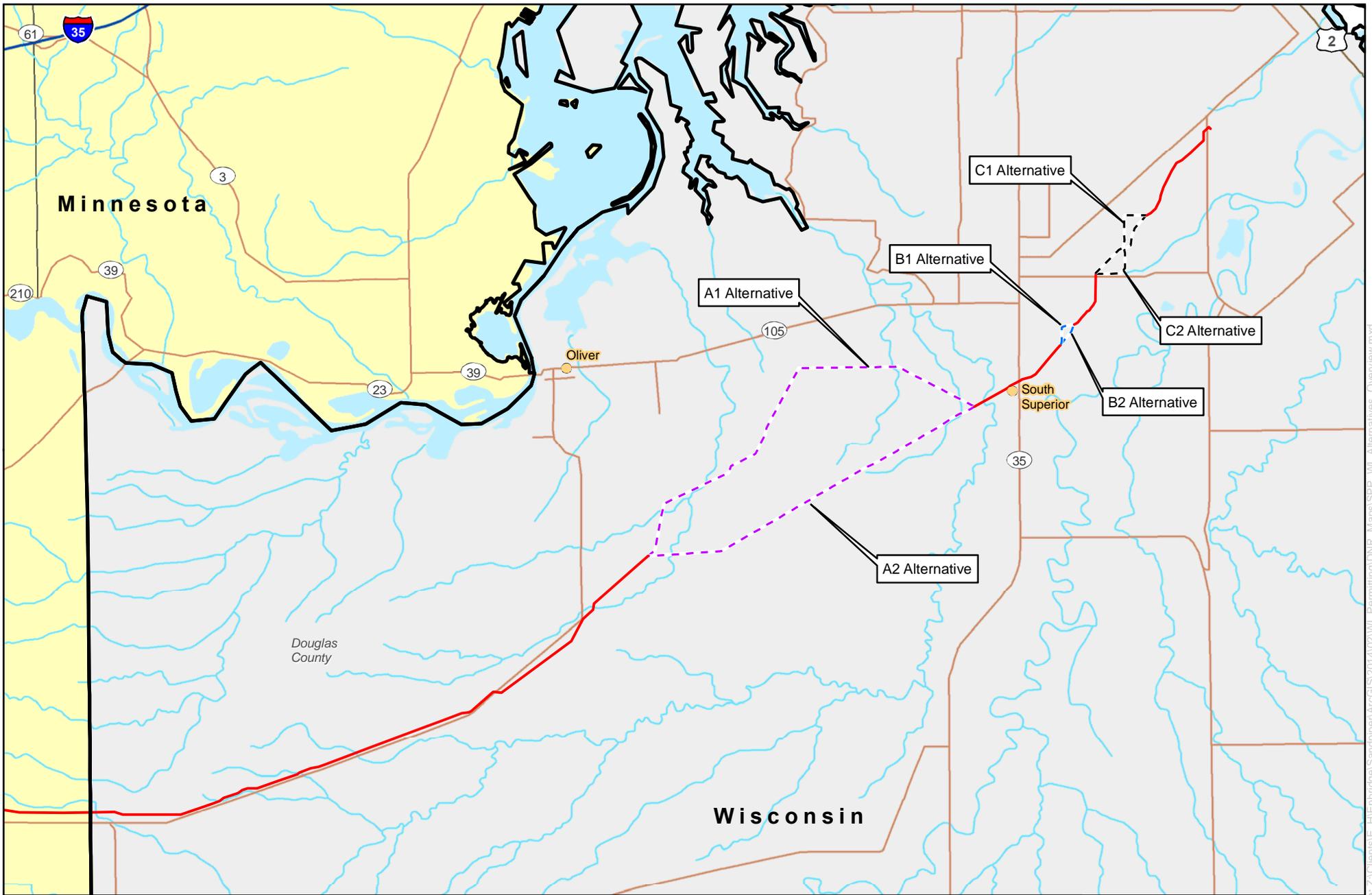
2.0 ALTERNATIVES

Enbridge identified and evaluated alternatives to the Project to determine whether the alternatives would be reasonable and environmentally preferable, including the no-action alternative, system alternatives, and route alternatives.

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." Enbridge completed a "Practicable Alternatives Analysis" (Wis. Admin. Code § NR 103.07(2)) 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.

Refer to Sections 2.0 and 3.0 of the enclosed Supporting Environmental Data document for detailed information on Enbridge's alternatives analysis.

Enbridge considered the corridor for which it received authorization to construct its most recent projects (Alberta Clipper and Southern Lights pipelines) as the baseline for this analysis. Therefore, Enbridge conducted a detailed quantitative analysis of environmental impacts for only those areas that may deviate from the previously permitted construction right-of-way (refer to Figure 2-1).



0 0.5 1
Miles
1 inch = 1.3 miles



Figure 2-1
Sandpiper Pipeline and Line 3 Replacement Projects
Overview of Alternatives

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



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

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

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

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

Because Enbridge will not allow trees and shrubs to fully regenerate within the permanent maintained right-of-way to facilitate aerial inspections, impacts on forested wetlands will be long-term and impacts within the permanent right-of-way will represent a conversion of forested wetlands to scrub-shrub or emergent wetlands.

2.1 ROUTE ALTERNATIVES A1 AND A2

Due to the proximity to existing residences and the Pokegama-Carnegie State Natural Area (SNA), Enbridge prepared an evaluation of Route Alternatives A1 and A2 between approximately MPs 607.0 and 611.2 (refer to Figure 2.1-1). Table 2.1-1 provides a comparison of the prominent land use features of these alternatives.

Alternative A2 follows the existing Enbridge corridor through the Pokegama-Carnegie SNA. Although Alternative A1 has a greater wetland impact and contributes to additional forested fragmentation in the area it avoids the SNA. For this reason, Enbridge prefers Alternative A1; however, final routing is subject to WDNR review.

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

SANDPIPER PIPELINE AND LINE 3 REPLACEMENT PROJECTS
DOUGLAS COUNTY, WISCONSIN
WATER RESOURCES APPLICATION FOR PROJECT PERMITS – SUPPLEMENTAL INFORMATION
FEBRUARY 24, 2014

TABLE 2.1-1			
Environmental Features Comparison –Route Alternatives A1 and A2			
Environmental Features	Unit	Route Alternative A1	Route Alternative A2
^a		Greenfield locations include, for purposes of the alternatives analysis, as areas where the route is not within 200 feet of an existing right-of-way.	
^b		Based on field delineated data from Fall 2013 surveys. Where 2013 survey was not completed, Enbridge utilized recent (2008 / 2009) wetland and waterbody field data from a previous project and WWI data.	
^c		Crossing length of proposed pipeline centerline across wetlands.	
^d		Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.	
^e		Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.	
^f		Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.	
^g		Identified by the WDNR and Great Lakes Indian Fish and Wildlife Commission.	

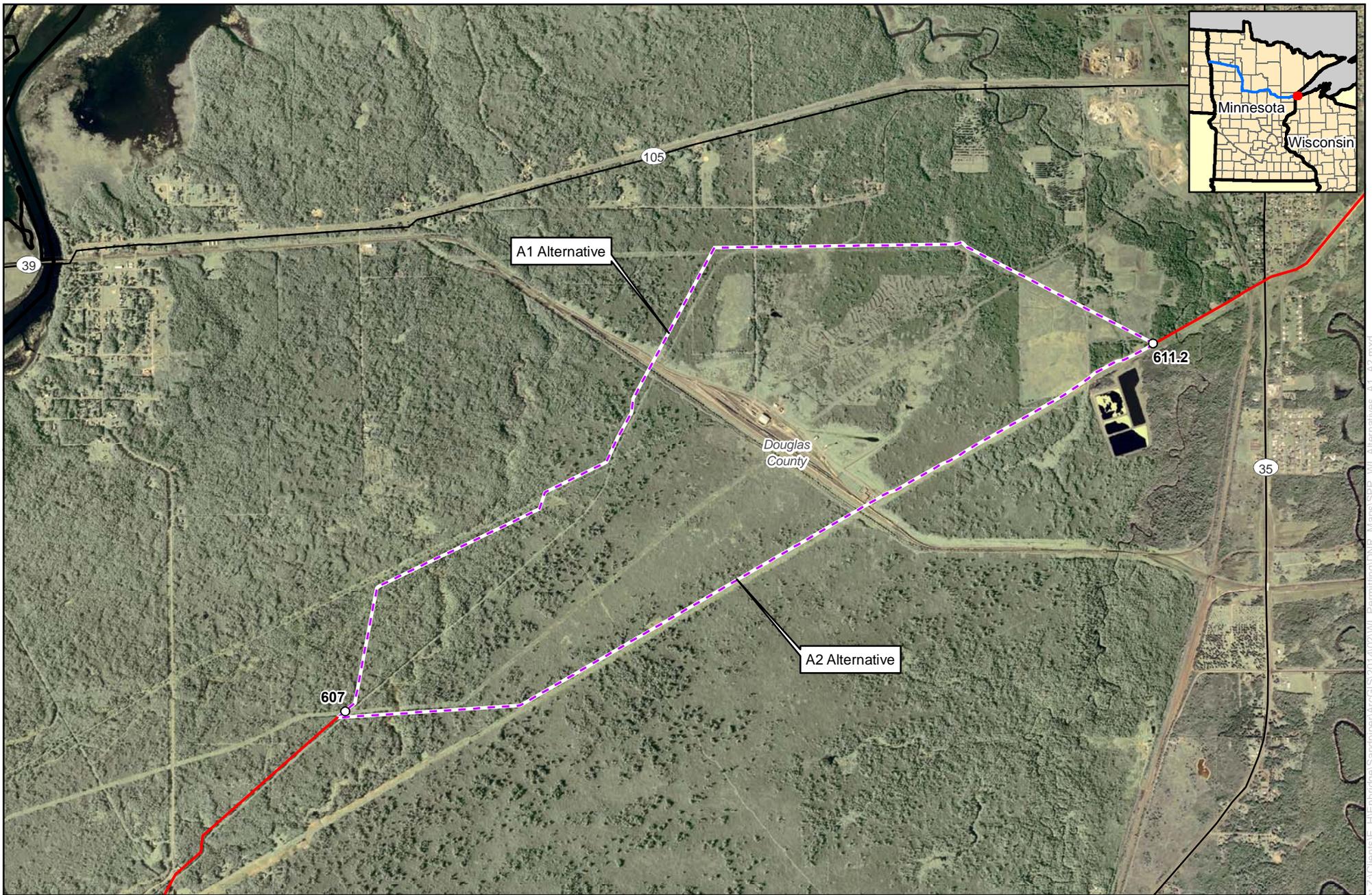


Figure 2.1-1
Sandpiper Pipeline and Line 3 Replacement Projects
 Route Alternatives A1 and A2



2.2 ROUTE ALTERNATIVES B1 AND B2

Enbridge prepared an evaluation of Route Alternatives B1 and B2 between MPs 612.2 and 612.5 (refer to Figure 2.2-1) due to outstanding legal issues with a landowner. The legal issues include the rights and interests involved in particular real property and have ascended to the Wisconsin State Supreme Court and are now on remand to the Circuit Court of Douglas County. Enbridge developed these route alternatives because the final resolution of the legal issues is indeterminable at this time. Therefore, Enbridge prefers Route Alternative B1 even though it deviates from the existing corridor and results in additional greenfield land crossed. Table 2.2-1 provides a comparison of the prominent land use features of these alternatives.

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

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

SANDPIPER PIPELINE AND LINE 3 REPLACEMENT PROJECTS
DOUGLAS COUNTY, WISCONSIN
WATER RESOURCES APPLICATION FOR PROJECT PERMITS – SUPPLEMENTAL INFORMATION
FEBRUARY 24, 2014

TABLE 2.2-1			
Environmental Features Comparison –Route Alternatives B1 and B2			
Environmental Features	Unit	Route Alternative B1	Route Alternative B2
b		Based on field delineated data from Fall 2013 surveys. Where 2013 survey was not completed, Enbridge utilized recent (2008 / 2009) wetland and waterbody field data from a previous project and WWI data.	
c		Crossing length of proposed pipeline centerline across wetlands.	
d		Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.	
e		Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.	
f		Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.	
g		Identified by the WDNR and Great Lakes Indian Fish and Wildlife Commission.	



Figure 2.2-1
Sandpiper Pipeline and Line 3 Replacement Projects
 Route Alternatives B1 and B2



2.3 ROUTE ALTERNATIVES C1 AND C2

Enbridge prepared an evaluation of Route Alternatives C1 and C2 located at approximately MPs 613.1 to 614.0 (refer to Figure 2.3-1) due to the Nemadji Golf Course. Table 2.3-1 provides a comparison of the prominent land use features of these alternatives.

Alternative C2 shorter than Alternative C1, and would cross less greenfield land, forest land, and wetlands. However, Alternative C2 would impact the operation of the Nemadji Golf Course during construction and restoration. For this reason, Enbridge prefers Alternative C1; however, final routing is subject to WDNR review.

TABLE 2.3-1			
Environmental Features Comparison –Route Alternatives C1 and C2			
Environmental Features	Unit	Route Alternative C1	Route Alternative C2
Length	miles	0.9	0.9
Adjacent to Existing Right-of-Way	miles	0.0	0.4
Greenfield Route ^a	miles	0.4	0.0
Wetland Crossing Length ^{b, c}	miles	0.8	0.3
Wetland Impact - Construction ^{b, d}			
PEM	acres	3.5	2.9
PSS	acres	8.0	2.4
PFO	acres	0.6	0.0
Wetland Impact - Operation ^{b, e}			
PEM	acres	0.0	0.0
PSS	acres	6.0	0.0
PFO	acres	0.6	0.0
Rare Plant Occurrences ^b	number	56	20
Hydric Soils	acres	13.2	11.9
Highly Wind Erodible Soils	acres	0.0	0.0
Agricultural Land	acres	0.0	0.0
Herbaceous Land	acres	1.2	0.5
Upland Forest	acres	7.5	0.4
Prime Farmland Soils	acres	0.0	0.0
Intermittent Waterbodies Crossed ^b	number	7	4
Ephemeral Waterbodies Crossed ^b	number	0	0
Perennial Waterbodies Crossed ^b	number	0	0
Lake Superior National Estuarine Research Reserve Properties	number	0	0
Priority Wetlands ^e	miles	0.0	0.0
Priority Navigable Waterway	number	0	0
Areas of Special Natural Resource Interest	miles	0.0	0.0
Wild Rice Production Area Drainages ^f	miles		
DNR Managed Lands	miles	0.0	0.0
State, County or Municipal Forest Land	miles	0.0	0.0
Railroads Crossed	number	1	1
Roads Crossed	number	0	0
Residences within 300 feet	number	0	0

^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.

SANDPIPER PIPELINE AND LINE 3 REPLACEMENT PROJECTS
DOUGLAS COUNTY, WISCONSIN
WATER RESOURCES APPLICATION FOR PROJECT PERMITS – SUPPLEMENTAL INFORMATION
FEBRUARY 24, 2014

TABLE 2.3-1			
Environmental Features Comparison –Route Alternatives C1 and C2			
Environmental Features	Unit	Route Alternative C1	Route Alternative C2
b		Based on field delineated data from Fall 2013 surveys. Where 2013 survey was not completed, Enbridge utilized recent (2008 / 2009) wetland and waterbody field data from a previous project and WWI data.	
c		Crossing length of proposed pipeline centerline across wetlands.	
d		Area of wetland impact within the construction workspace based typically on a 110-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.	
e		Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.	
f		Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.	
g		Identified by the WDNR and Great Lakes Indian Fish and Wildlife Commission.	



Figure 2.3-1
Sandpiper Pipeline and Line 3 Replacement Projects
 Route Alternatives C1 and C2



3.0 WATERBODIES AND WETLANDS

Project activities within waterbodies include the installation of temporary bridge crossings over waterbodies for the purpose of moving construction equipment across the feature and the installation of the two pipelines beneath the bed of the waterbody. Project activities also include the installation of the two pipelines along approximately 11.7 miles of wetlands.

Enbridge requests the following permits and approvals for the Project:

- Temporary Bridges (Wis. Stat. §30.123);
- Grading (Wis. Stat. §30.19);
- Utility Crossing (Wis. Stat. § 30.20 and 30.12);
- Individual Wetland Permit (Wis. Stat. § 281.36); and
- Water Quality Certifications (NR 103 and 299).

Enbridge collected wetland and waterbody data during late summer and early fall of 2013 on all accessible tracts along Project route and alternatives. Enbridge used WWI and NHD data in areas to be surveyed in the spring of 2014. The waterbody and wetland delineation report for the 2013 surveys is provided as Appendix C.

3.1 WATERBODY CROSSINGS

Field investigators classified each waterbody (perennial, intermittent, or ephemeral) on-site, including a review of topographic maps, and other published data.

Appendix D includes a waterbody crossing table with the specific crossing methods Enbridge proposes to implement.

3.1.1 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.

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 equipment operation within waterbodies to the area necessary to complete the crossing. Enbridge will restore and stabilize disturbed areas at crossings as soon as practical after pipeline installation.

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 and perform routine removal of brush and trees; however, little disturbance is expected within the permanent right-of-way.

3.2 WETLAND CROSSINGS

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 included a delineation report including representative photos, data sheets, and maps as Appendix C.

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.

Appendix E includes a wetland crossing table identifying Project impacts.

3.2.1 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 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 (refer to Section 3.0 the EPP in Appendix B for additional details).

3.2.2 Wetland Mitigation

Enbridge proposes to mitigate for wetland impacts through a Project-specific consolidated wetland mitigation site located in the Nemadji River watershed. Appendix F includes the Wetland Mitigation Compensation Site Plan.

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

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

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

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

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

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

4.0 LAND OWNERSHIP

The Project route predominantly crosses private lands located outside of municipal areas. The Project will not cross federal or Native American Reservation land. The Project crosses land owned by the City and Village of Superior, and Douglas County Forest.

The Project will cross approximately 0.2-mile of Douglas County Forest, as well as either an additional 1.6 or 2.6 miles depending on which Route Alternative (A1 or A2) is selected (refer to Section 2.1). The

SANDPIPER PIPELINE AND LINE 3 REPLACEMENT PROJECTS
DOUGLAS COUNTY, WISCONSIN
WATER RESOURCES APPLICATION FOR PROJECT PERMITS – SUPPLEMENTAL INFORMATION
FEBRUARY 24, 2014

woodlands crossed are primarily residential property, recreation, and/or domestic wood products. Also, 0.3-mile of state WDNR-managed land will be crossed.

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.

A listing of the landowners along the Project route and alternatives is provided as Appendix G.

5.0 PERMITTING REQUIREMENTS

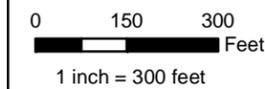
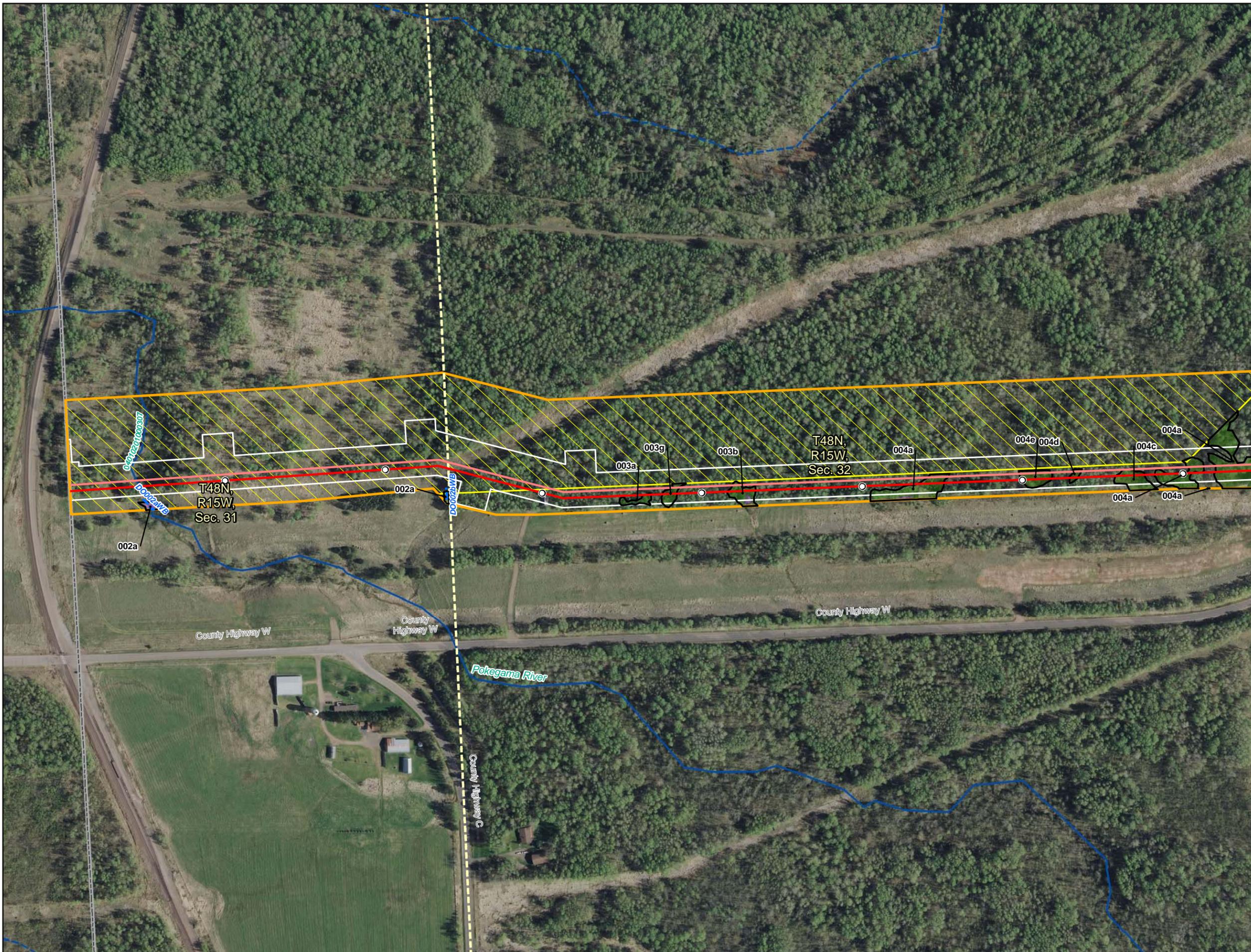
The required local, state, and federal permits for the Project work in Wisconsin are provided in Table 5.1-1.

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

SANDPIPER PIPELINE AND LINE 3 REPLACEMENT PROJECTS
 DOUGLAS COUNTY, WISCONSIN
 WATER RESOURCES APPLICATION FOR PROJECT PERMITS – SUPPLEMENTAL INFORMATION
 FEBRUARY 24, 2014

TABLE 5.1-1				
Agency Permits/Approvals in Wisconsin				
Name of Agency	Title of Permit/Approval	Date of Application ^a	Date of Decision ^b	Status
^a Actual date of initial consultation/anticipated dates for submission. ^b Projected dates of action.				

Appendix A
Detailed Route Maps



- Milepost
- Sandpiper Centerline
- - - Sandpiper Alternative
- Line 3 Centerline
- - - Line 3 Alternative
- Construction Workspace
- ▨ Survey Area
- ▨ 2013 Field Survey Not Complete
- - - Field Delineated Waterbody
- - - Section Boundary

- Wetlands**
- 2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI
- PEM
 - PFO
 - PSS
 - PUB

- National Hydrography Dataset**
- Perennial Stream
 - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A Exhibit A-1 Detailed Route Map

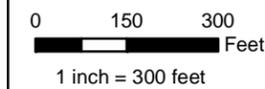
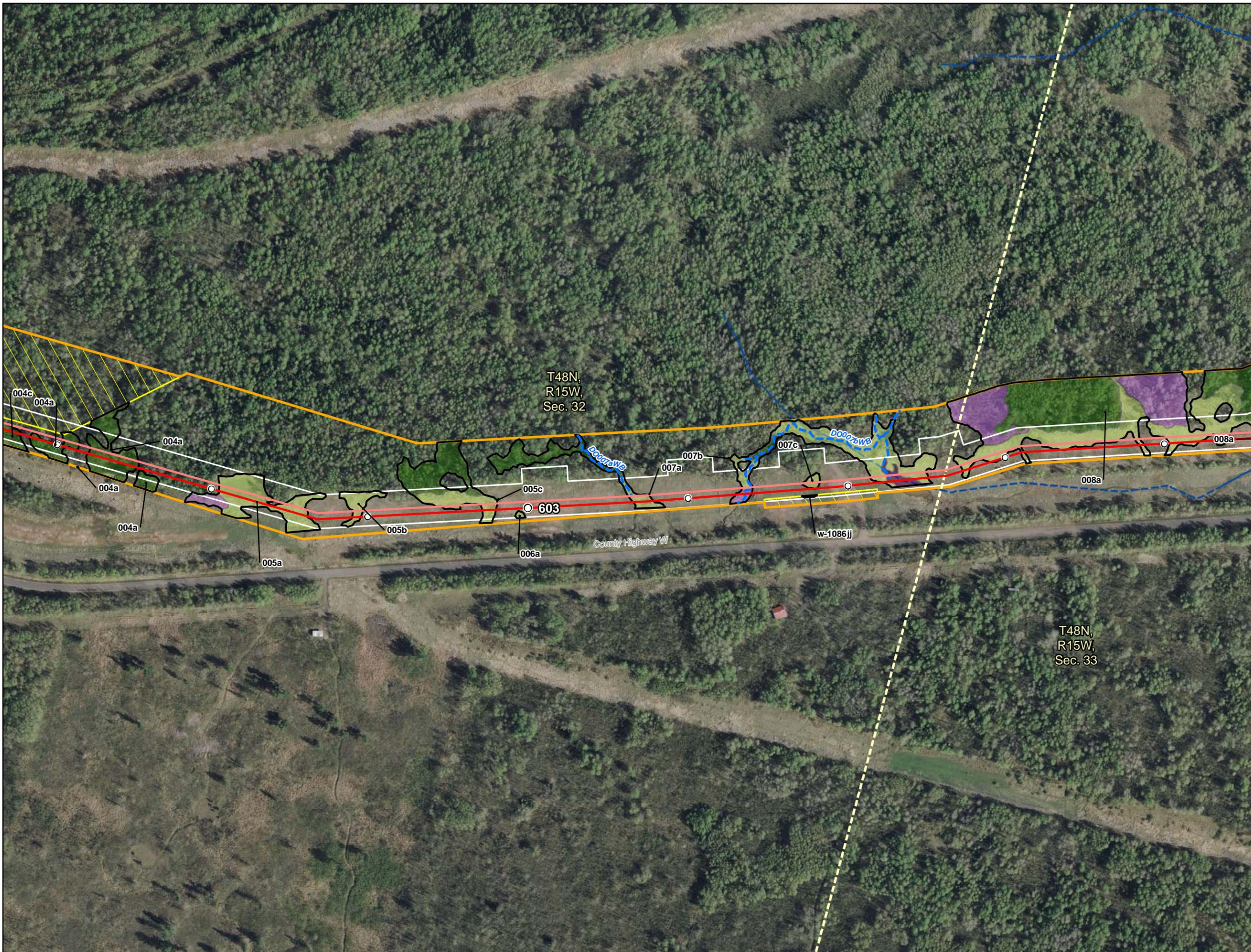
Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin



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- Milepost
- Sandpiper Centerline
- - - Sandpiper Alternative
- Line 3 Centerline
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- Construction Workspace
- ▭ Survey Area
- ▨ 2013 Field Survey Not Complete
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- - - Section Boundary
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- PEM
- PFO
- PSS
- PUB
- National Hydrography Dataset**
- Perennial Stream
- - - Intermittent Stream
- Canal/Ditch
- Waterbody

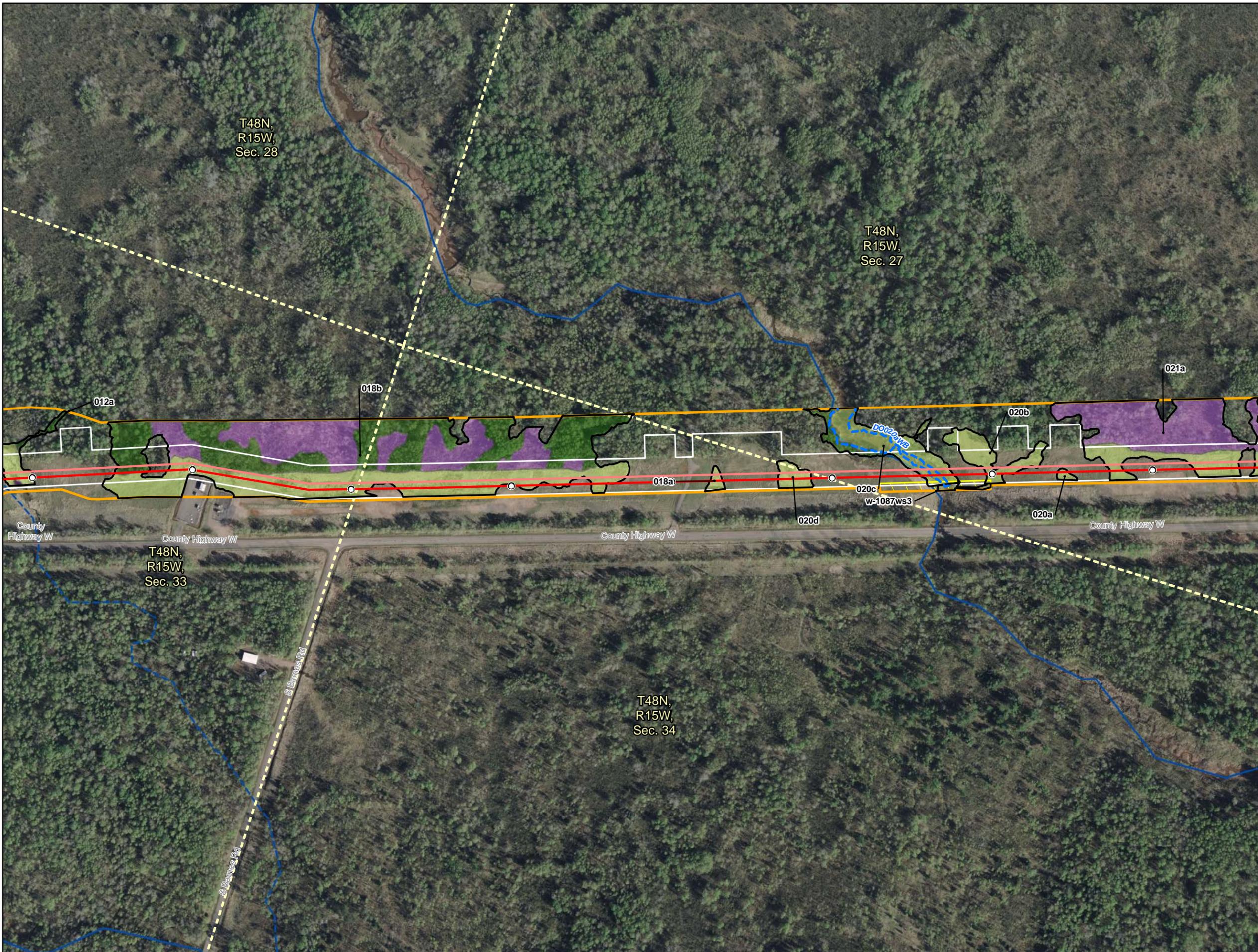
**Appendix A
Exhibit A-2
Detailed Route Map**

**Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project**

**(Field Delineated and WWI
Wetlands and Waterbodies)**

Douglas County, Wisconsin





- Milepost
 - Sandpiper Centerline
 - - - Sandpiper Alternative
 - Line 3 Centerline
 - - - Line 3 Alternative
 - Construction Workspace
 - Survey Area
 - 2013 Field Survey Not Complete
 - Field Delineated Waterbody
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- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-4
Detailed Route Map

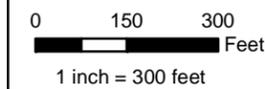
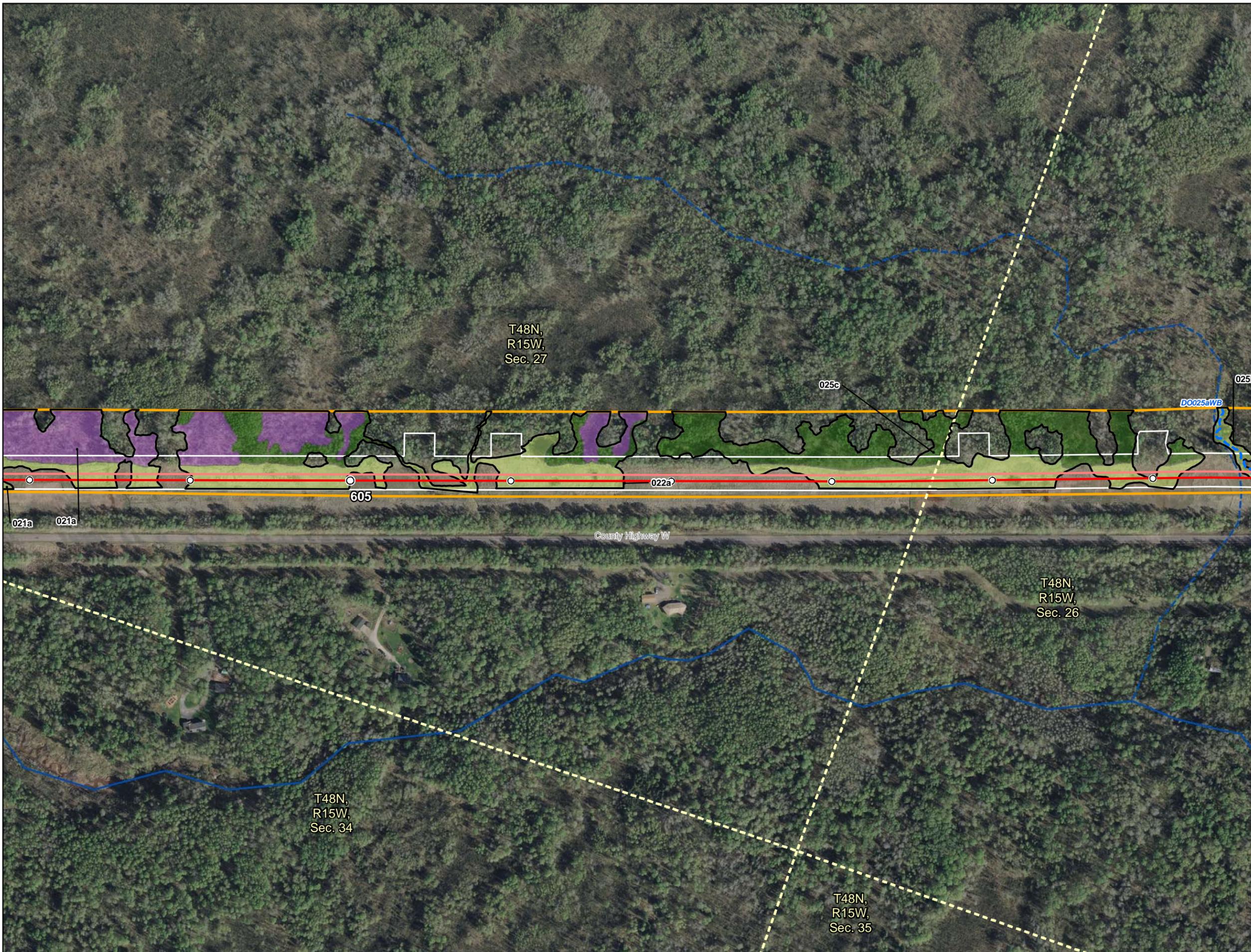
Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin

Date: (5/23/2014) 5/23/2014

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- Milepost
 - Sandpiper Centerline
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 - - - Line 3 Alternative
 - Construction Workspace
 - ▭ Survey Area
 - ▭ 2013 Field Survey Not Complete
 - - - Field Delineated Waterbody
 - - - Section Boundary
- Wetlands**
- 2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI**
- ▭ PEM
 - ▭ PFO
 - ▭ PSS
 - ▭ PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - ▭ Waterbody

**Appendix A
Exhibit A-5
Detailed Route Map**

**Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project**

**(Field Delineated and WWI
Wetlands and Waterbodies)**

Douglas County, Wisconsin





- Milepost
 - Sandpiper Centerline
 - - - Sandpiper Alternative
 - Line 3 Centerline
 - - - Line 3 Alternative
 - Construction Workspace
 - Survey Area
 - 2013 Field Survey Not Complete
 - - - Field Delineated Waterbody
 - - - Section Boundary
- Wetlands**
2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI
- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

**Appendix A
 Exhibit A-6
 Detailed Route Map**

**Sandpiper Pipeline Project and
 Line 3 Replacement -
 Phase 2 Project**

**(Field Delineated and WWI
 Wetlands and Waterbodies)**

Douglas County, Wisconsin



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- Milepost
 - Sandpiper Centerline
 - - - Sandpiper Alternative
 - Line 3 Centerline
 - - - Line 3 Alternative
 - Construction Workspace
 - Survey Area
 - 2013 Field Survey Not Complete
 - Field Delineated Waterbody
 - Section Boundary
- Wetlands**
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 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
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 - Canal/Ditch
 - Waterbody

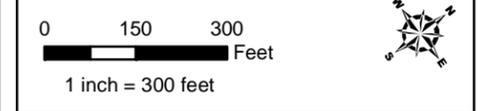
**Appendix A
Exhibit A-7
Detailed Route Map**

**Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project**

**(Field Delineated and WWI
Wetlands and Waterbodies)**

Douglas County, Wisconsin





- Milepost
 - Sandpiper Centerline
 - - - Sandpiper Alternative
 - Line 3 Centerline
 - - - Line 3 Alternative
 - Construction Workspace
 - Survey Area
 - 2013 Field Survey Not Complete
 - Field Delineated Waterbody
 - Section Boundary
- Wetlands**
- 2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI**
- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-8
Detailed Route Map

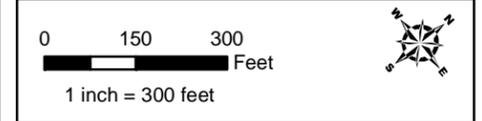
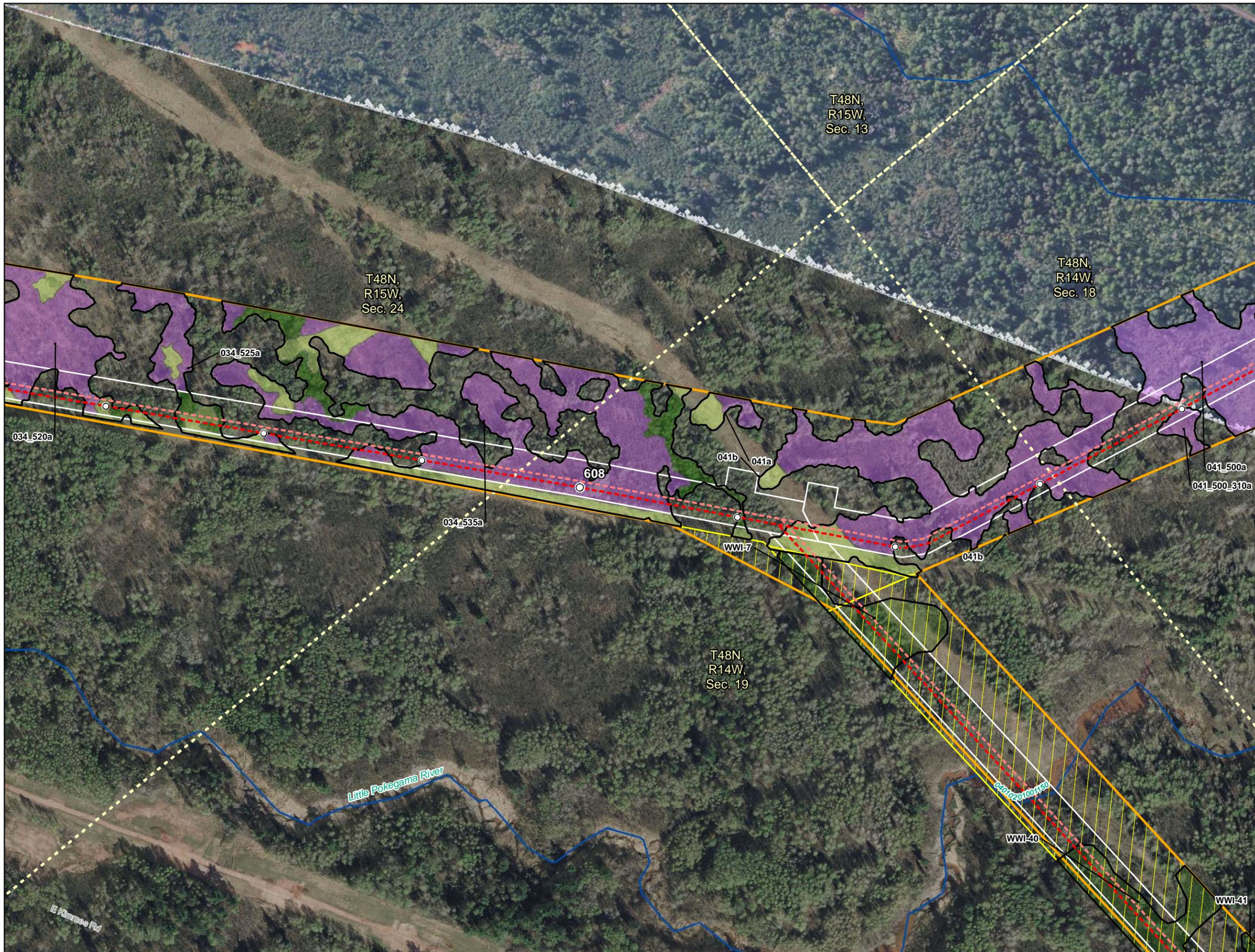
Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin



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- Milepost
 - Sandpiper Centerline
 - - - Sandpiper Alternative
 - Line 3 Centerline
 - - - Line 3 Alternative
 - Construction Workspace
 - Survey Area
 - 2013 Field Survey Not Complete
 - Field Delineated Waterbody
 - Section Boundary
- Wetlands**
- 2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI**
- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-9
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin

5/23/2014

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T48N,
R15W,
Sec. 13

T48N,
R14W,
Sec. 18

T48N,
R14W,
Sec. 19



- Milepost
 - Sandpiper Centerline
 - - - Sandpiper Alternative
 - Line 3 Centerline
 - - - Line 3 Alternative
 - Construction Workspace
 - Survey Area
 - 2013 Field Survey Not Complete
 - - - Field Delineated Waterbody
 - - - Section Boundary
- Wetlands**
- 2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI**
- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-10
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

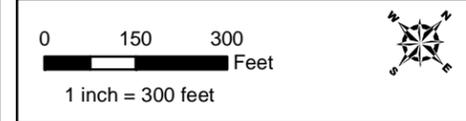
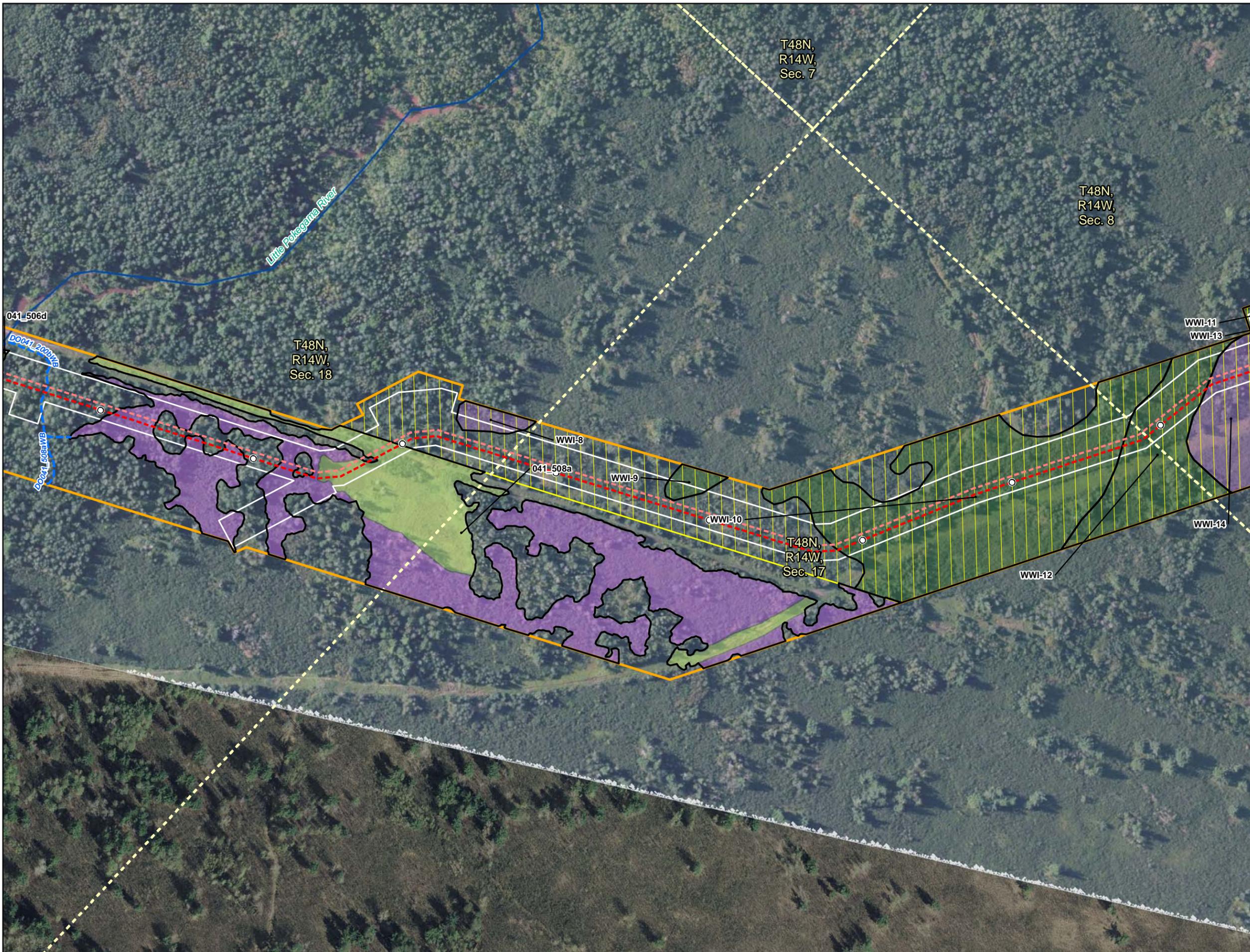
(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin



5/23/2014

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- Milepost
 - Sandpiper Centerline
 - - - Sandpiper Alternative
 - Line 3 Centerline
 - - - Line 3 Alternative
 - Construction Workspace
 - Survey Area
 - 2013 Field Survey Not Complete
 - Field Delineated Waterbody
 - Section Boundary
- Wetlands**
- 2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI**
- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-11
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin

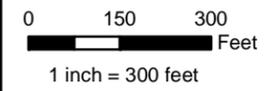
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T48N,
R14W,
Sec. 7

T48N,
R14W,
Sec. 8

T48N,
R14W,
Sec. 17



- Milepost
- Sandpiper Centerline
- - - Sandpiper Alternative
- Line 3 Centerline
- - - Line 3 Alternative
- Construction Workspace
- Survey Area
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- PUB
- National Hydrography Dataset**
- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody

**Appendix A
Exhibit A-12
Detailed Route Map**

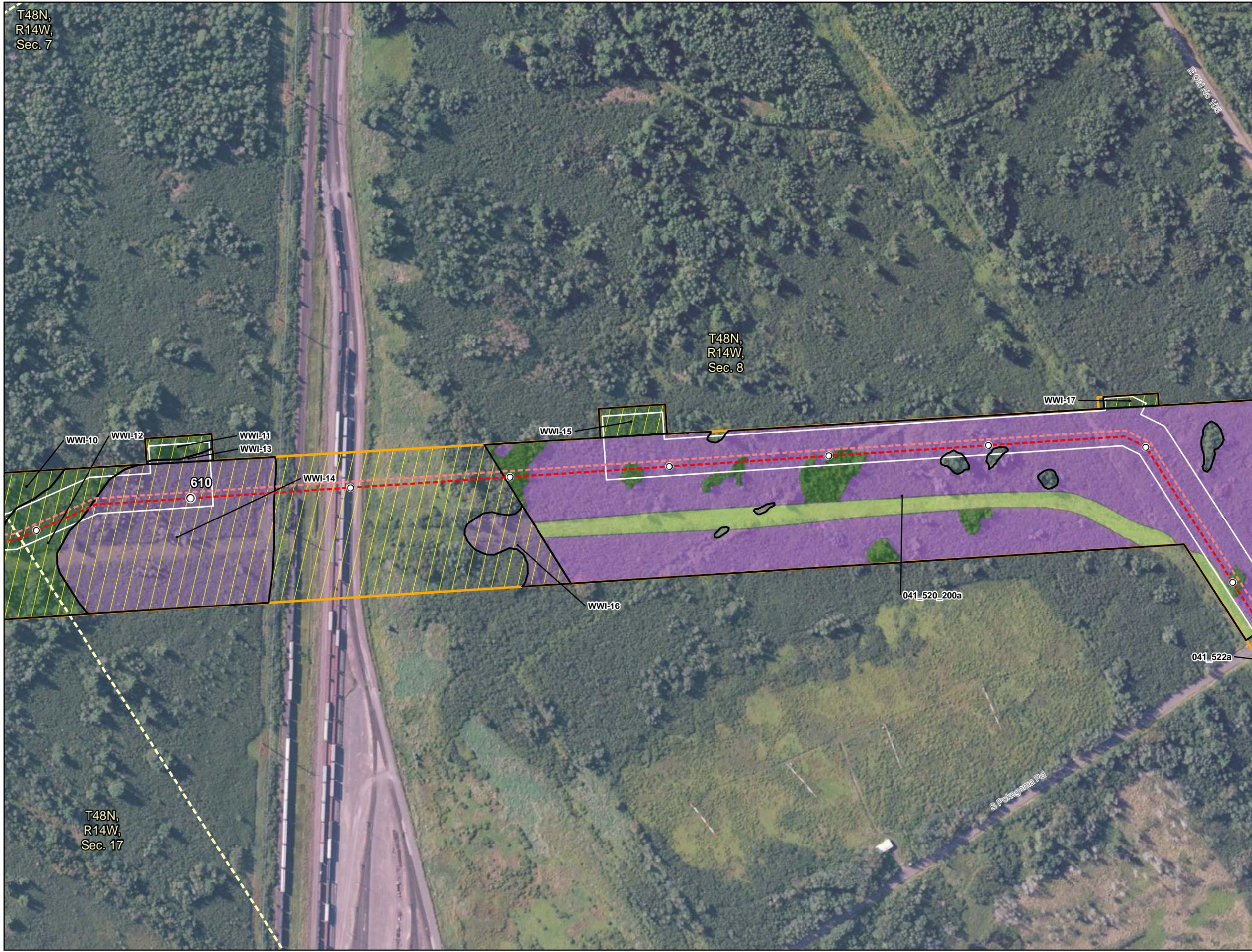
**Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project**

**(Field Delineated and WWI
Wetlands and Waterbodies)**

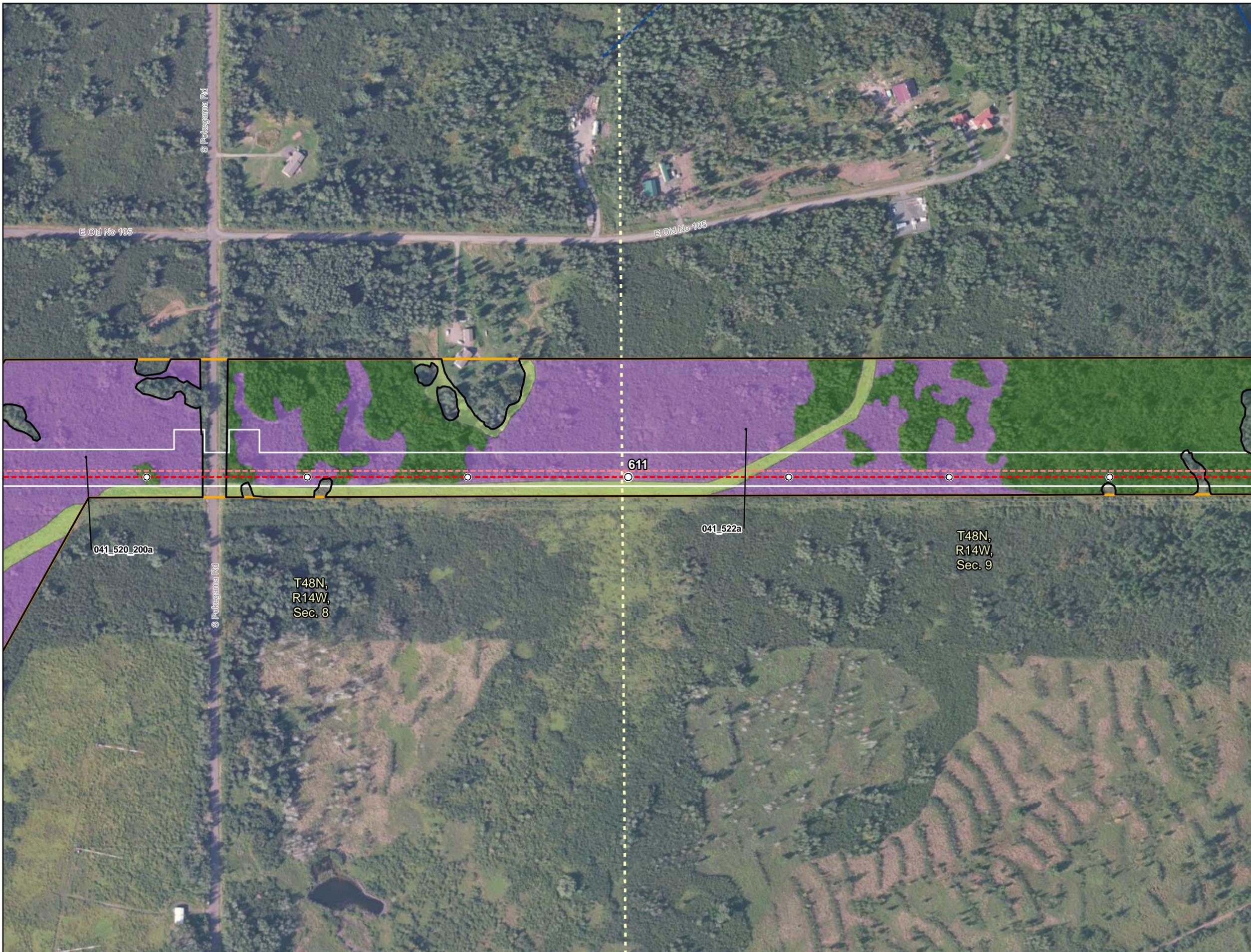
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- Milepost
- Sandpiper Centerline
- - - Sandpiper Alternative
- Line 3 Centerline
- - - Line 3 Alternative
- Construction Workspace
- Survey Area
- 2013 Field Survey Not Complete
- Field Delineated Waterbody
- Section Boundary

- Wetlands**
- 2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI**
- PEM
 - PFO
 - PSS
 - PUB

- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

**Appendix A
Exhibit A-13
Detailed Route Map**

**Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project**

**(Field Delineated and WWI
Wetlands and Waterbodies)**

Douglas County, Wisconsin





- Milepost
 - Sandpiper Centerline
 - - - Sandpiper Alternative
 - Line 3 Centerline
 - - - Line 3 Alternative
 - Construction Workspace
 - Survey Area
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 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-14
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

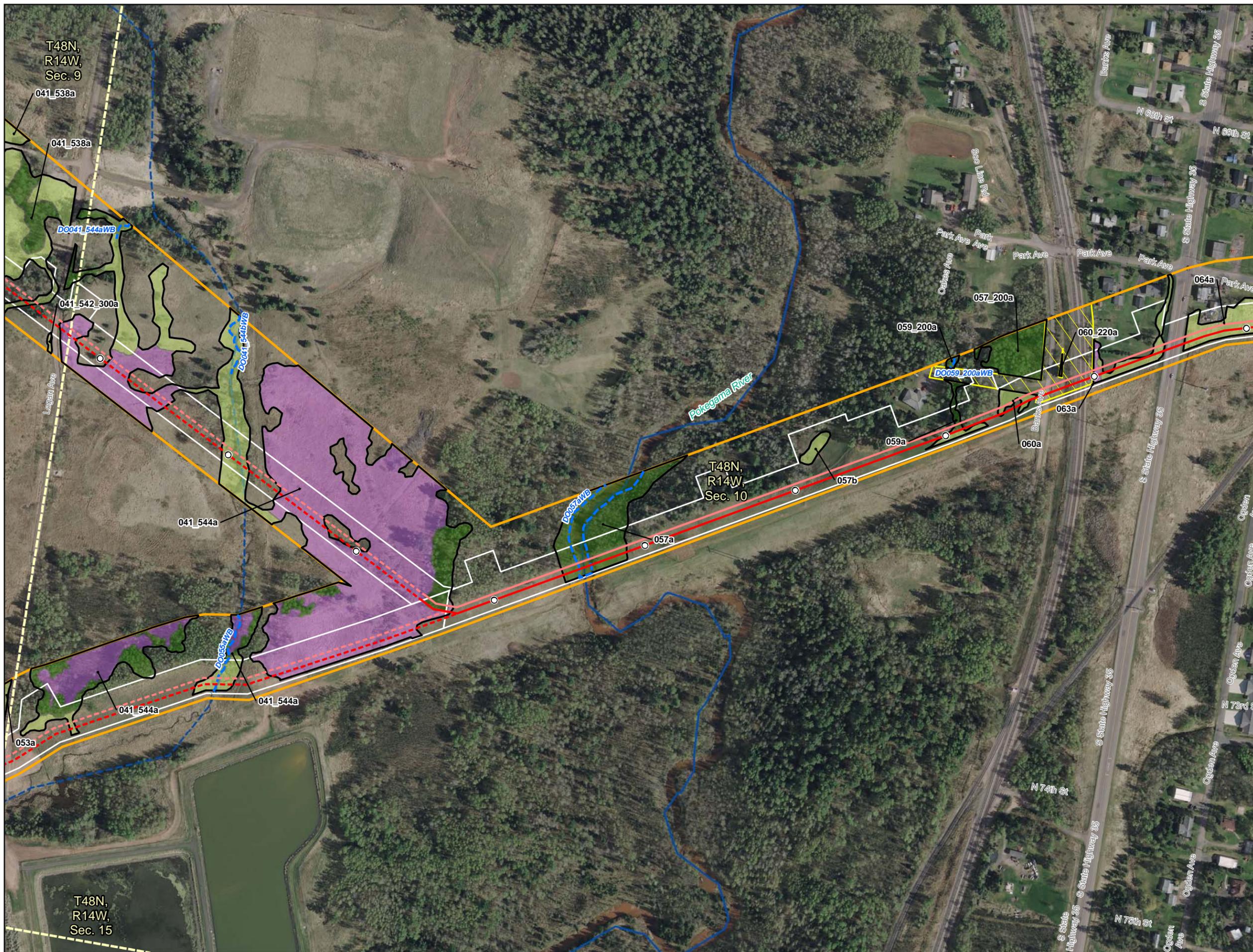
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- Milepost
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 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-15
Detailed Route Map

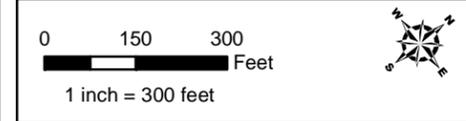
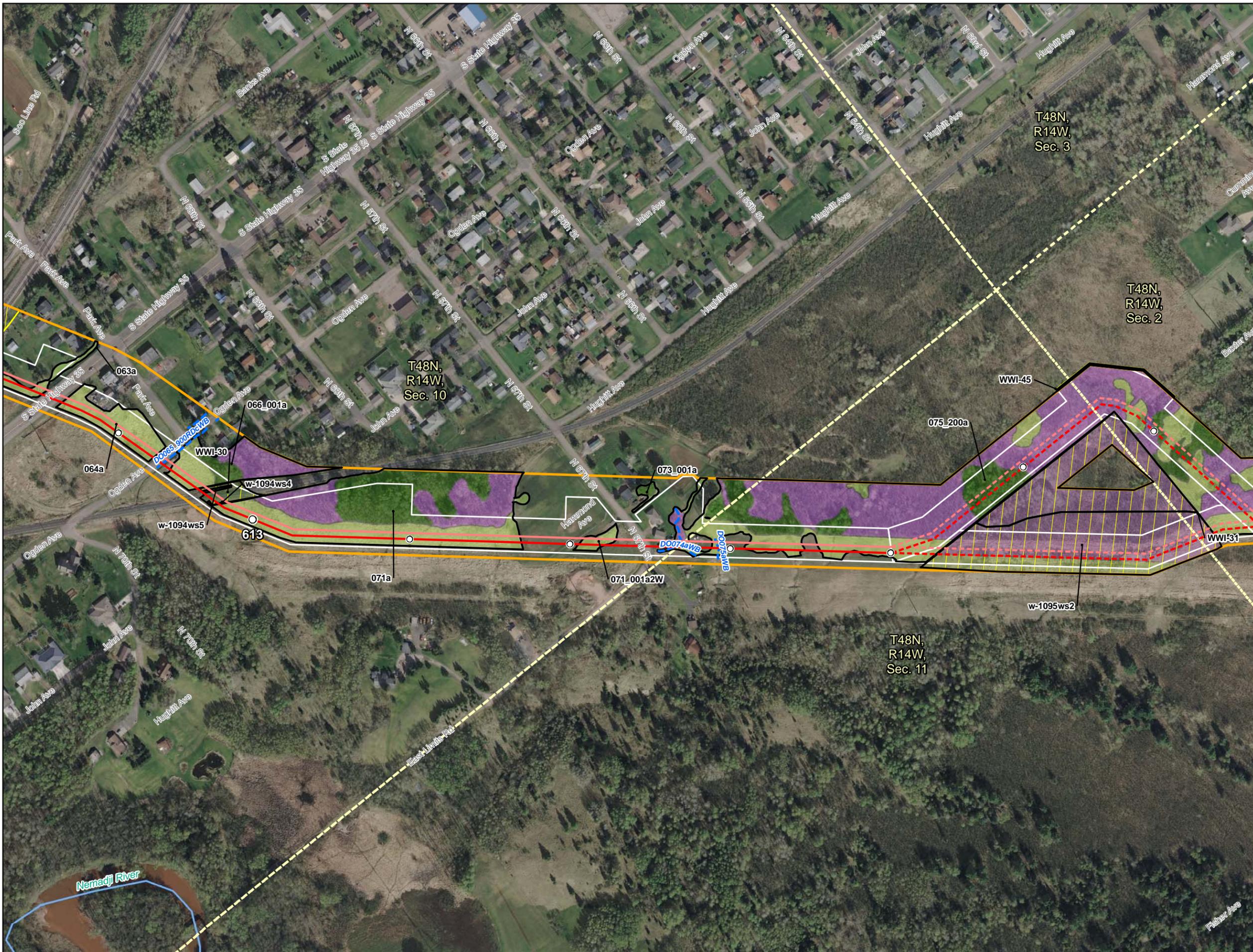
Sandpiper Pipeline Project and
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Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin

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- Milepost
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 - - - Sandpiper Alternative
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 - - - Line 3 Alternative
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 - Field Delineated Waterbody
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- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-16
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

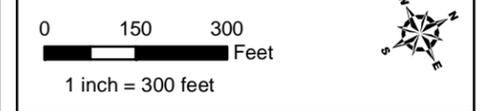
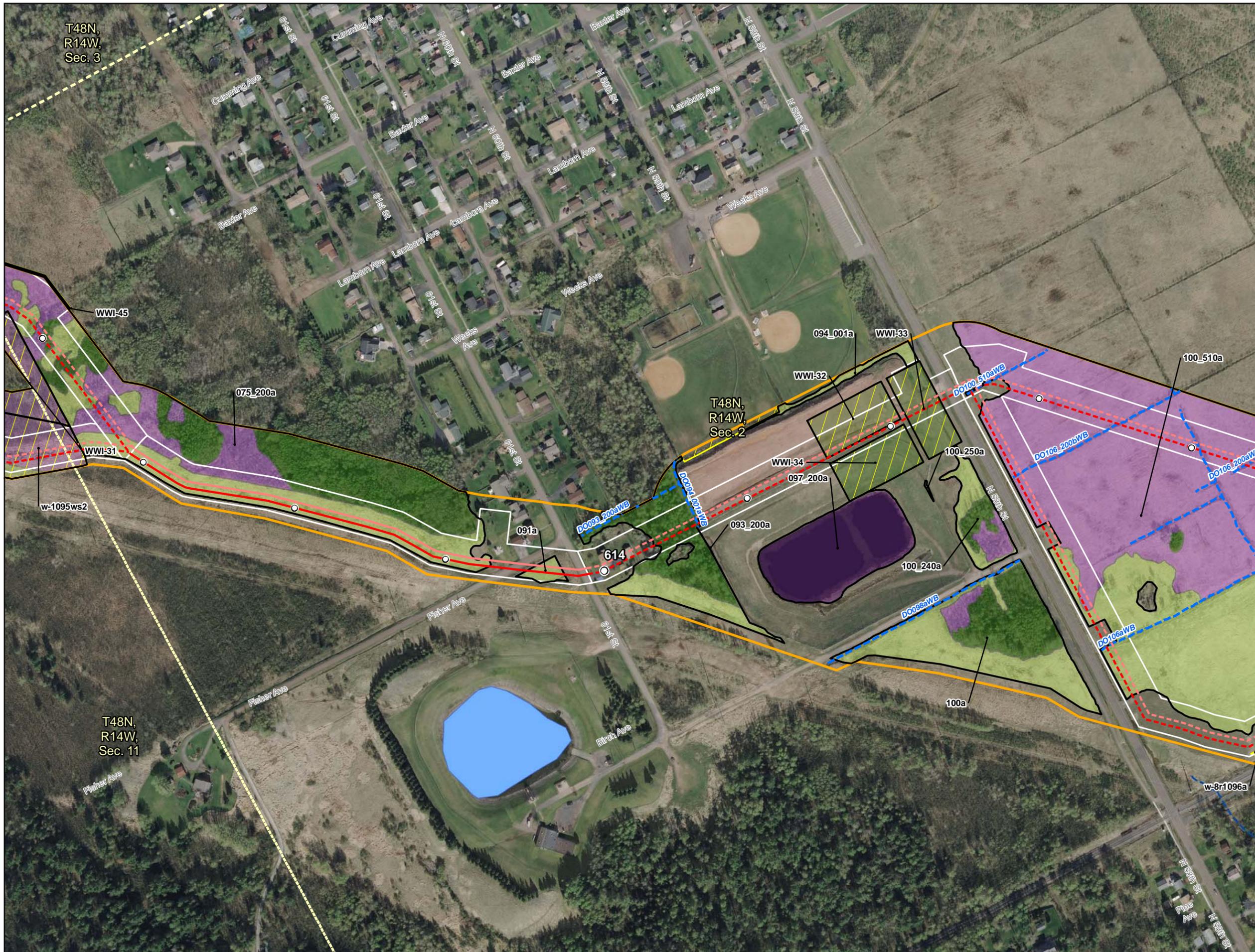
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Wetlands and Waterbodies)

Douglas County, Wisconsin



5/23/2014

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- Milepost
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 - Line 3 Centerline
 - - - Line 3 Alternative
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- Wetlands**
2013 Field Delineated Wetlands, Alberta Clipper Wetlands and WWI
- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-17
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

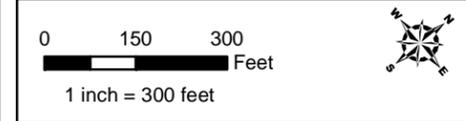
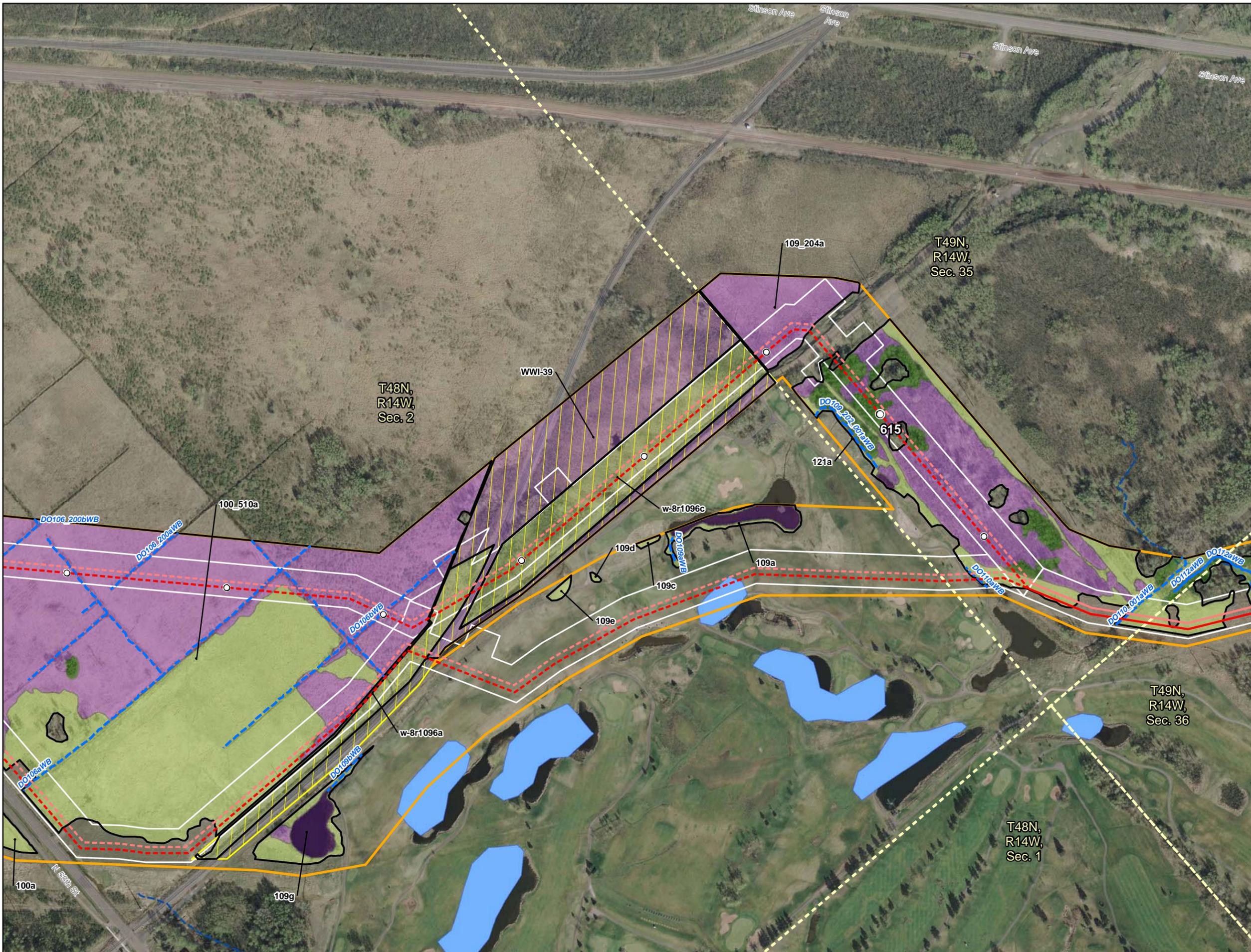
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- Milepost
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- PEM
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 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-18
Detailed Route Map

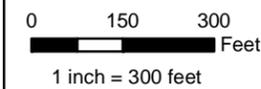
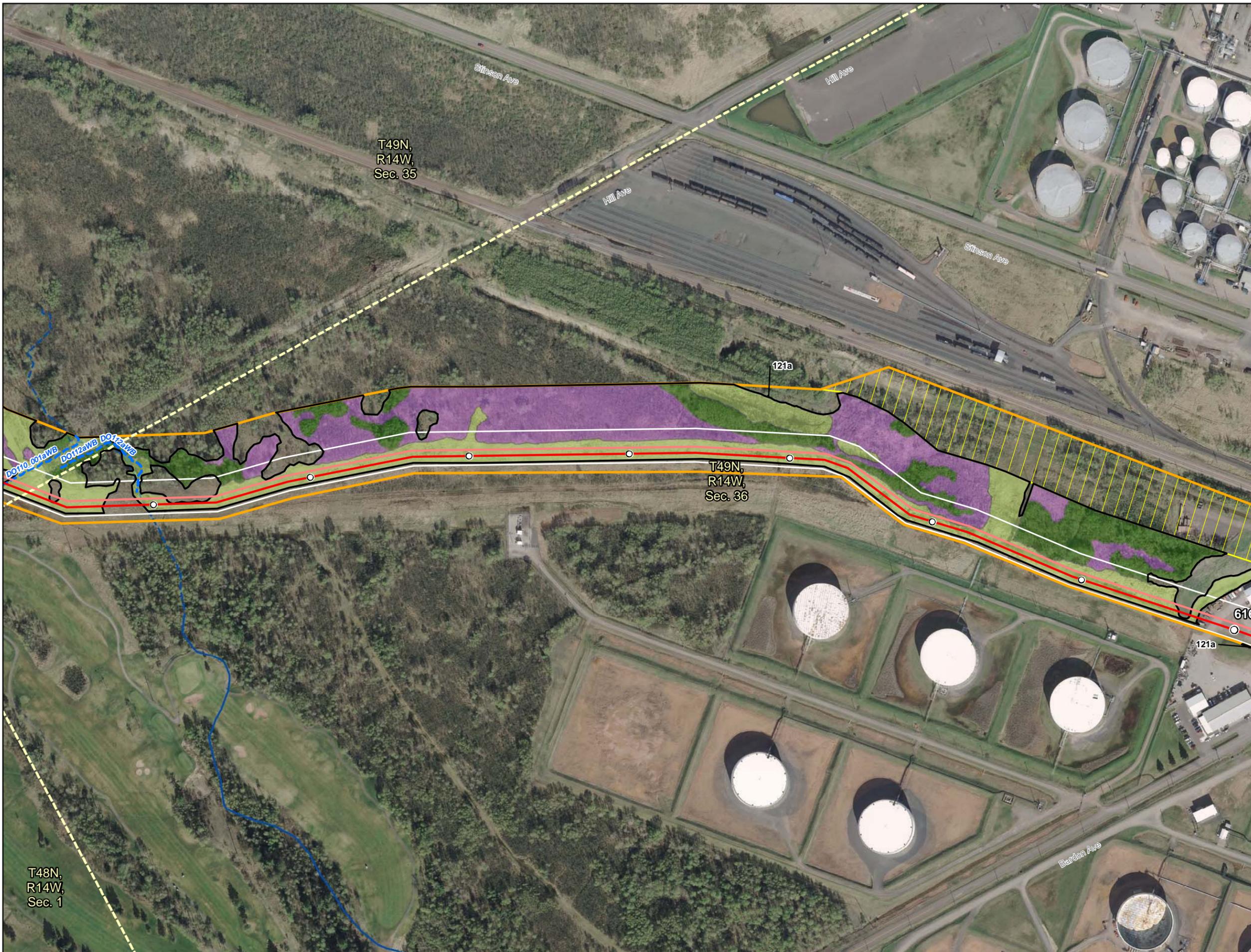
Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin

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 - Canal/Ditch
 - Waterbody

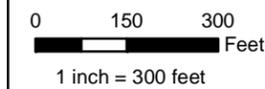
**Appendix A
Exhibit A-19
Detailed Route Map**

**Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project**

**(Field Delineated and WWI
Wetlands and Waterbodies)**

Douglas County, Wisconsin





- Milepost
- Sandpiper Centerline
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- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
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Appendix A Exhibit A-20 Detailed Route Map

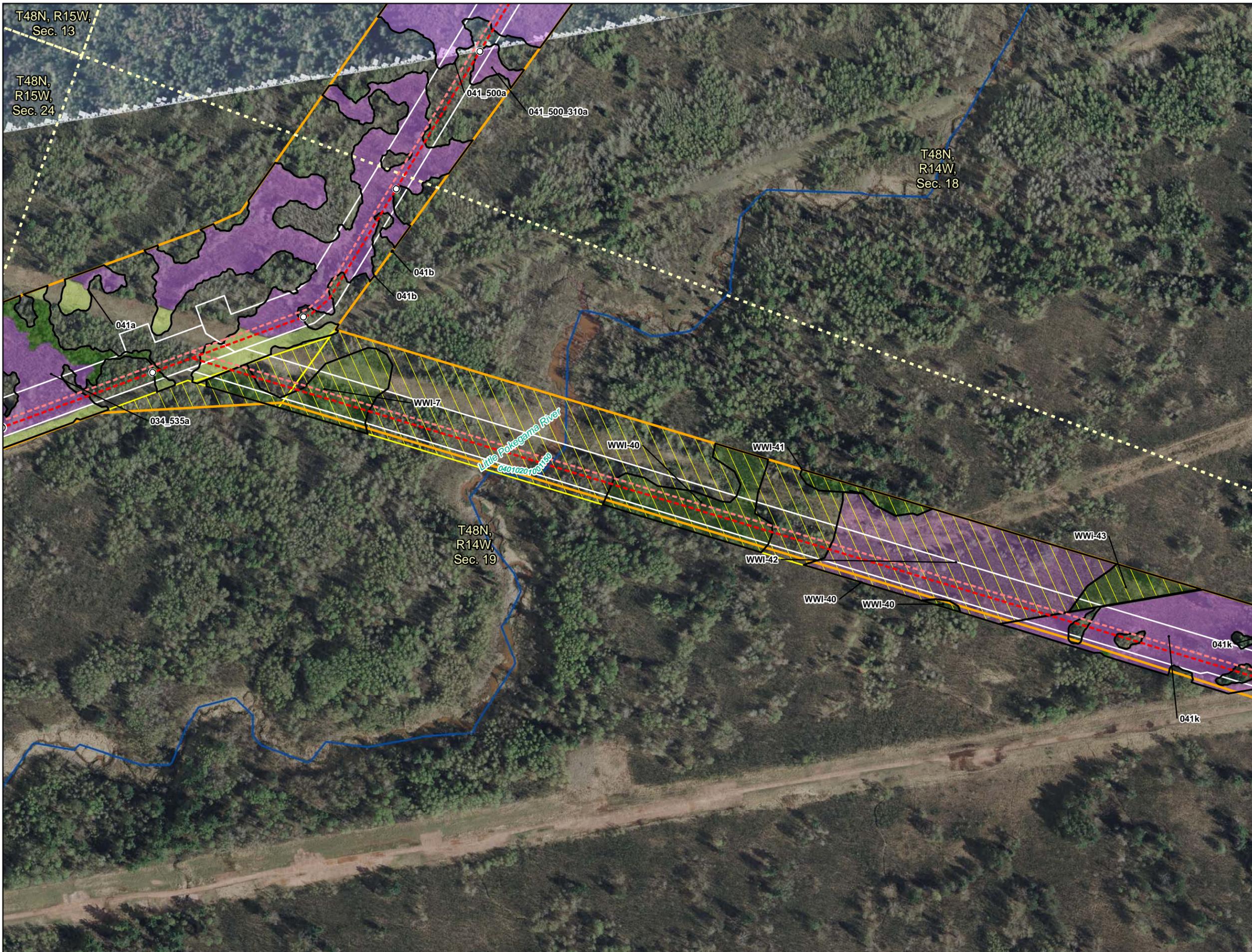
**Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project**

**(Field Delineated and WWI
Wetlands and Waterbodies)**

Douglas County, Wisconsin



5/23/2014



- Milepost
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- PFO
- PSS
- PUB
- National Hydrography Dataset**
- Perennial Stream
- - - Intermittent Stream
- Canal/Ditch
- Waterbody

Appendix A
Exhibit A-21
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin



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- Milepost
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 - - - Sandpiper Alternative
 - Line 3 Centerline
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 - PFO
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 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-22
Detailed Route Map
Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin


 Date: (5/23/2014)

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- Milepost
 - Sandpiper Centerline
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- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-23
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin

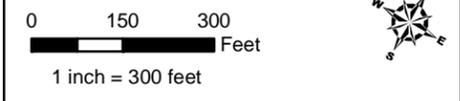
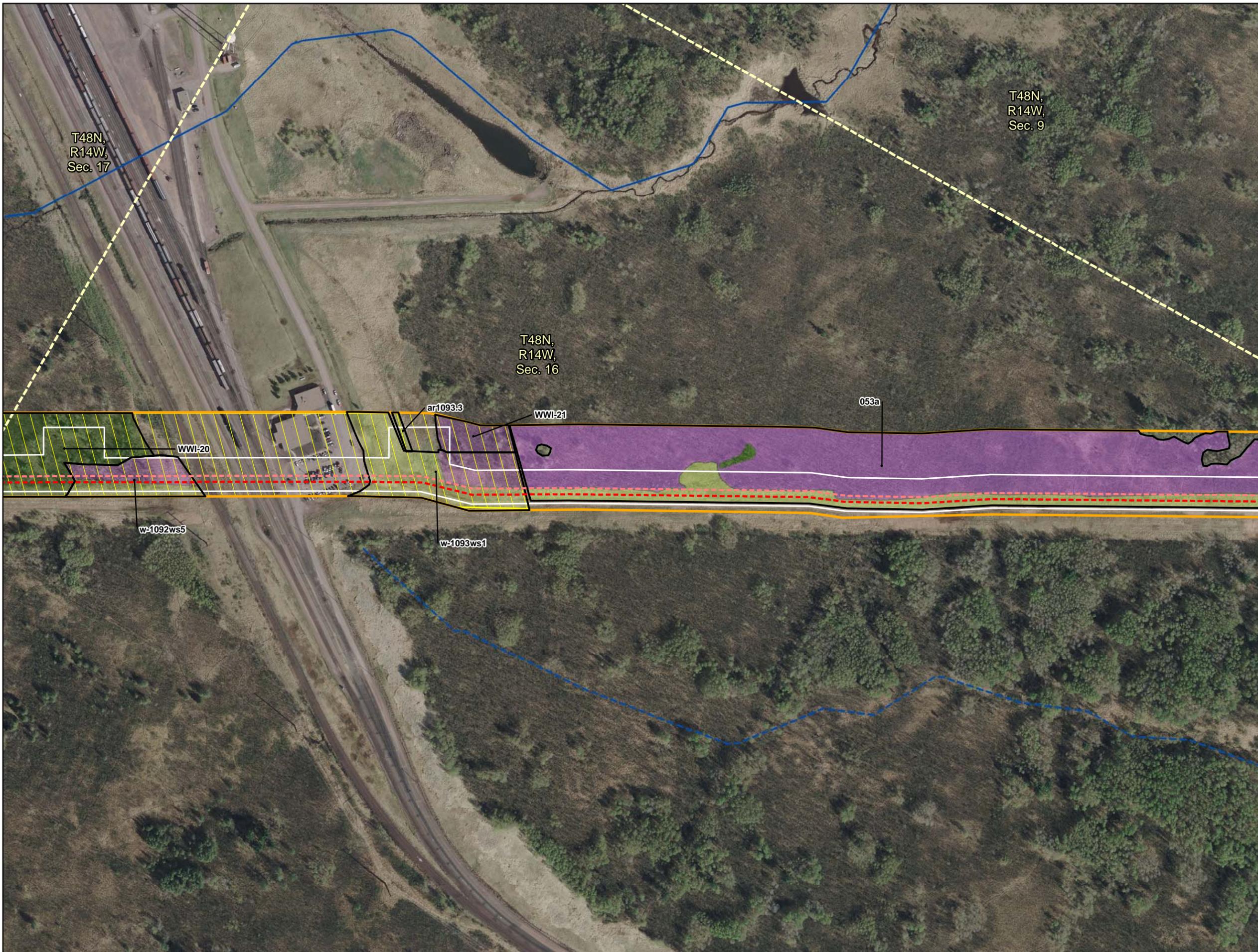
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Sec. 20

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R14W,
Sec. 17

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R14W,
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 - Survey Area
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- PEM
 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-24
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

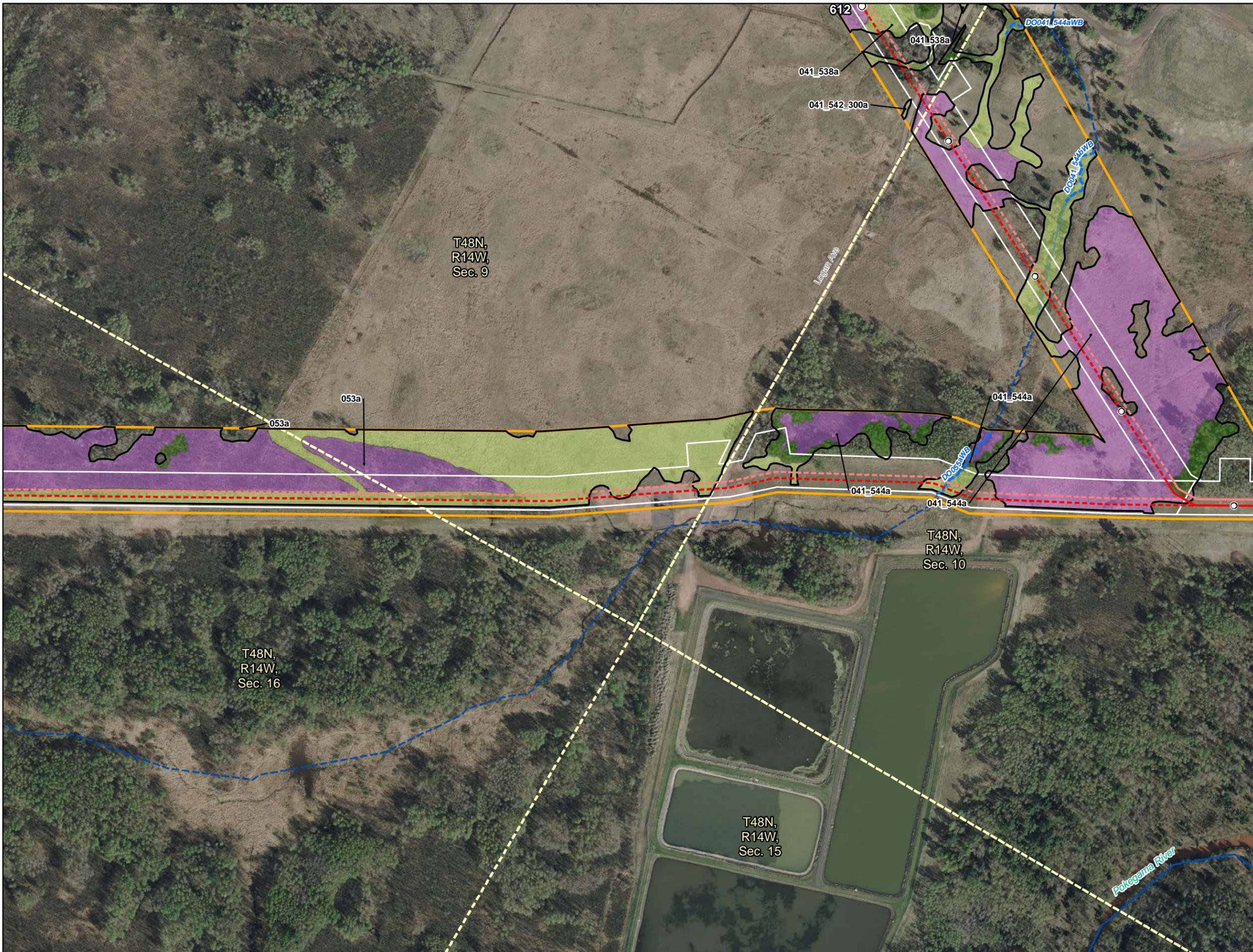
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Wetlands and Waterbodies)

Douglas County, Wisconsin



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- Milepost
 - Sandpiper Centerline
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 - PFO
 - PSS
 - PUB
- National Hydrography Dataset**
- Perennial Stream
 - - - Intermittent Stream
 - Canal/Ditch
 - Waterbody

Appendix A
Exhibit A-25
Detailed Route Map

Sandpiper Pipeline Project and
Line 3 Replacement -
Phase 2 Project

(Field Delineated and WWI
Wetlands and Waterbodies)

Douglas County, Wisconsin



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Appendix B
Environmental Protection Plan



Enbridge (U.S.) Inc.

ENVIRONMENTAL PROTECTION PLAN

October 2013





ENVIRONMENTAL PROTECTION PLAN

TABLE OF CONTENTS

INTRODUCTION 1

1.0 GENERAL MITIGATION MEASURES 3

 1.1 IDENTIFICATION OF AVOIDANCE AREAS 3

 1.2 CONSTRUCTION LINE LIST AND PERMITS 3

 1.3 WET WEATHER SHUTDOWN 3

 1.4 RIGHT-OF-WAY ACCESS 3

 1.5 RIGHT-OF-WAY REQUIREMENTS 4

 1.6 CONTROLLING SPREAD OF UNDESIRABLE SPECIES 4

 1.6.1 Prevention and Control Measures 5

 1.7 POTHOLING/HYDROVAC SLURRY 6

 1.8 UPLAND CLEARING 6

 1.8.1 Disposal of Non-Merchantable Timber 6

 1.8.2 Disposal of Merchantable Timber 6

 1.8.3 Upland Grading and Stump Removal 6

 1.9 TEMPORARY EROSION AND SEDIMENT CONTROLS 6

 1.9.1 Temporary Stabilization 7

 1.9.2 Erosion Control Blanket 7

 1.9.3 Mulch 7

 1.9.4 Cat Tracking 8

 1.9.5 Temporary Slope Breakers 8

 1.10 UPLAND TOPSOIL SEGREGATION 9

 1.11 UPLAND TRENCHING 10

 1.11.1 Timing 10

 1.12 FOAM PILLOW INSTALLATION 10

 1.13 TRENCH BREAKERS 10

 1.14 DRAIN TILE INLET PROTECTION AND TILE REPAIRS 11

 1.15 UPLAND BACKFILLING 11

 1.16 CLEANUP AND ROUGH/FINAL GRADING 11

 1.16.1 Timing 11

 1.17 PERMANENT EROSION AND SEDIMENT CONTROLS 12

 1.18 SOIL COMPACTION TREATMENT 12

1.19	STONE REMOVAL.....	12
1.20	REPAIR OF DAMAGED CONSERVATION PRACTICES.....	12
1.21	LAND LEVELING FOLLOWING CONSTRUCTION.....	13
2.0	STREAM AND RIVER CROSSING GENERAL REQUIREMENTS.....	14
2.1	TIME WINDOW FOR CONSTRUCTION.....	14
2.2	CLEARING AND GRADING.....	14
2.2.1	Impaired Waters.....	15
2.3	ADDITIONAL TEMPORARY WORKSPACE.....	15
2.4	BRIDGES.....	15
2.4.1	Types of Bridges.....	15
2.4.2	Bridge Design and Maintenance.....	16
2.5	STREAM AND RIVER CROSSING CONSTRUCTION METHODS.....	16
2.5.1	Wet Trench Method.....	16
2.5.2	Dam and Pump Method.....	17
2.5.3	Flume Method.....	18
2.5.4	Directional Drill and/or Guided Bore Method.....	19
2.6	PERMANENT RESTORATION.....	20
2.6.1	Vegetative Bank Restoration.....	20
2.6.2	Supplemental Bank Stabilization.....	20
2.6.3	Bridge Removal.....	21
2.6.4	Swales.....	21
3.0	WETLAND CROSSING GENERAL REQUIREMENTS.....	22
3.1	WETLAND ACCESS.....	22
3.2	CLEARING.....	22
3.3	ADDITIONAL TEMPORARY WORKSPACE IN WETLANDS.....	22
3.4	GRADING IN A WETLAND.....	23
3.5	RIGHT-OF-WAY STABILIZATION.....	23
3.6	TRENCHING.....	23
3.6.1	Topsoil Segregation.....	23
3.6.2	Trench Breakers.....	24
3.7	PIPELINE INSTALLATION.....	24
3.7.1	Push/Pull Method.....	24
3.7.2	Temporary Erosion and Sediment Controls.....	24
3.7.3	Concrete Coating.....	24
3.8	BACKFILLING.....	24
3.9	ROUGH GRADING, CLEANUP, AND TEMPORARY RESTORATION.....	25
3.9.1	Timing.....	25
3.9.2	Temporary Stabilization.....	25
4.0	HIGHWAY, ROAD and RAIL CROSSINGS.....	26
4.1	ADDITIONAL WORKSPACE.....	26
4.2	MAINTENANCE.....	26

4.3	TEMPORARY EROSION AND SEDIMENT CONTROLS.....	26
5.0	CONSTRUCTION DEWATERING.....	27
5.1	TRENCH DEWATERING.....	27
5.1.1	Flow Measurement and Water Sampling.....	28
5.1.2	Regulatory Notification and Reporting.....	28
5.2	HYDROSTATIC TEST DISCHARGES.....	28
5.2.1	Refueling.....	28
5.2.2	Siting of Test Manifolds.....	28
5.2.3	Water Sampling.....	28
5.2.4	Best Management Practices.....	28
5.2.5	Flow Measurement.....	29
6.0	WATER APPROPRIATION.....	30
6.1	GENERAL.....	30
6.2	WATER SOURCES.....	30
6.3	FLOW MEASUREMENT.....	30
6.4	WATER SAMPLING.....	30
6.5	REGULATORY NOTIFICATION AND REPORTING.....	30
7.0	REVEGETATION & MONITORING.....	31
7.1	PROJECT SEED SPECIFICATIONS.....	31
7.2	TEMPORARY REVEGETATION.....	31
7.3	TIMING FOR TEMPORARY VEGETATION.....	32
7.4	MULCH.....	32
7.5	PERMANENT REVEGETATION.....	32
7.6	UPLAND CONSTRUCTION AREAS.....	33
7.7	PERMANENT SEEDING OF WETLAND AREAS.....	33
7.7.1	Unsaturated Wetland Areas.....	33
7.7.2	Saturated/Standing Water Wetlands.....	33
7.7.3	Forested Wetland Restoration.....	33
7.8	PERMANENT SEEDING OF WATERBODY BANKS.....	33
7.9	SPECIALIZED SEED MIXES.....	33
7.10	CONSERVATION RESERVE PROGRAM (CRP) PROPERTIES.....	34
7.11	SEED BED PREPARATION AND SEEDING PROCEDURES.....	34
7.12	SEEDING METHODS.....	34
7.12.1	Drill Seeding.....	34
7.12.2	Broadcast Seeding.....	34
7.12.3	Hydroseeding.....	34
7.13	SOIL AMENDMENTS.....	35
7.14	SEEDING PERIODS.....	35
7.15	TIMING OF FINAL SEEDING.....	35
7.16	EROSION & SEDIMENT CONTROL.....	35

7.17 DORMANT SEEDING.....35

7.18 MONITORING36

8.0 WINTER CONSTRUCTION.....37

9.0 WASTE MANAGEMENT38

9.1 HAZARDOUS WASTES38

9.2 ABRASIVE BLAST DEBRIS38

10.0 SPILL PREVENTION, CONTAINMENT, AND CONTROL MEASURES39

10.1 PLANNING AND PREVENTION39

10.2 ROLES AND RESPONSIBILITIES.....39

10.2.1 Spill Coordinator.....39

10.2.2 Environmental Inspector.....39

10.2.3 Authorized Personnel40

10.2.4 Construction Superintendent40

10.2.5 Construction Personnel40

10.3 TRAINING.....40

10.4 EQUIPMENT40

10.5 SUPERVISION AND INSPECTION41

10.6 STORAGE AND HANDLING OF FUELS/HAZARDOUS LIQUIDS41

10.6.1 Fuel Storage - General41

10.6.2 Refueling.....41

10.6.3 Refueling, Maintenance, and Fuel Storage Near Wetlands and Waterbodies.....41

10.6.4 Overnight parking42

10.6.5 Concrete Washout Handling.....42

10.7 INITIAL SPILL MANAGEMENT.....42

10.7.1 Immediate Response.....42

10.7.2 Mobilization43

10.8 SPILL NOTIFICATION RESPONSIBILITIES.....43

10.8.1 Notification Volumes.....43

10.8.2 Spill Report Form43

10.8.3 Agency Notification.....43

10.9 SPILL CONTAINMENT AND CLEANUP44

10.9.1 Spill Control - Upland Areas44

10.10 SPILL CONTROL - WETLANDS AND WATERBODIES44

10.11 STORAGE AND DISPOSAL OF CONTAMINATED MATERIALS45

11.0 DRILLING FLUID RESPONSE, CONTAINMENT, AND NOTIFICATION PROCEDURES46

11.1 ON-SITE OBSERVATION DURING CONSTRUCTION46

11.2 CONTAINMENT, RESPONSE, AND CLEAN-UP EQUIPMENT46

11.3 RESPONSE.....47

11.3.1 Upland Locations.....47

11.3.2 Wetland and Waterbody Locations.....47

11.4 NOTIFICATION AND RESUMPTION OF SUSPENDED HDD OPERATIONS...48

11.5 CLEAN-UP48

11.6 RESTORATION AND POST-CONSTRUCTION MONITORING49

FIGURES¹

Figure 1	Typical Topsoil Segregation – Modified Ditch Plus Spoil Side
Figure 2	Typical Topsoil Segregation – Full Right-of-Way
Figure 3	Typical Topsoil Segregation – Trench Line Only
Figure 4	Typical Temporary or Permanent Berms – Perspective View
Figure 5	Typical Temporary or Permanent Berms – Elevation View
Figure 6	Typical Silt Fence Installation
Figure 7	Typical Straw Bale Installation
Figure 8	Typical Erosion Control Blanket Installation
Figure 9	Typical Staple Pattern for Erosion Control Fabric
Figure 10	Typical Bio-log Installation
Figure 11	Typical Cat Tracking
Figure 12	Typical Trench Breakers – Perspective View
Figure 13	Typical Trench Breakers – Plan and Profile Views
Figure 14	Permanent Slope Breakers – Perspective View
Figure 15	Typical Waterbody Crossing – Wet Trench Method
Figure 16	Typical Waterbody Crossing – Dam and Pump Method
Figure 17	Typical Waterbody Crossing – Flume Method
Figure 18	Typical Waterbody Crossing – Directional Drill Method
Figure 19	Typical Span Type Bridge With and Without Support (Timber Mat Bridge)
Figure 20	Typical Rock and Flume Bridge
Figure 21	Typical Dewatering Measures
Figure 22A	Typical Straw Bale Dewatering Structure
Figure 22B	Typical Straw Bale Dewatering Structure
Figure 22C	Typical Straw Bale Dewatering Structure
Figure 23	Typical Final Stream Bank Stabilization – Rip Rap & Erosion Control
Figure 24	Typical Wetland Crossing
Figure 25	Typical Improved Road Crossing-Directional Bore
Figure 26	Typical Stream Bank Stabilization Bio-log
Figure 27	Typical Root Wad
Figure 28	Typical Natural Material Revetment

APPENDICES

Appendix A	Noxious and Invasive Weed Species
Appendix B	Equipment Cleaning Log
Appendix C	Seed Mixes
Appendix D	Enbridge Environment Hydrostatic Test Discharge Authorization & Documentation
Appendix E	Emergency Response Contractors/Disposal and Treatment Facilities
Appendix F	Spill Report Form
Appendix G	Spill Reporting-Agency Contacts

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.

<u>Slope (%)</u>	<u>Approximate Spacing (ft)</u>
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:

<u>Slope (%)</u>	<u>Approximate Spacing (ft)</u>
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:

$$(95\% \text{ germination} \times 80\% \text{ purity})/100 = 76\% \text{ PLS}$$
$$10 \text{ pounds PLS per acre} / .76\% \text{ PLS} = 13.2 \text{ pounds per acre actual seeding rate}$$

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 subject to approval by Enbridge.

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 double 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 double 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 topsoiling 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 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:

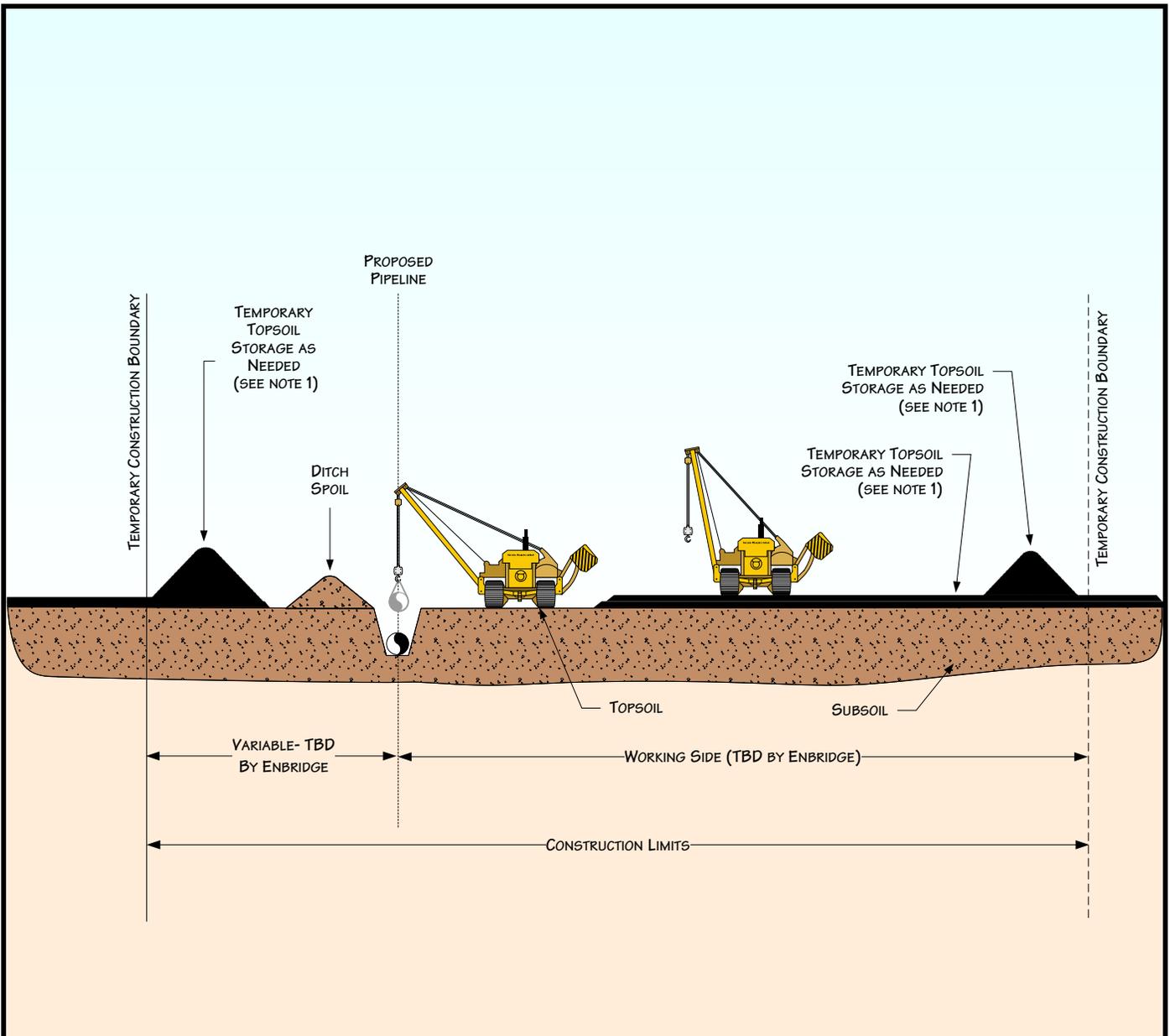
- Drilling fluid will be cleaned up by hand using hand shovels, buckets and soft-bristled brooms as possible without causing extensive ancillary damage to existing vegetation. Clean water washes may also be employed if deemed beneficial and feasible.
- Containment structures will be pumped out and the 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:

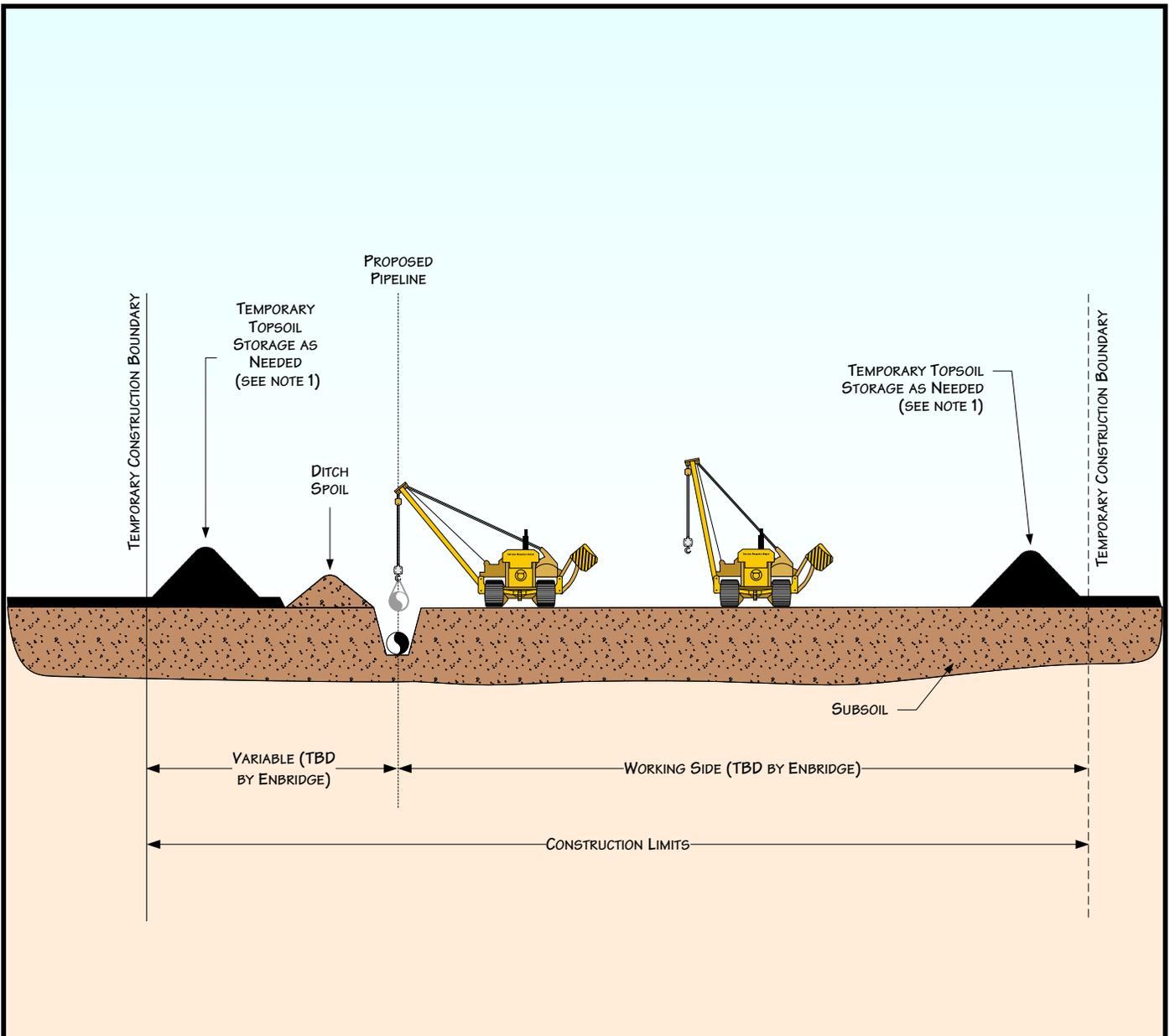
- 1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATIONS APPROVED BY THE COMPANY.

Environmental Protection Plan



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	
<small>K:\CLIENT_PROJECTS\ID-FIEEL\2011-019\FIG 1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD</small>	



PROFILE

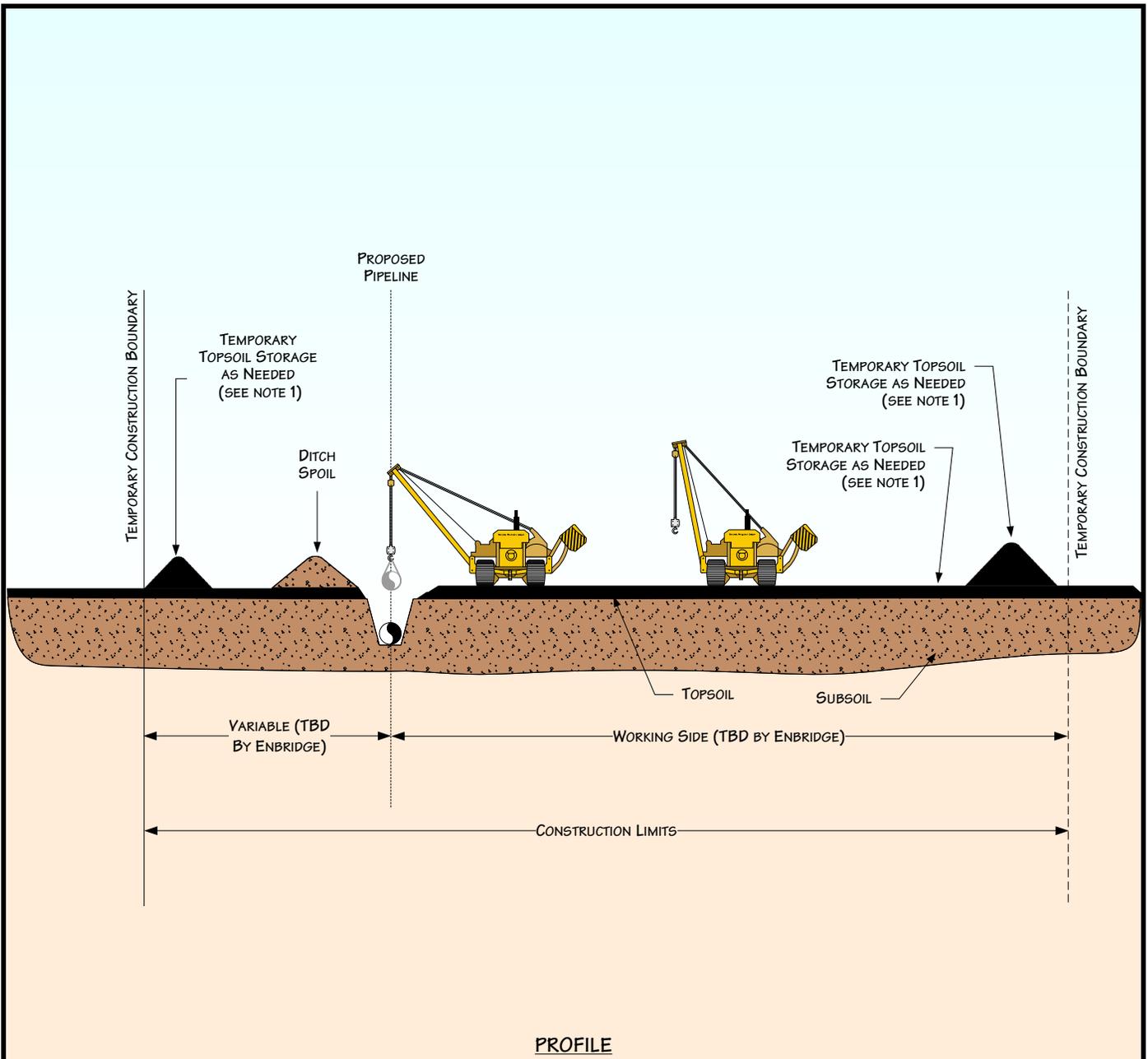
NOTES:

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\ID-FIEEL\2011-019\FIG 1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD	



PROFILE

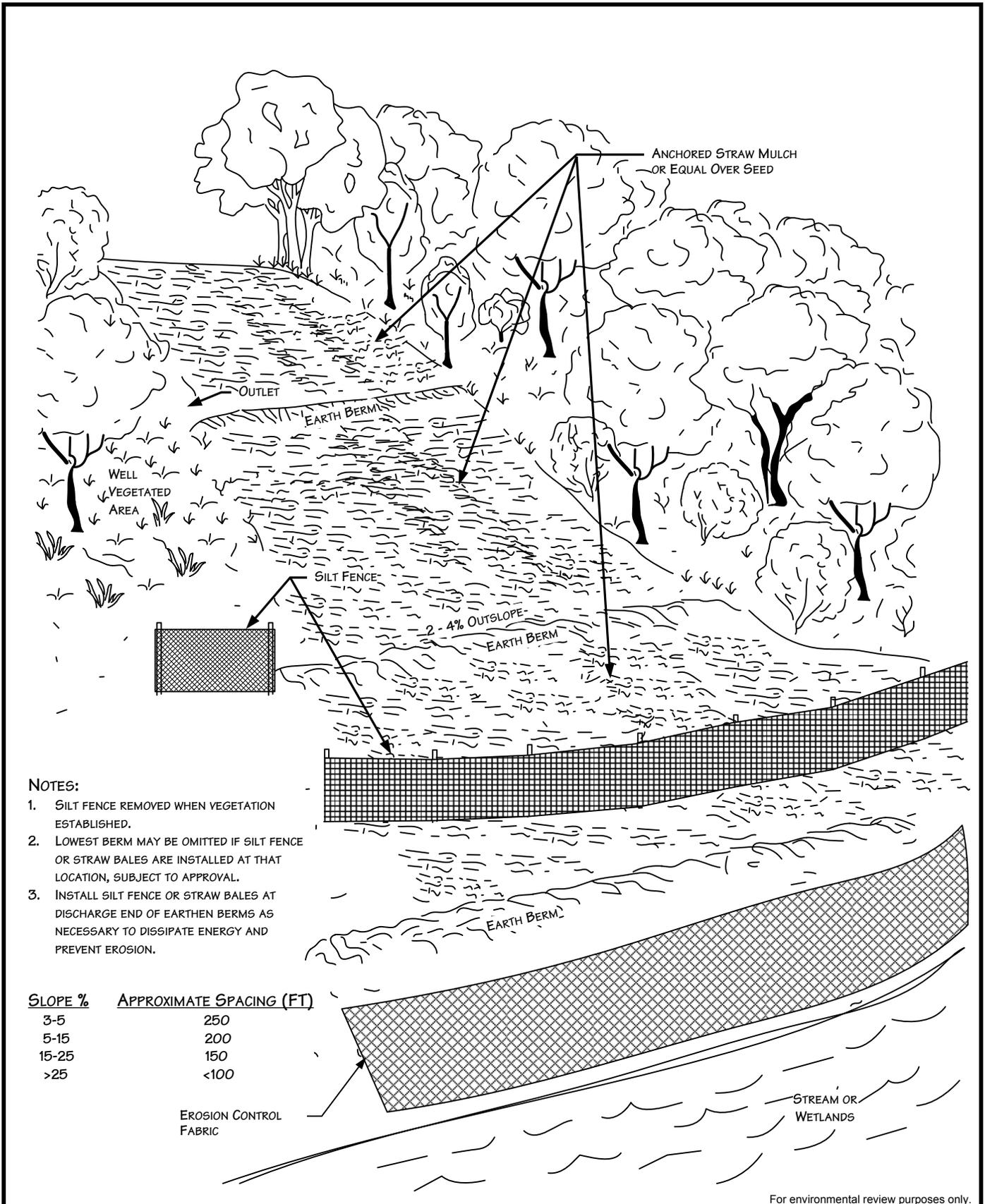
NOTES:

- 1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATIONS APPROVED BY THE COMPANY.



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

DATE: 7/9/2001	
REVISED: 3/11/2011	
SCALE: NTS	
DRAWN BY: JPBOENTJE	
<small> K:\CLIENT_PROJECTS\ID-FIEEL\2011-019\FIG 1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD </small>	



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.

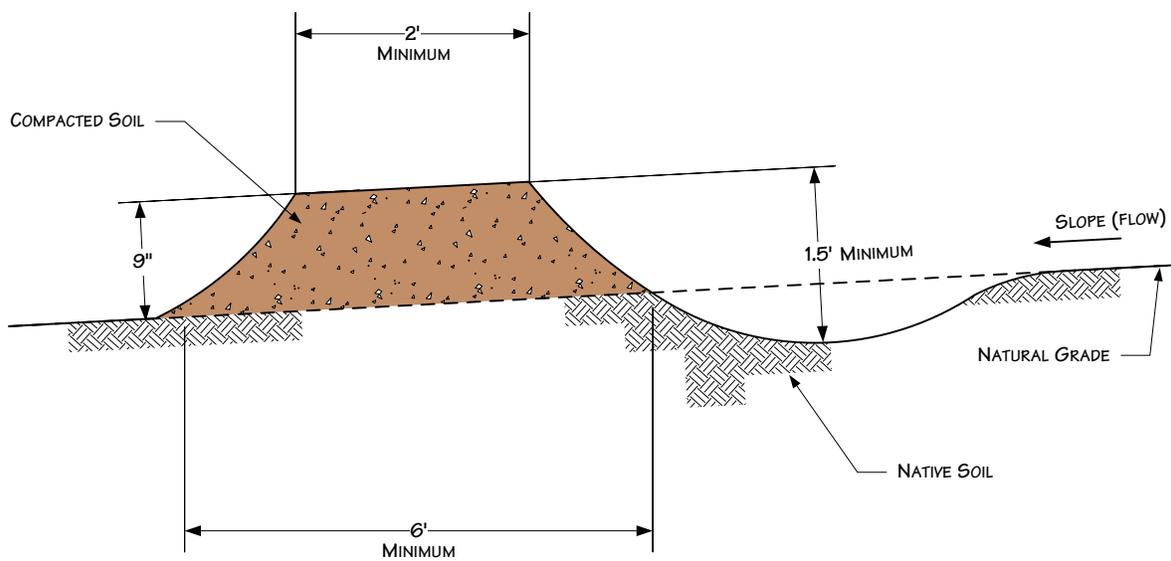
SLOPE %	APPROXIMATE SPACING (FT)
3-5	250
5-15	200
15-25	150
>25	<100

For environmental review purposes only.



Figure 4
Environmental Mitigation Plan
 Typical Temporary or Permanent Berms
 Perspective View

DATE: 11/14/2000	
REVISED: 3/11/2011	
SCALE: NTS	
DRAWN BY: KMKENDALL	
<small>K:\ CLIENT PROJECTS\ID-PEEL\2011-019\ FIG_4_BERMS_PERSPECTIVE_VIEW.VSD</small>	



NOTES

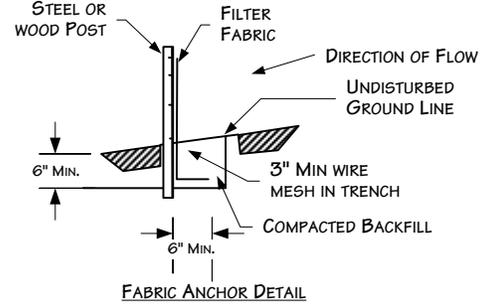
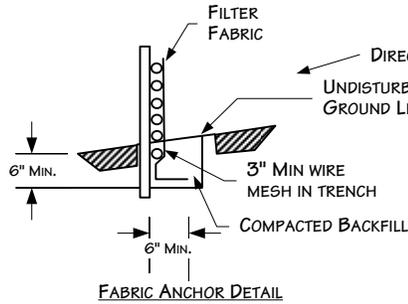
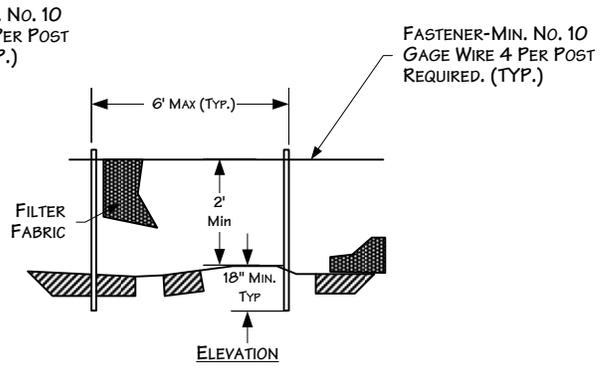
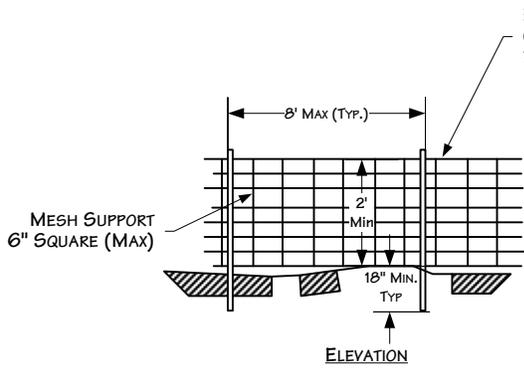
1. BERMS SHALL BE CONSTRUCTED WITH 2 TO 4 PERCENT OUTSLOPE.
2. BERMS SHALL BE OUTLETED TO WELL VEGETATED STABLE AREAS, SILT FENCES, STRAW BALES OR ROCK APRONS.
3. BERMS SHALL BE SPACED AS DESCRIBED IN CONSTRUCTION SPECIFICATIONS.
4. ADDITIONAL INFORMATION INCLUDED ON OTHER DRAWINGS.

For environmental review purposes only.



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	
<small>K:\ CLIENT PROJECTS\ID-PEEL\2011-019\ FIG_5_BERMS_ELEVATION_VIEW.VSD</small>	

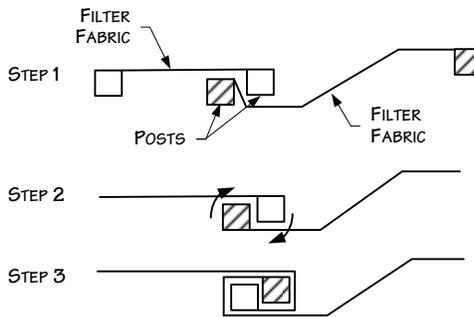


SILT FENCE WITH WIRE SUPPORT PLAN

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.

For environmental review purposes only.



Figure 6
Environmental Protection Plan
Typical Silt Fence Installation

DATE: 5/25/2001

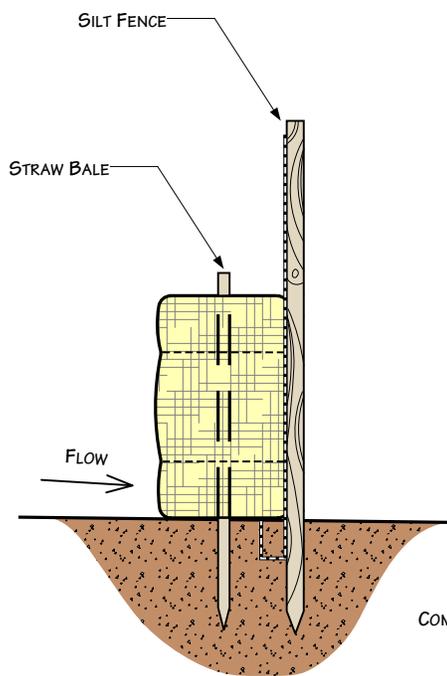
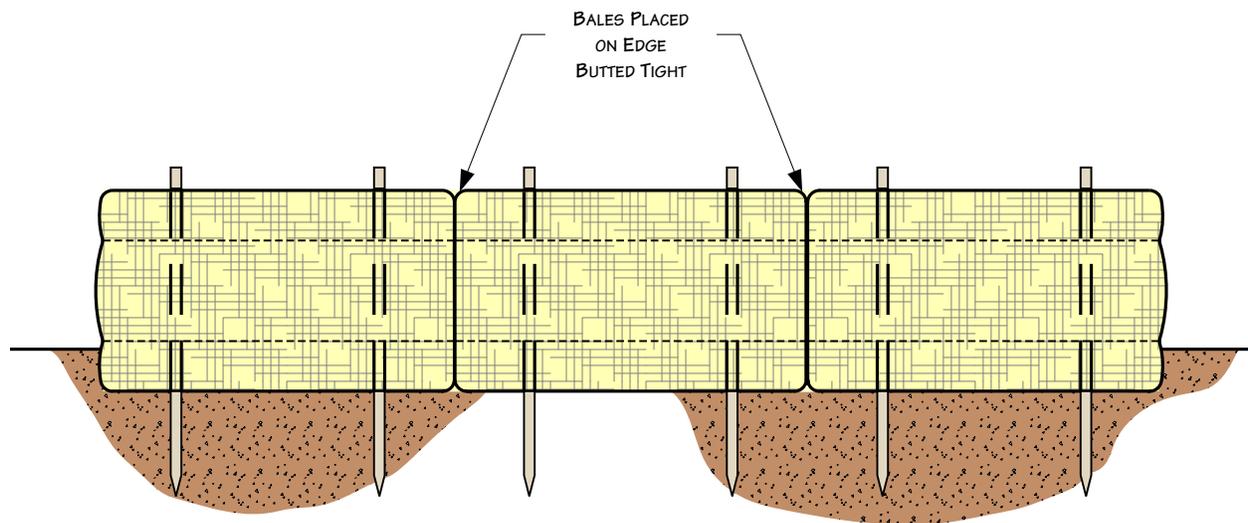
REVISED: 3/23/2011

SCALE: NTS

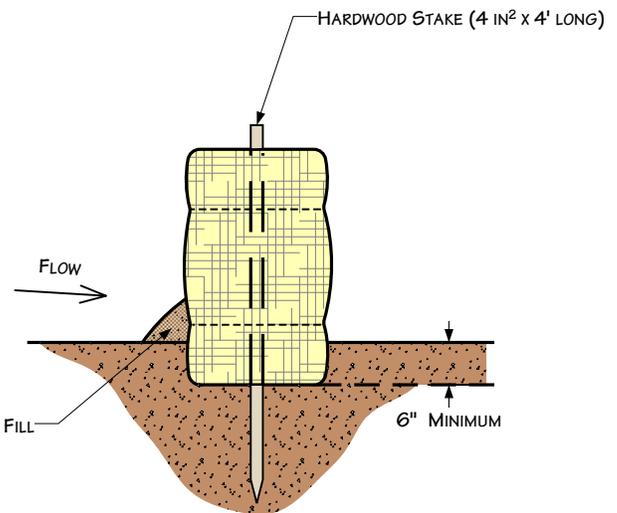
DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-PEEL\2011-019\FIG_6_SILT_FENCE_INSTALL.VSD





STRAW BALES & SILT FENCE



STRAW BALES ONLY

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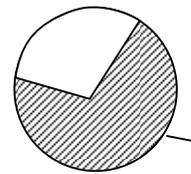


Figure 7
Environmental Protection Plan
 Typical Straw Bale Installation

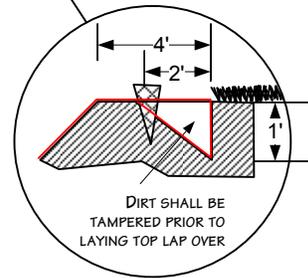
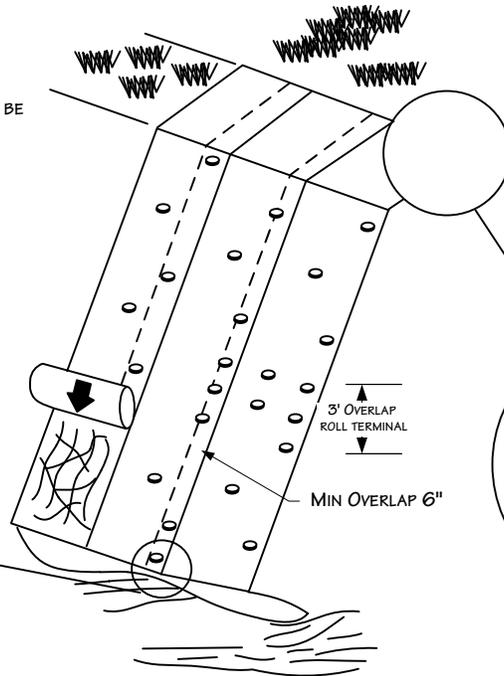
DATE: 5/25/01	
REVISED: 3/11/11	
SCALE: Not to Scale	
DRAWN BY: KMKENDALL	
<small>K:_CLIENT PROJECTS\D-FIEEL\2011-019\FIG_7_STRAW_BALE_INSTALL.VSD</small>	

FILL SLOPE SECTION
 EROSION CONTROL BLANKETS SHOULD BE
 INSTALLED VERTICALLY DOWNSLOPE.

NOTE: SLOPE SURFACE SHALL BE
 SMOOTH AND FREE OF ROCKS,
 LUMPS OF DIRT, GRASS AND STICKS.
 MAT SHALL BE PLACED FLAT ON SURFACE
 TO ENSURE PROPER SOIL CONTACT.

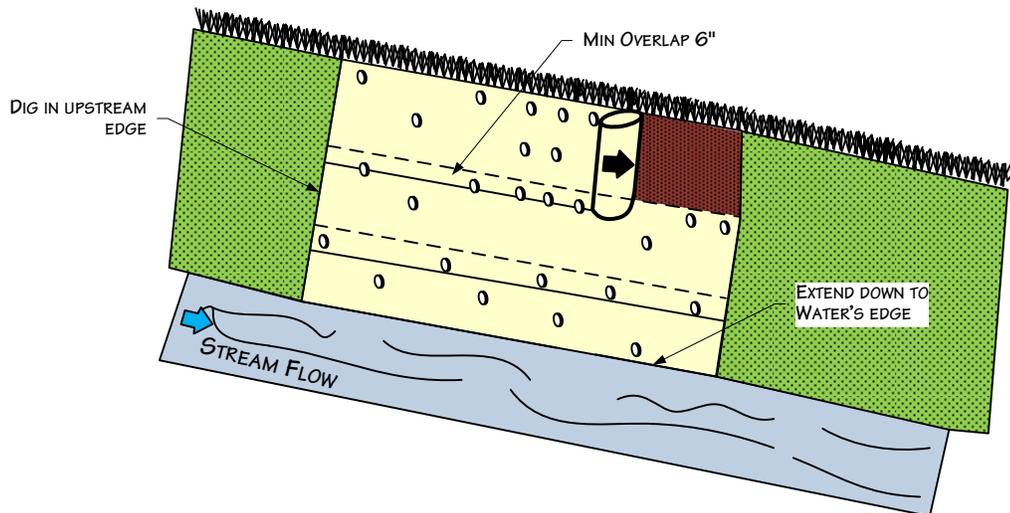


TOE
 MAINTAIN SLOPE ANGLE



BERM
 TRENCH INTO BERM AND
 PROGRESS DOWNSLOPE

STREAM CHANNEL
 EROSION CONTROL BLANKETS SHOULD BE
 INSTALLED HORIZONTALLY WITH STREAM FLOW.



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Figure 8
 Environmental Protection Plan
 Typical Erosion Control Blanket Installation

DATE: 5/25/2001

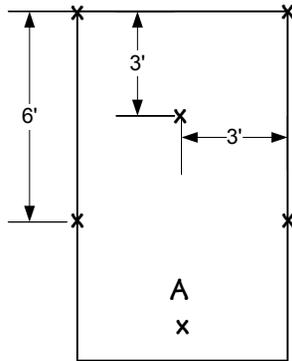
REVISED: 3/23/2011

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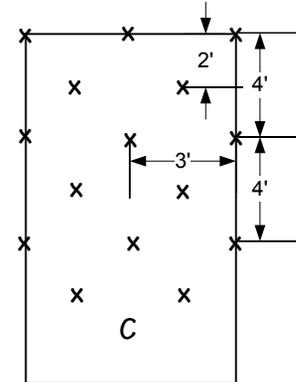
DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FIEEL\2011-019\FIG 8 EROSION_CONTROL_BLANKET_INS TALL.VSD

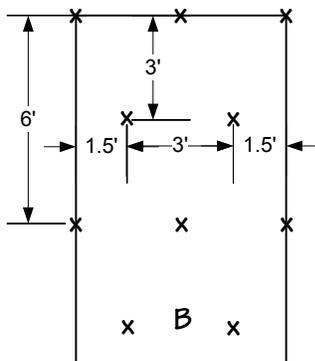
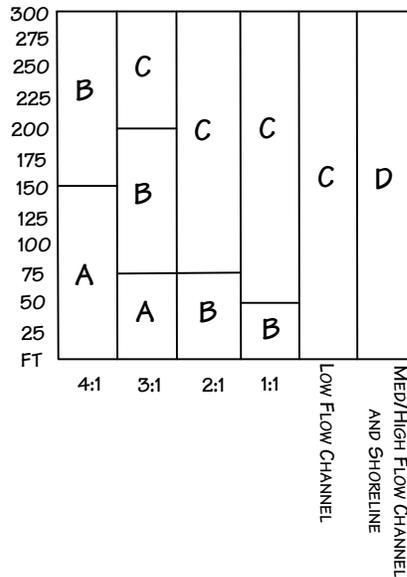




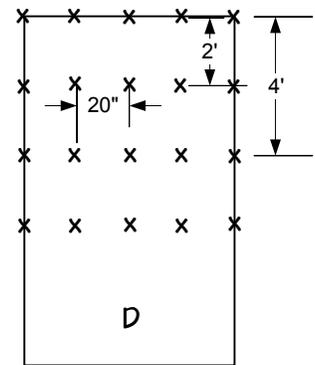
1 STAPLE PER SQ. YD



2 STAPLES PER SQ. YD



1 1/2 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.

For environmental review purposes only.



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

DATE: 5/25/2001

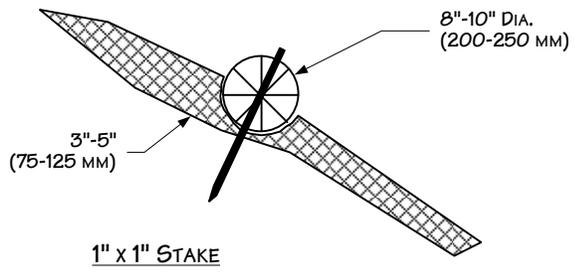
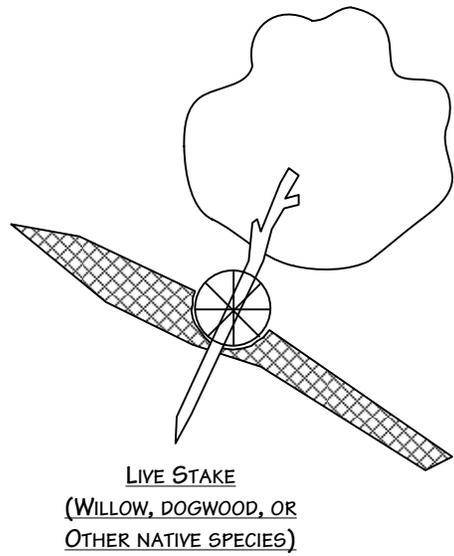
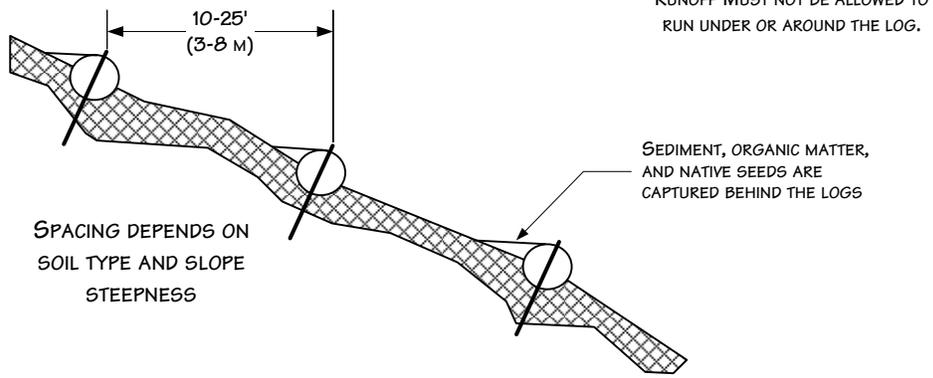
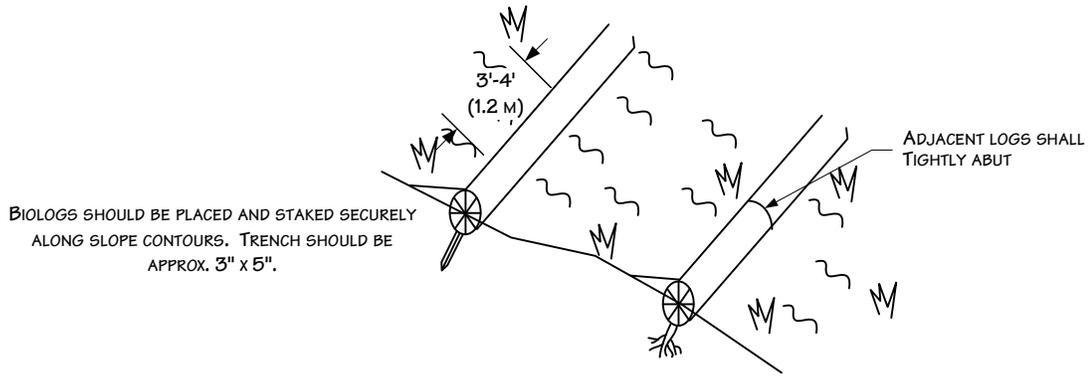
REVISED: 3/24/2011

SCALE: NTS

DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG 9 STAPLE PATTERN_EROSION_CON TROL_FABRIC.VSD



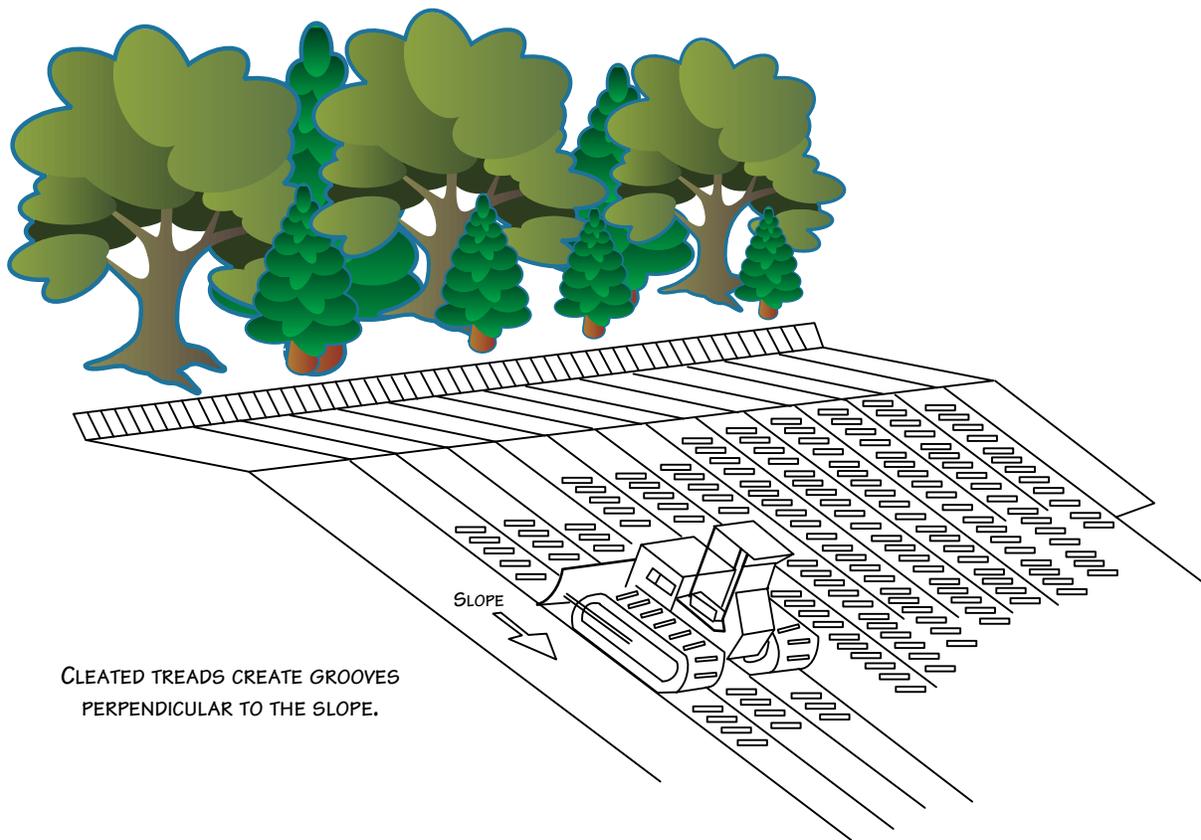


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Figure 10
Environmental Protection Plan
Typical Biolog Installation

DATE: 5/25/2001	
REVISED: 3/24/2011	
SCALE: NTS	
DRAWN BY: KMKENDALL	
K:\ CLIENT PROJECTS\ID-FEEL\2011-019\ FIG_10_BIOLOG INSTALL.VSD	



CLEATED TREADS CREATE GROOVES
PERPENDICULAR TO THE SLOPE.

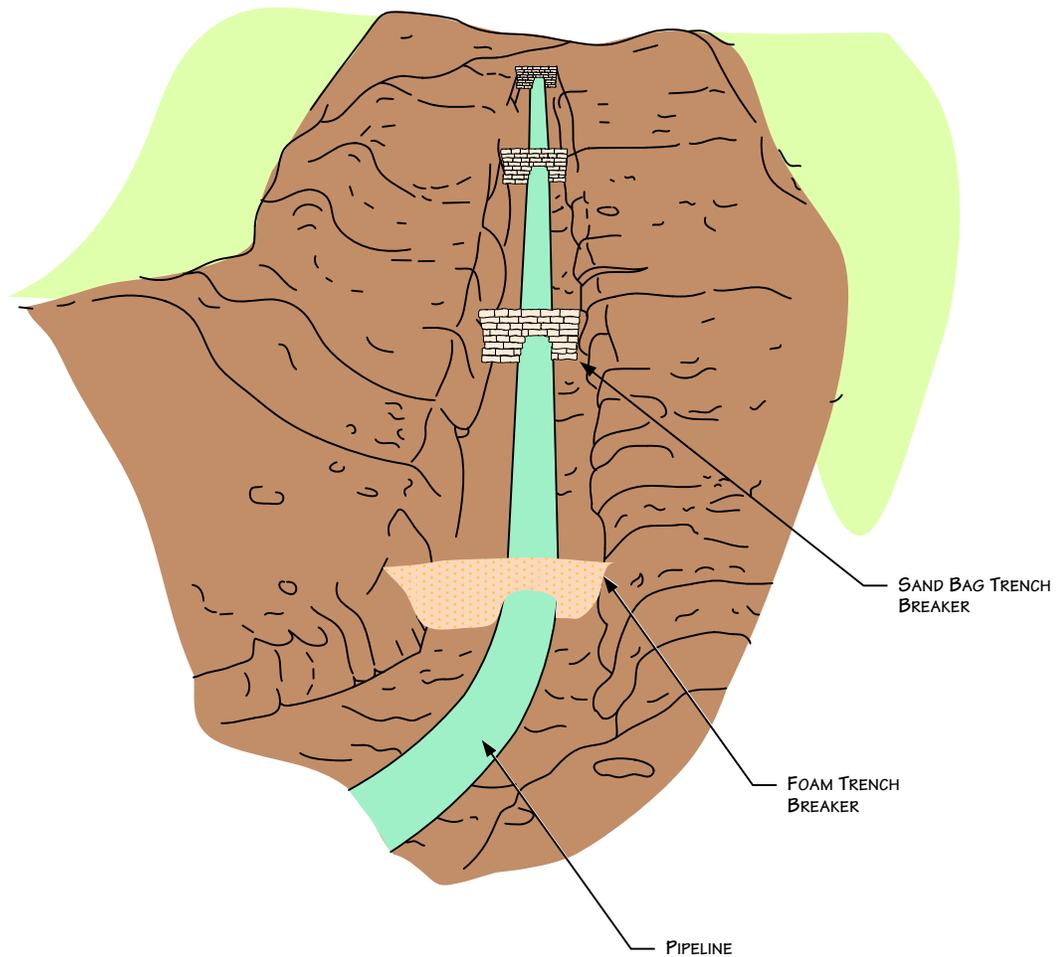
For environmental review purposes only.



Figure 11
Environmental Protection Plan
Typical Cat Tracking

DATE: 5/25/2001	
REVISED: 3/24/2011	
SCALE: NTS	
DRAWN BY: KMKENDALL	

K:\CLIENT_PROJECTS\ID-FEEL\2011-019\FIG_11_CAT_TRACKING.VSD



NOTES

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

For environmental review purposes only.



Figure 12
Environmental Protection Plan
 Typical Trench Breakers - Perspective View

DATE: 5/25/2001

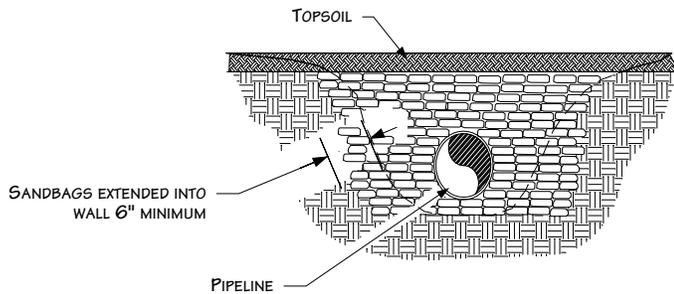
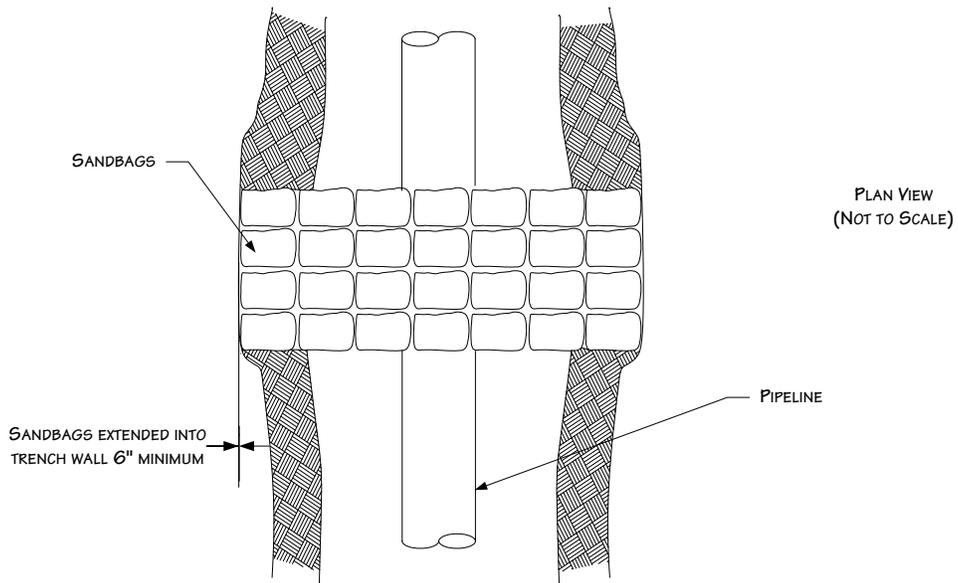
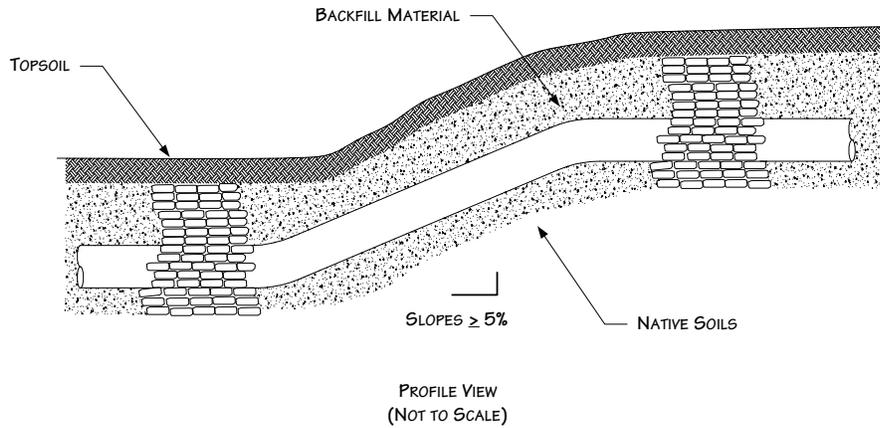
REVISED: 3/11/11

SCALE: NTS

DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG_12_TRENCH_BREAKER_PERSPECTIV E_VIEW.VSD





NOTES

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

For environmental review purposes only.



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

DATE: 11/15/2000

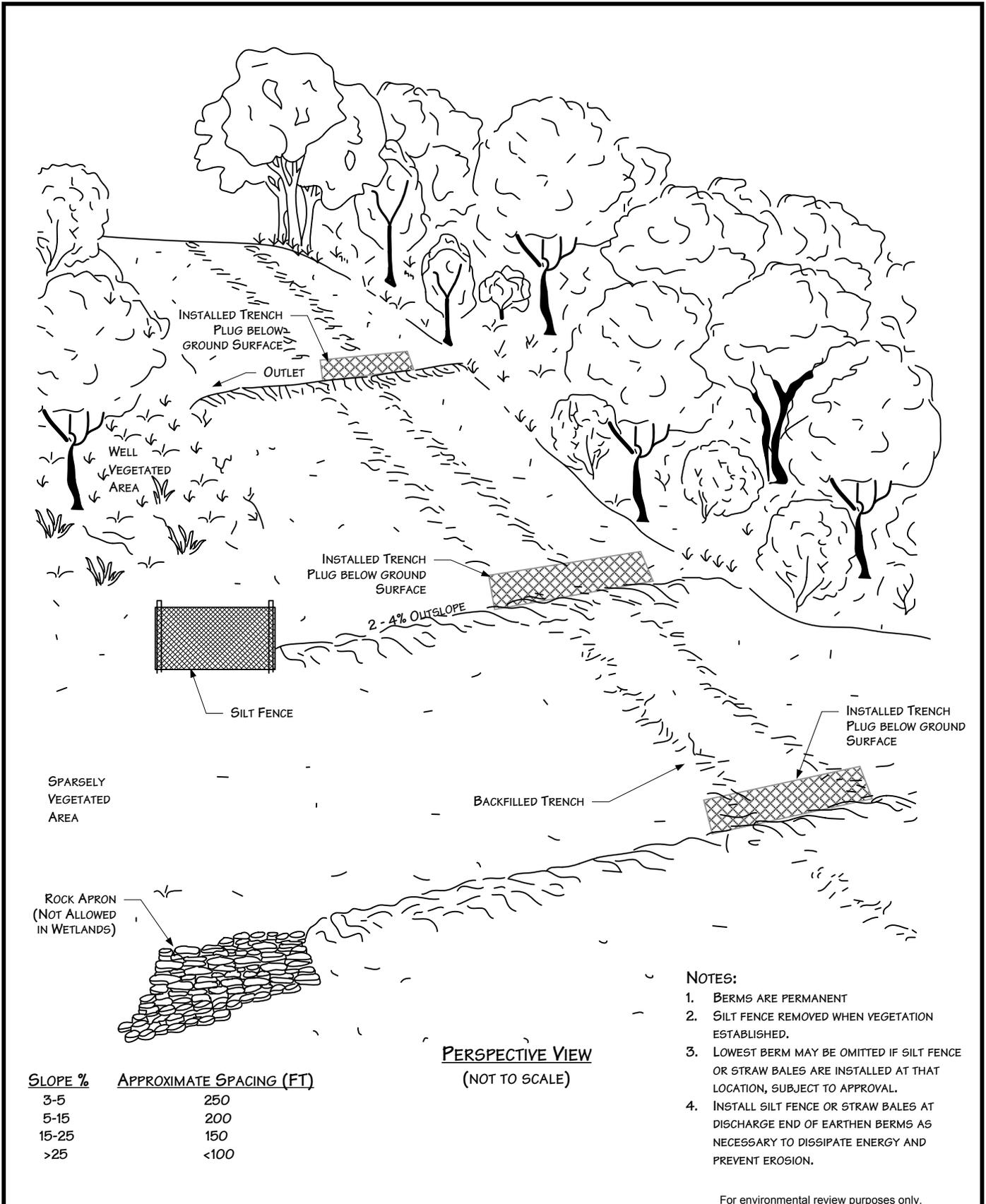
REVISED: 3/11/11

SCALE: NTS

DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG_13_TRENCH_BREAKER_PLAN_PROFIL_E_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.

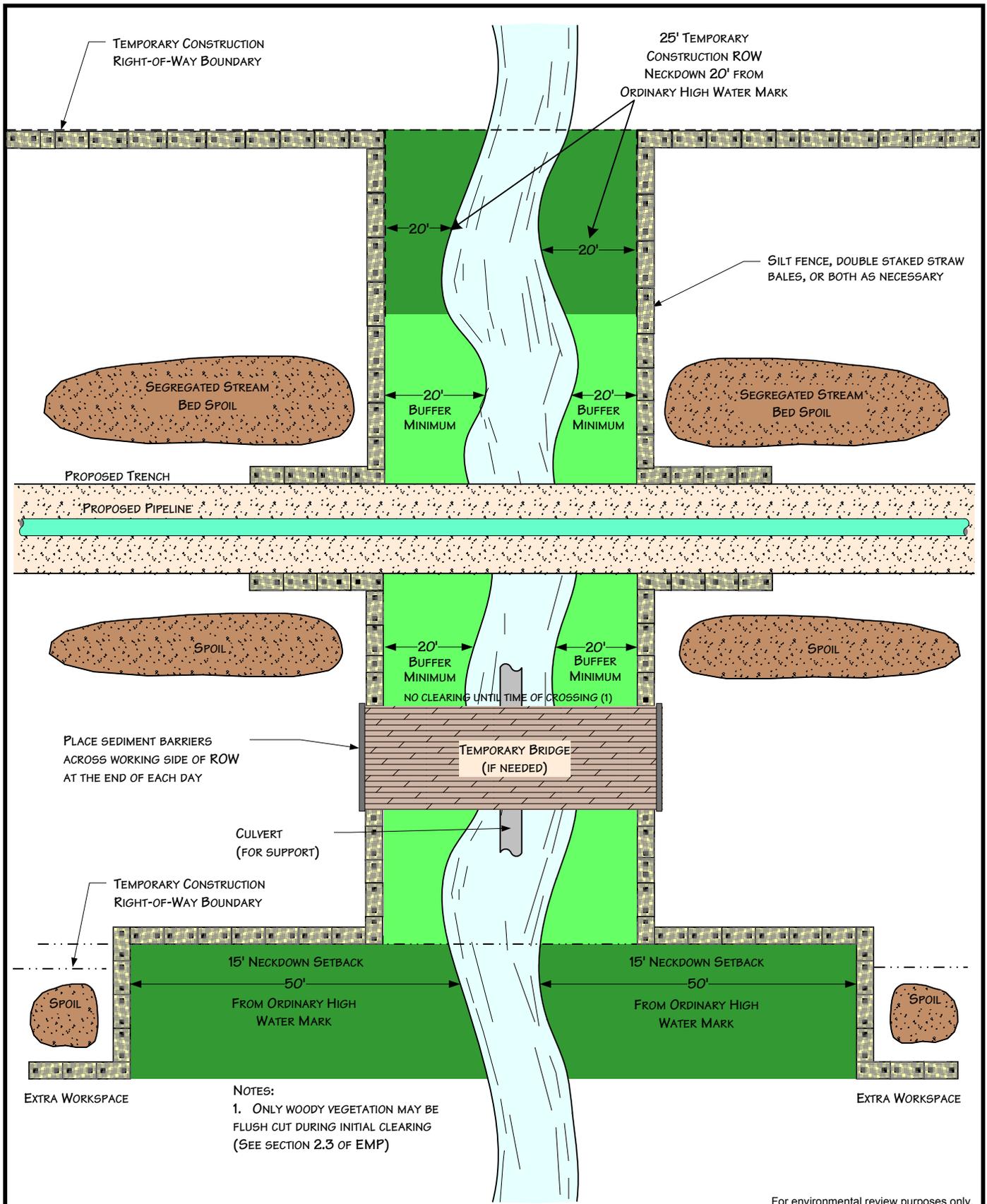
For environmental review purposes only.



Figure 14
Environmental Mitigation Plan
Permanent Slope Breakers - Perspective View

DATE: 5/25/2001
 REVISED: 3/11/11
 SCALE: NTS
 DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG 14_SLOPE_BREAKERS_PERSPECTIVE_VIEW.VSD



For environmental review purposes only.



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\ID-PIEL\2011-019\FIG_15_WATERBODY_OPENCUT_WETTRENCH.VSD



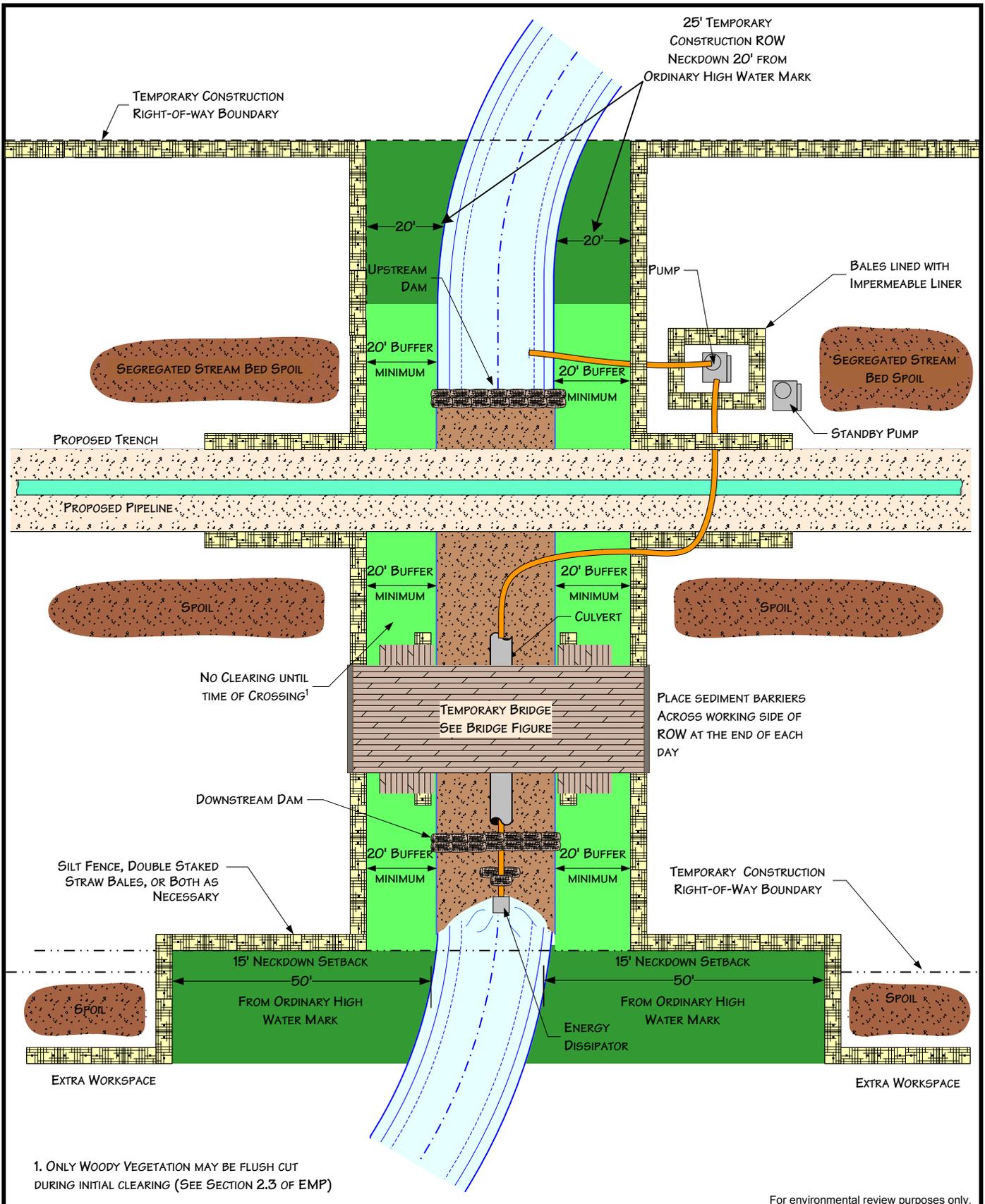


Figure 16
Environmental Protection Plan
 Typical Waterbody Crossing
 Dam and Pump Method

DATE: 11/29/2005	
REVISED: 4/20/09	
SCALE: NTS	
DRAWN BY: JPB	
<small>K:\CLIENT_PROJECTS\ID-PEEL\2011-019\FIG_16_WATERBODY_DAM_AND_PUMP_VSD</small>	

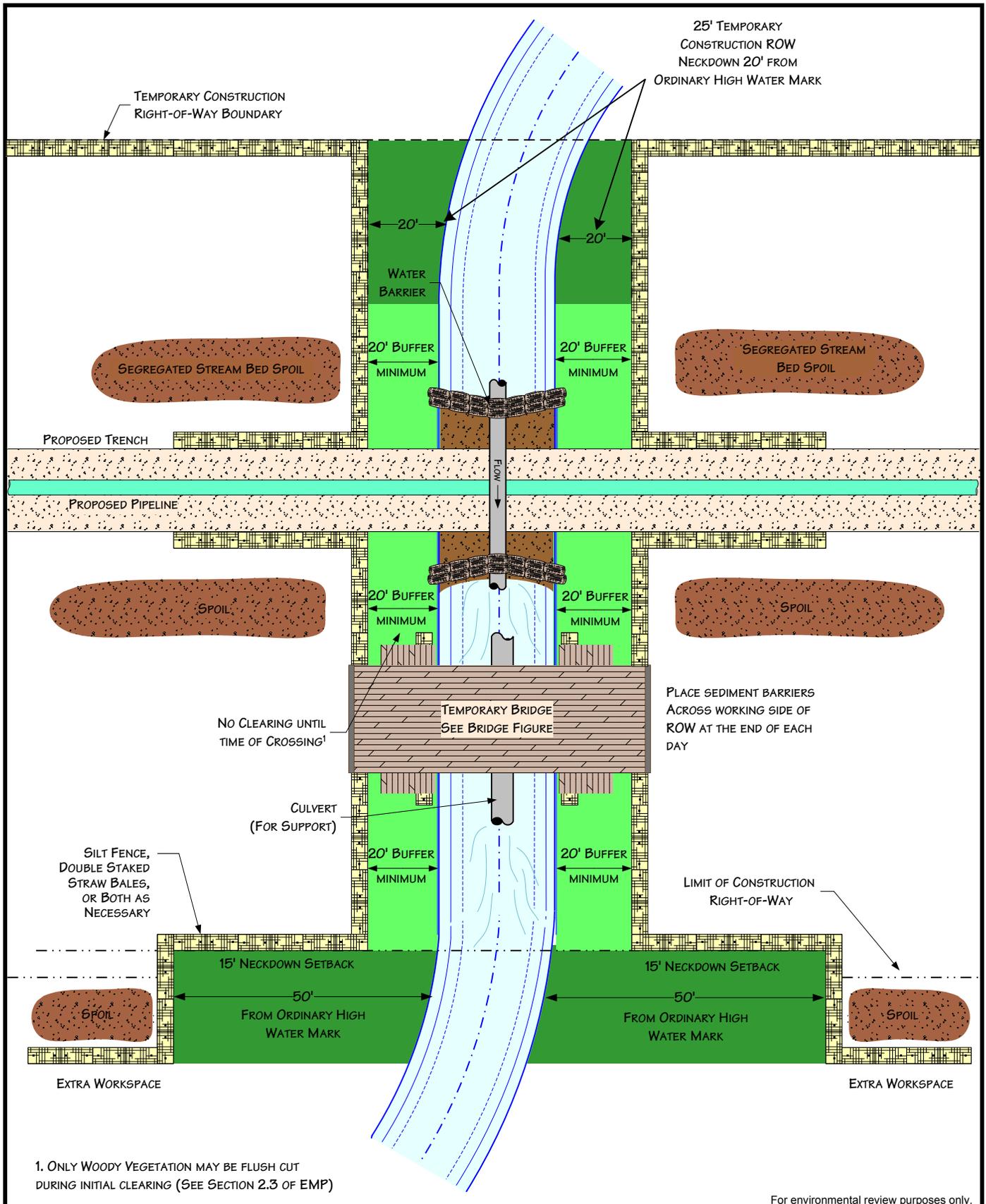


Figure 17
Environmental Protection Plan
 Typical Waterbody Crossing
 Flume Method

DATE: 11/29/2005

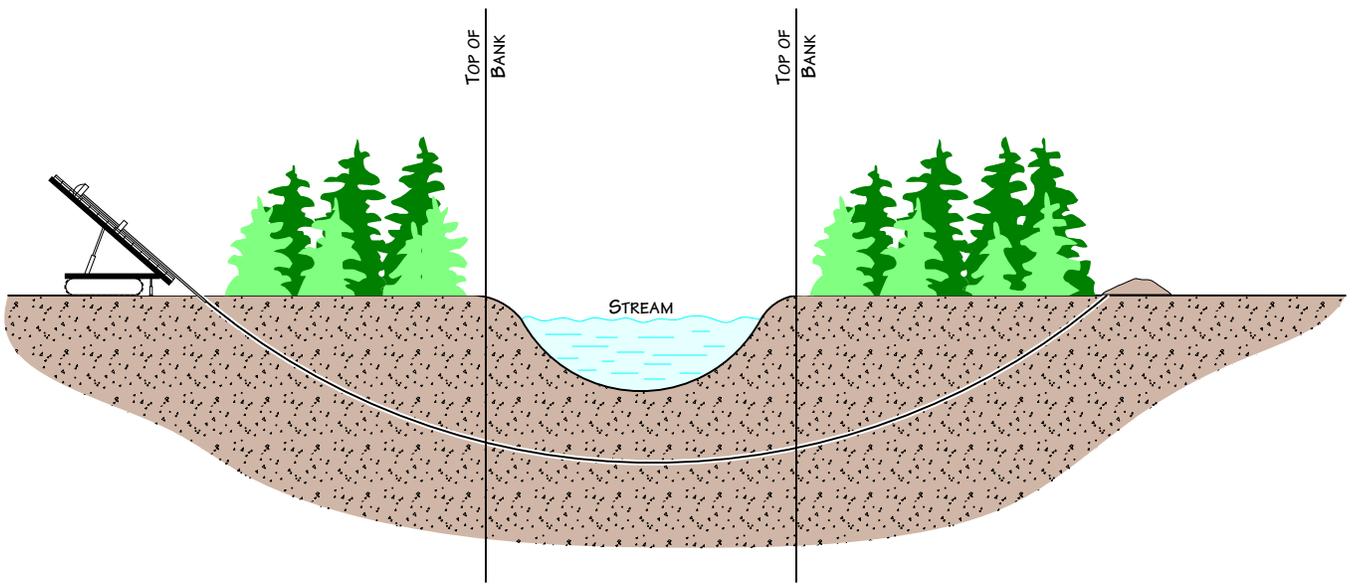
REVISED: 3/11/11

SCALE: NTS

DRAWN BY: JPB

K:\CLIENT_PROJECTS\ID-PEEL\2011-019\FIG_17_WATERBODY_FLUME.VSD





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Figure 18
Environmental Protection Plan
 Typical Waterbody Crossing
 Directional Drill Method

DATE: 7/14/2000

REVISED: 3/11/11

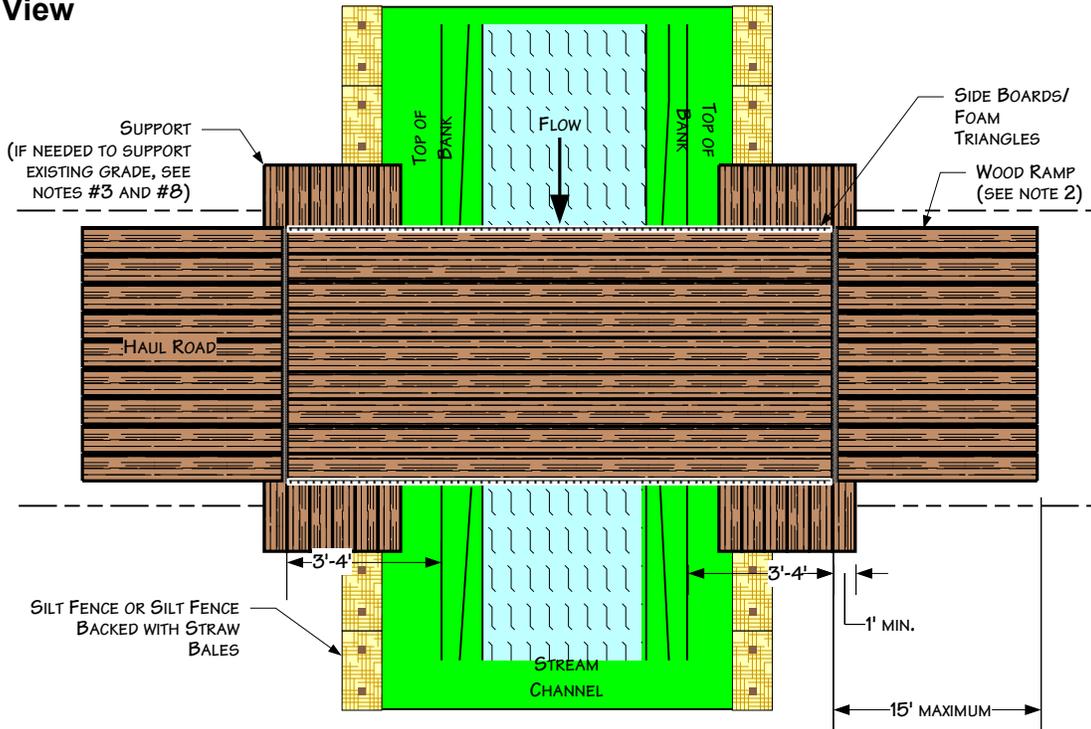
SCALE: NTS

DRAWN BY: KMKENDALL

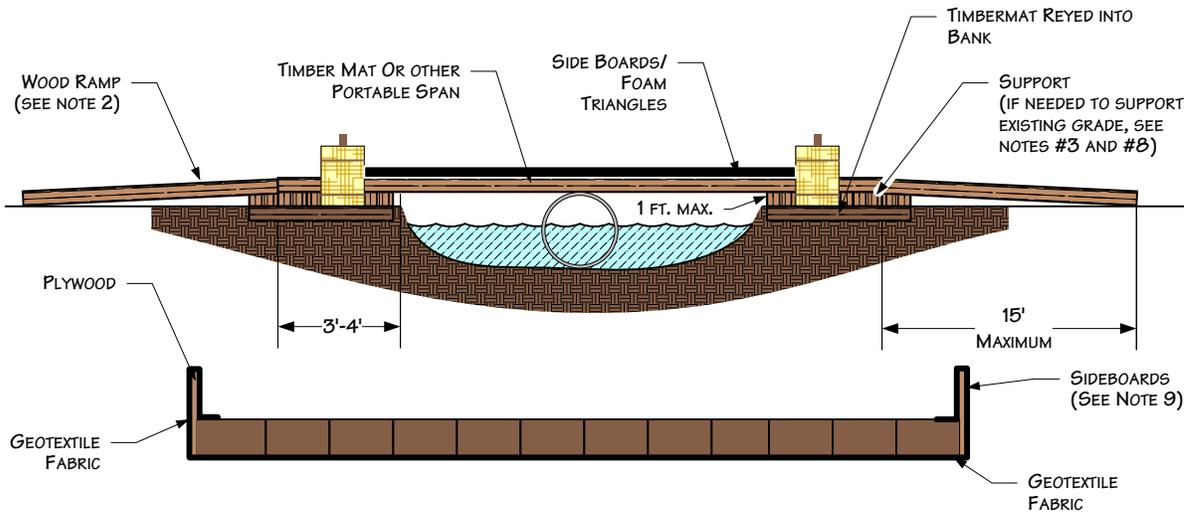
K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG_18_WATERBODY_DIRECTIONAL_DRILL.VSD



Plan View



Profile View



NOTES:

1. INSPECT BRIDGE OPENING PERIODICALLY AND FOLLOWING RAINFALLS OF OVER $\frac{1}{2}$ ". 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. SIDEBARDS WILL BE INSTALLED ON TEMPORARY BRIDGES TO MINIMIZE THE POTENTIAL FOR SEDIMENT TRANSPORT. SIDEBARDS 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 SIDEBARDS IN A CONTINUOUS FASHION.

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Figure 19
Environmental Protection Plan
 Typical Span Type Bridge
 With or Without Instream Support

DATE: 3/11/2003

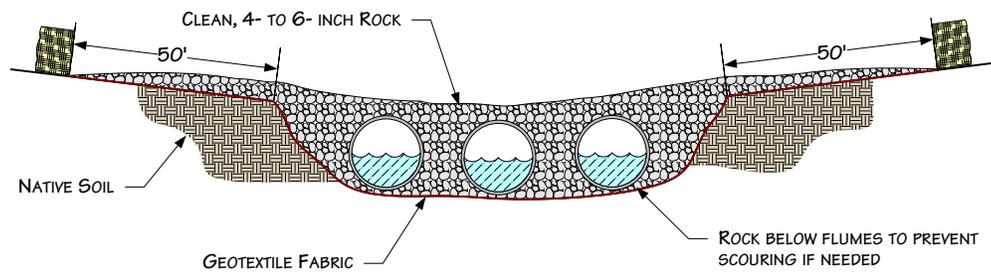
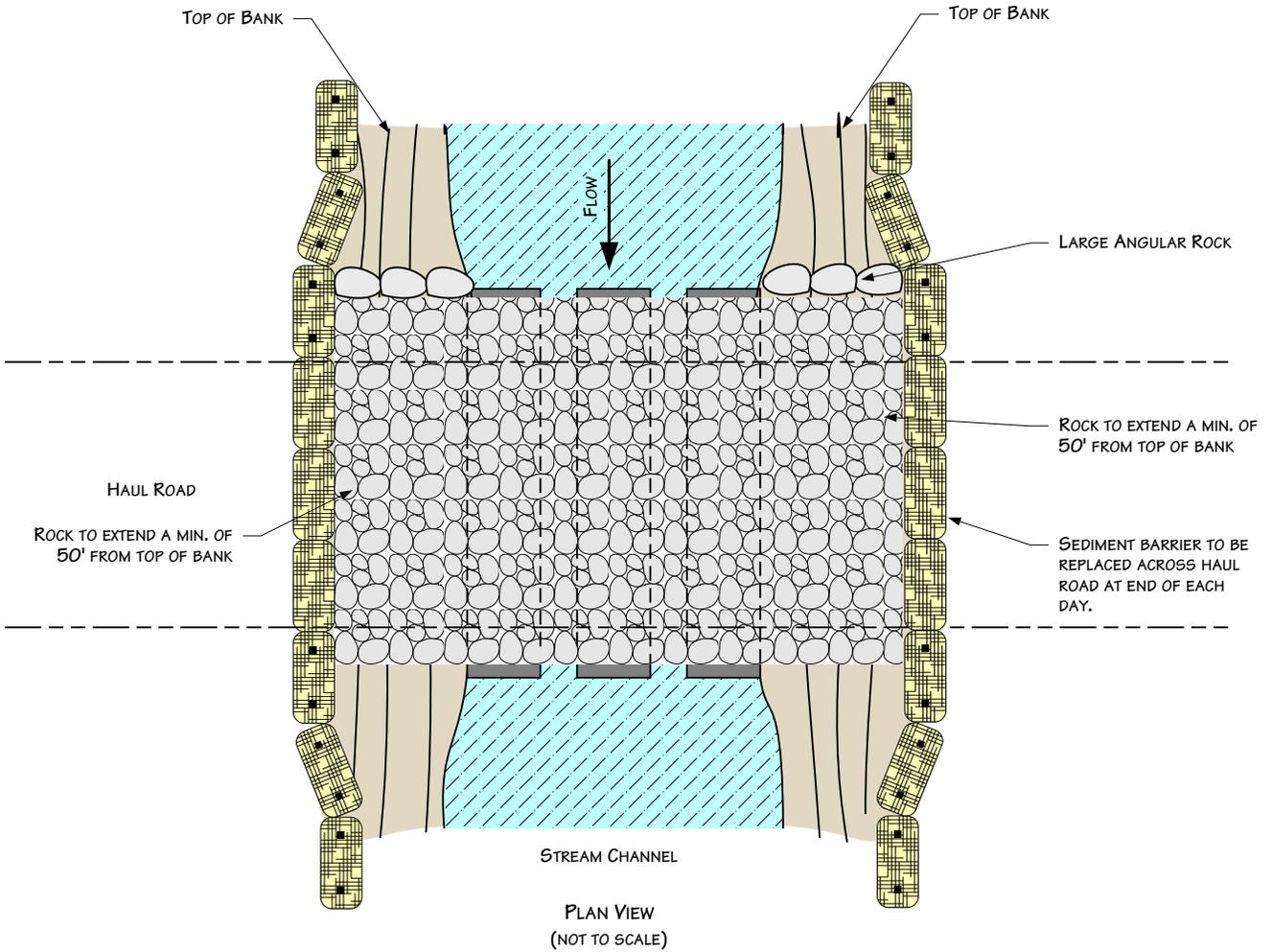
REVISED: 3/25/2011

SCALE: NTS

DRAWN BY: KMK6792

K:\ CLIENT PROJECTS\ID-FEEL\2011-019\ FIG_19_BRIDGE_SPAN.VSD





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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Figure 20
Environmental Protection Plan
Typical Rock Flume Bridge

DATE: 5/25/2001

REVISED: 3/15/11

SCALE: NTS

DRAWN BY: KMKENDALL

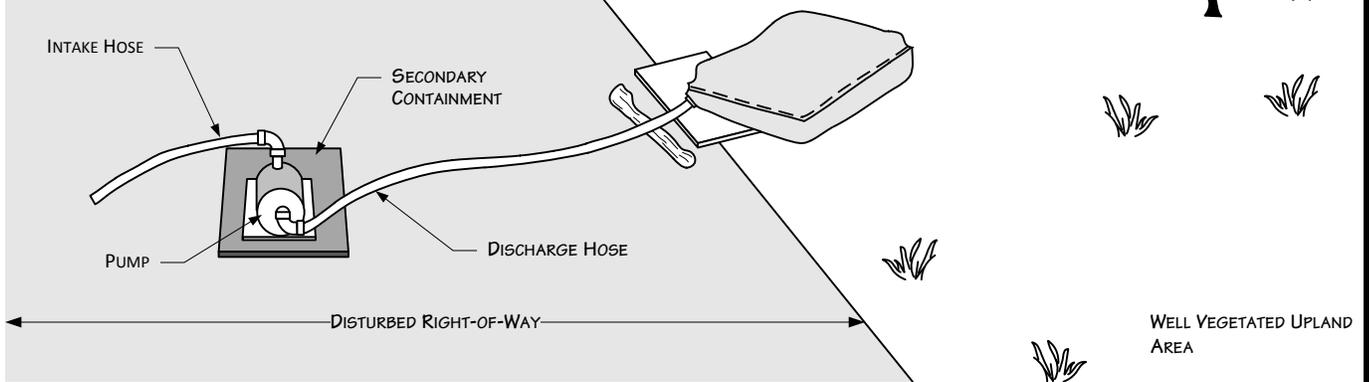
K:\CLIENT PROJECTS\ID-PEEL\2011-019\FIG_20_ROCK_FLUME_BRIDGE.VSD



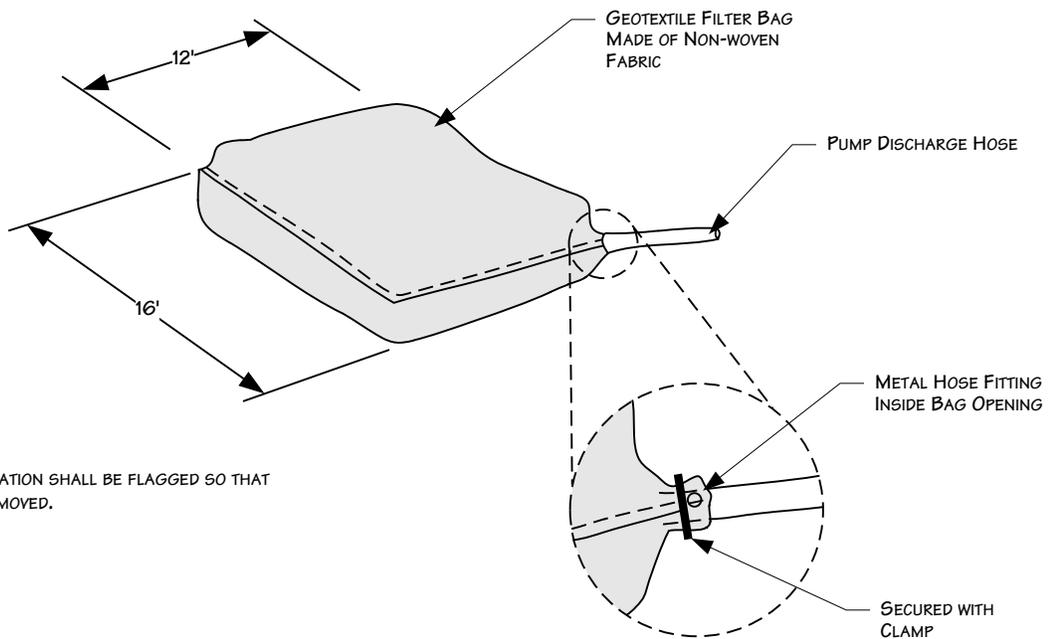
DEWATERING DISCHARGE IN WELL VEGETATED UPLANDS

NOTES:

1. PUMP INTAKE 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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Figure 21
Environmental Protection Plan
Typical Dewatering Measures

DATE: 5/25/2001

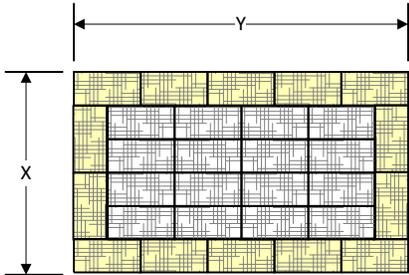
REVISED: 3/15/11

SCALE: NTS

DRAWN BY: KMKENDALL

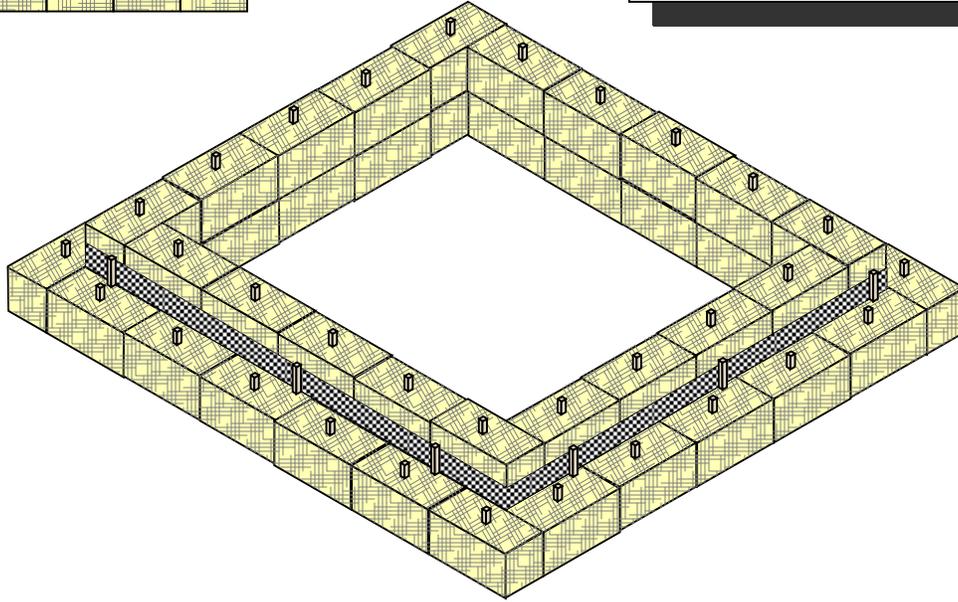
K:\CLIENT_PROJECTS\SD-FEEL\2011-019\FIG_21_DEWATERING_MEASURES.VSD



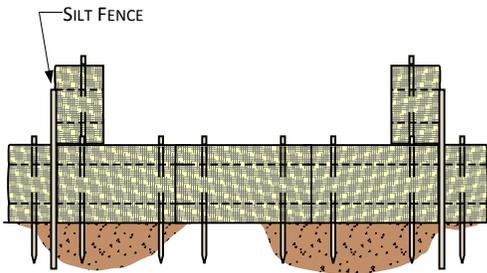


NOTES

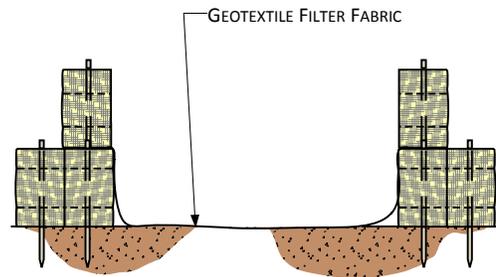
1. ARRANGE THE STRAW BALES TO THE X AND Y DIMENSIONS AS SPECIFIED BELOW.
2. IF BOTTOM OF STRUCTURE IS NOT LINED WITH STRAW BALES (OPTION 1), LINE ENTIRE STRUCTURE WITH GEOTEXTILE FILTER FABRIC.



PERSPECTIVE VIEW



OPTION 1



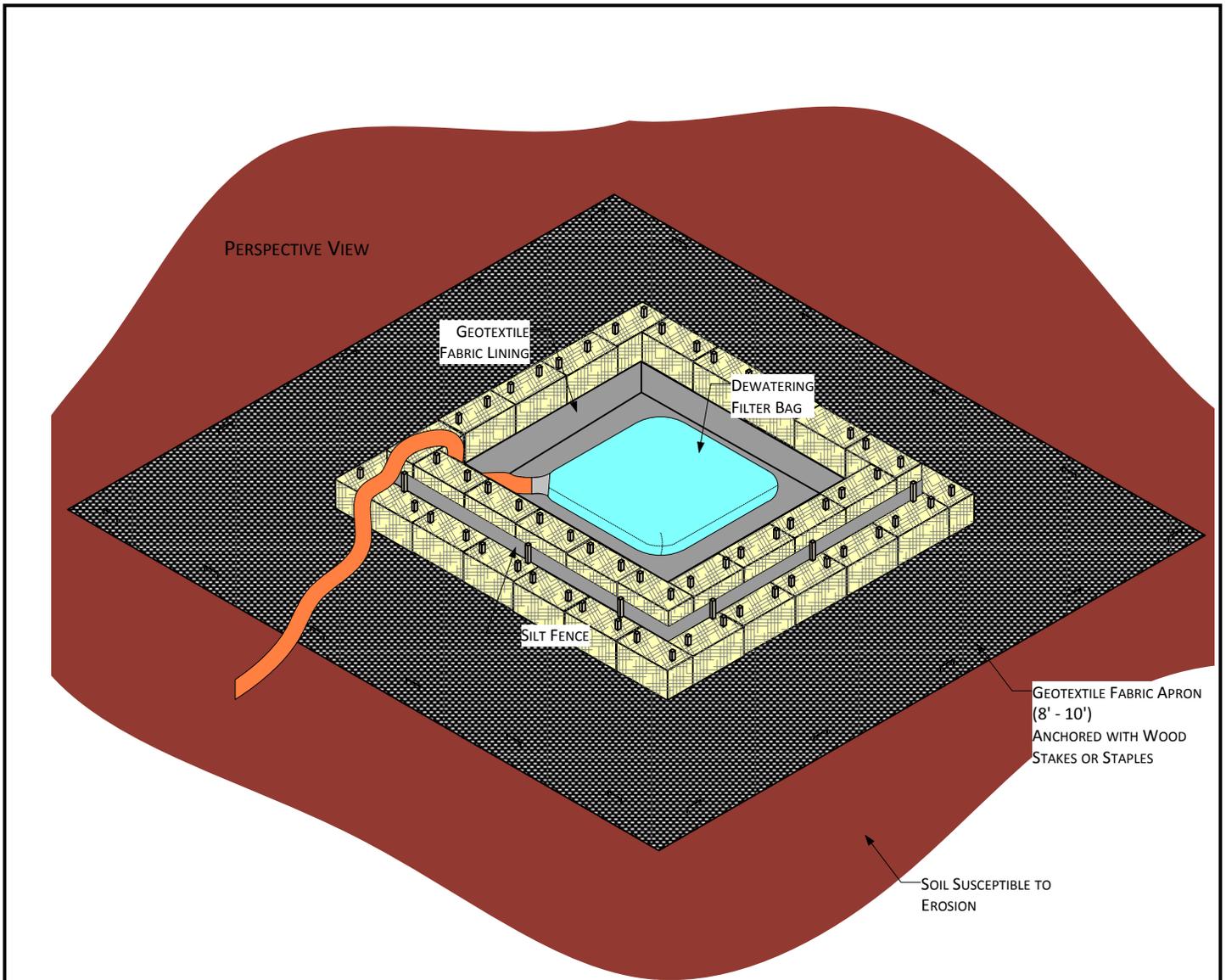
OPTION 2

TYPICAL MINIMUM SUMP DIMENSIONS (FEET)		MAXIMUM PUMPING RATE GALLONS PER MINUTE
X	Y	
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





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:

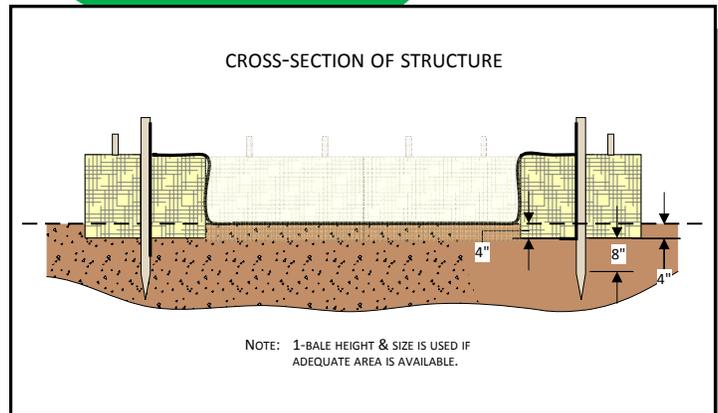
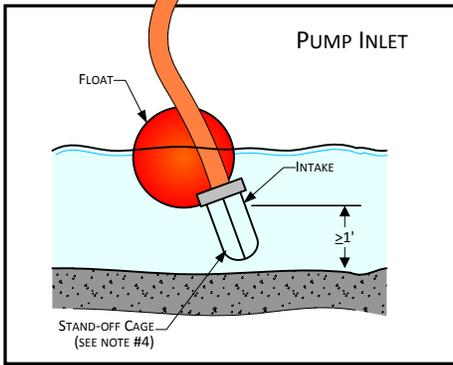
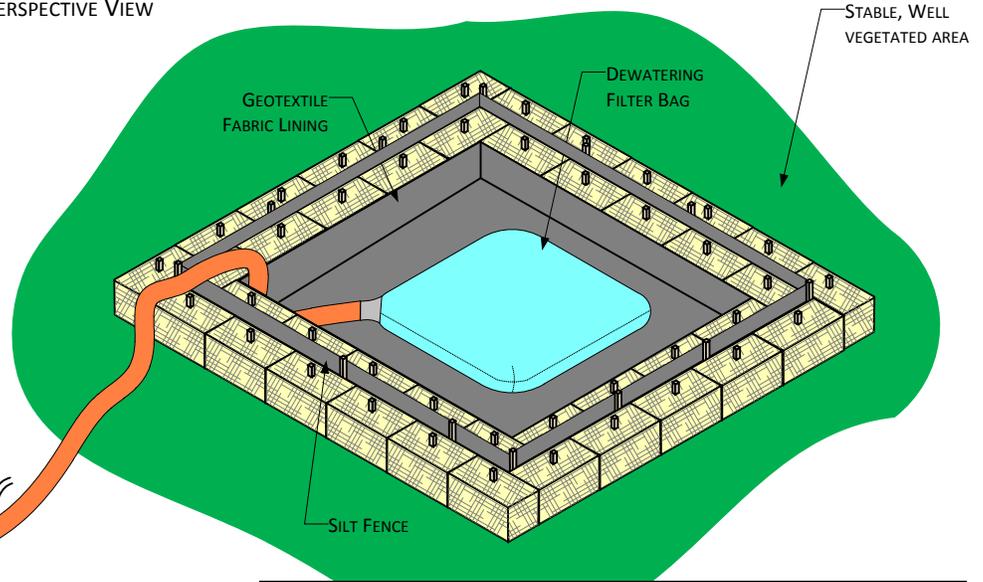
1. SILT FENCE ENDS MUST BE WRAPPED TO JOIN TWO SECTIONS.
2. INSTALL SILT FENCE 2 INCHES ABOVE TOP OF STRAW BALES, AND ANCHOR A MINIMUM OF 8 INCHES STRAIGHT DOWN.
3. SILT FENCE POST STAKING MUST BE 4 FEET OR LESS.
4. DEWATERING INTAKE HOSE SUPPORTED AT LEAST 1 FOOT FROM BOTTOM OF TRENCH BEING DEWATERED.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

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Figure 22B
Environmental Protection Plan
Straw Bale Dewatering Structure



PERSPECTIVE VIEW



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:

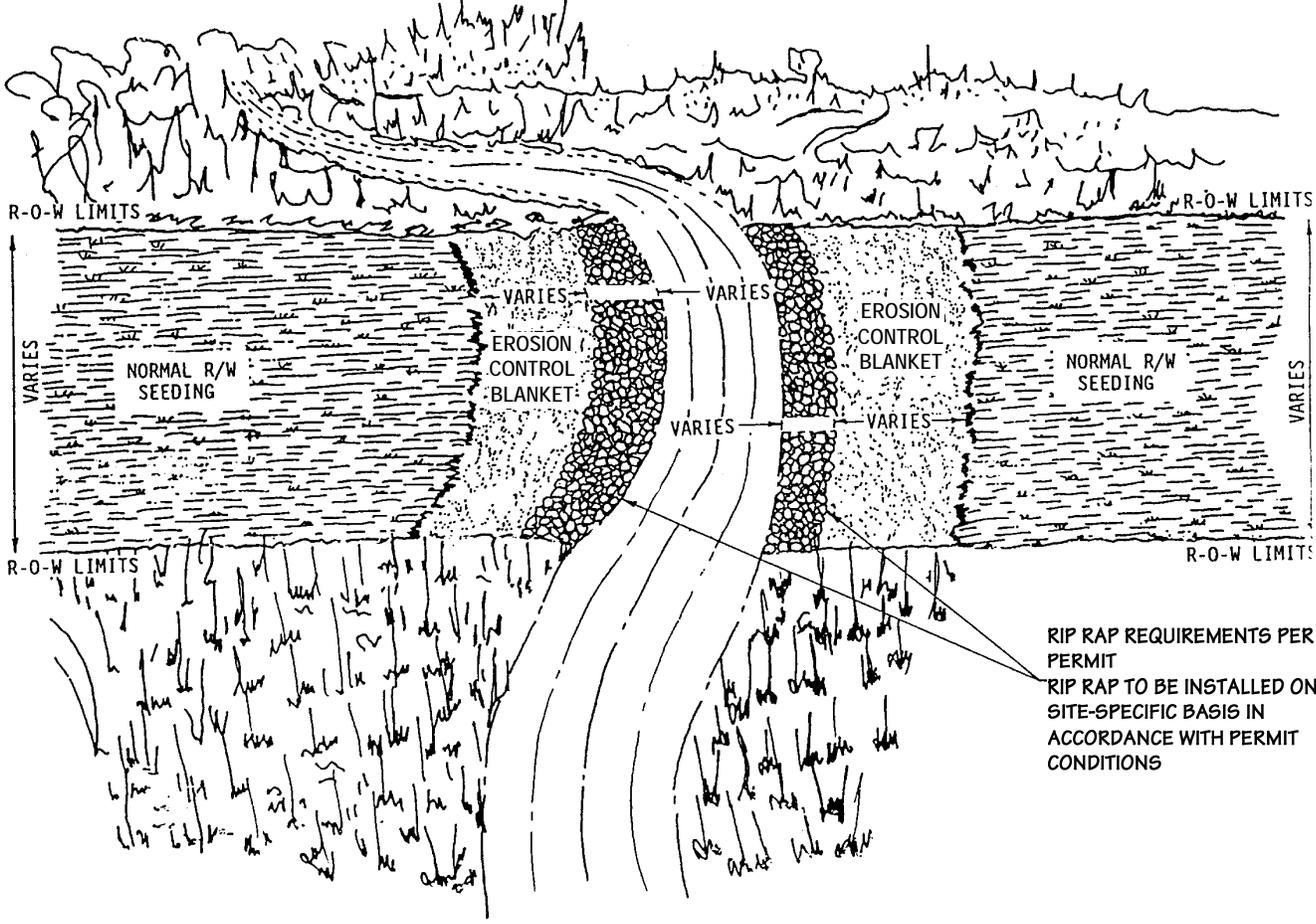
1. SILT FENCE ENDS MUST BE WRAPPED TO JOIN TWO SECTIONS.
2. INSTALL SILT FENCE 2 INCHES ABOVE TOP OF STRAW BALE, AND ANCHOR A MINIMUM OF 8 INCHES STRAIGHT DOWN.
3. SILT FENCE POST STAKING MUST BE 4 FEET OR LESS.
4. DEWATERING INTAKE HOSE SUPPORTED AT LEAST 1 FOOT FROM BOTTOM OF TRENCH BEING DEWATERED.
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



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.



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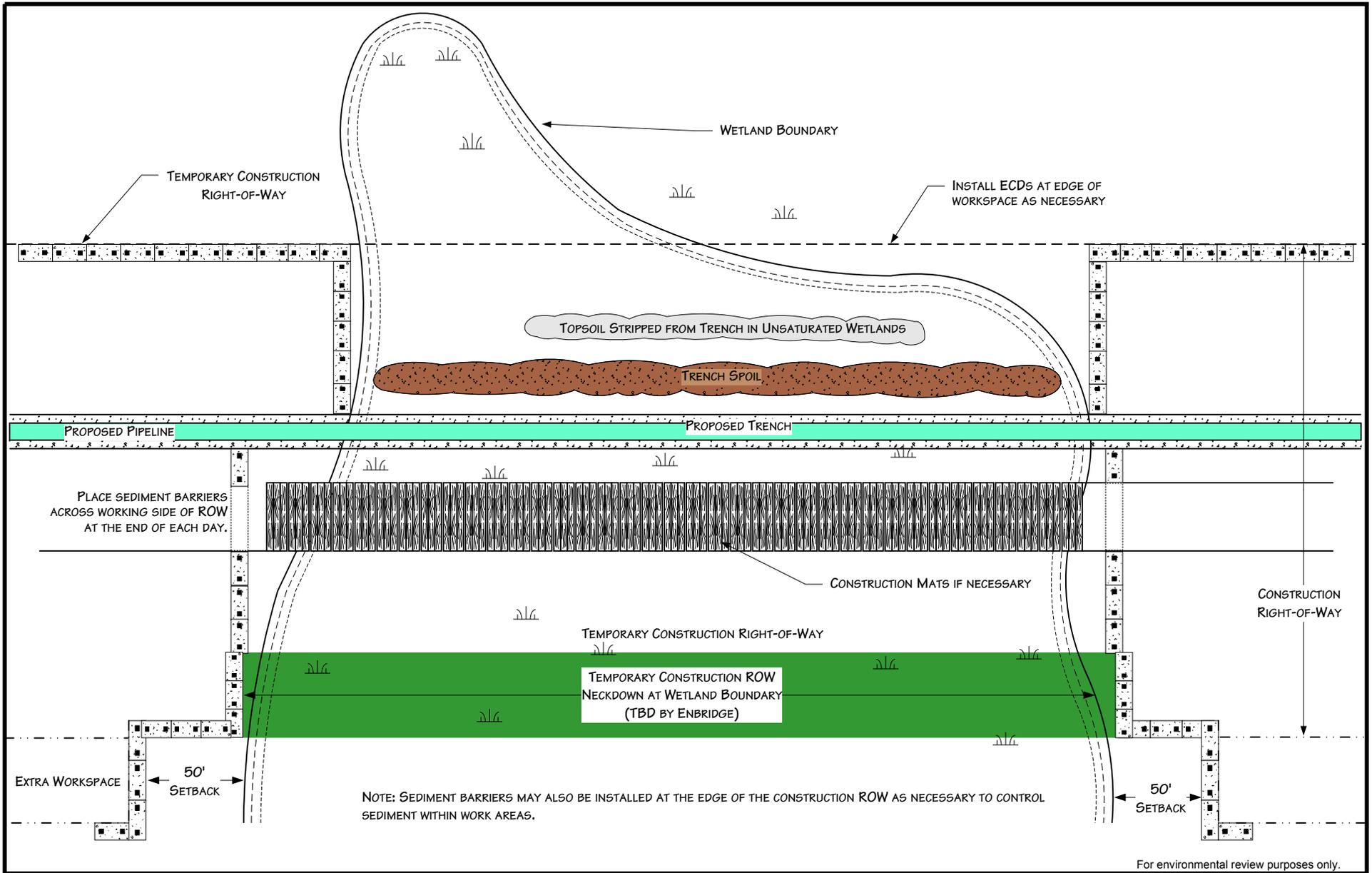


Figure 23
Environmental Protection Plan
 Typical Final Stream Bank Stabilization
 Rip Rap & Erosion Control

DATE: 7/19/2000
 REVISED: 3/14/11
 SCALE: NTS
 DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\SD-FEEL\2011-019\FIG_23_STREAM_BANK_STABILIZATION.VSD



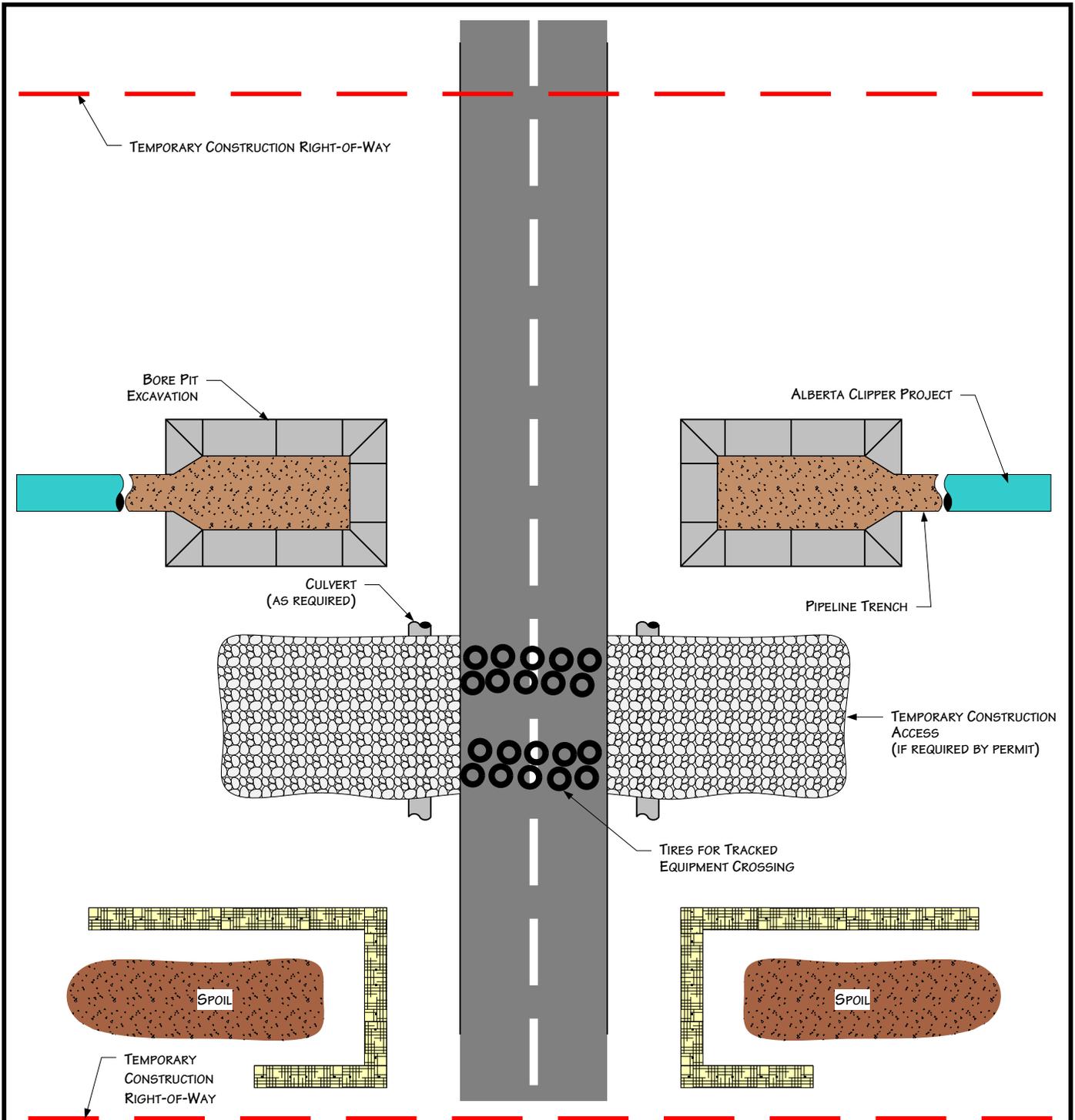


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Figure 24
Environmental Protection Plan
 Typical Wetland Crossing Method

DATE: 5/25/2001	
REVISED: 3/14/11	
SCALE: NTS	
DRAWN BY: KMKENDALL	
K:\ CLIENT PROJECTS\ID-FEEL\2011-019\ FIG 24_WETLAND_CROSSING_METHOD.V SD	



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.

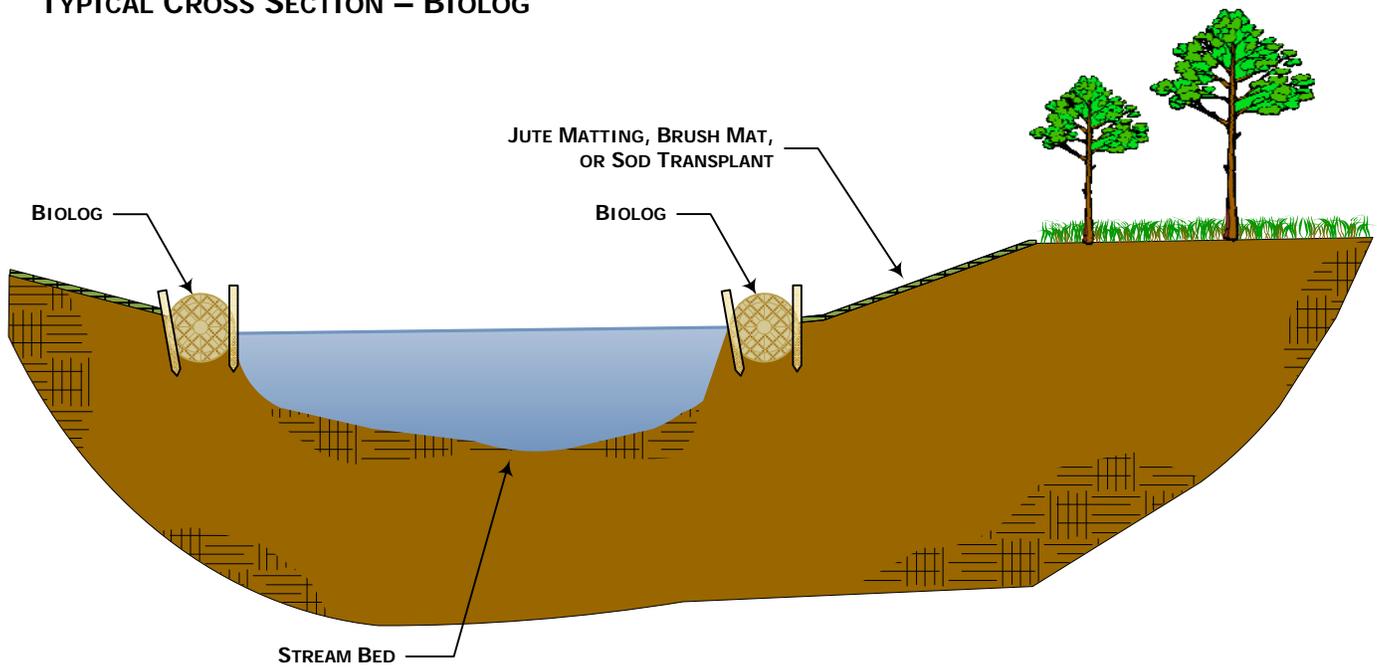
For environmental review purposes only.



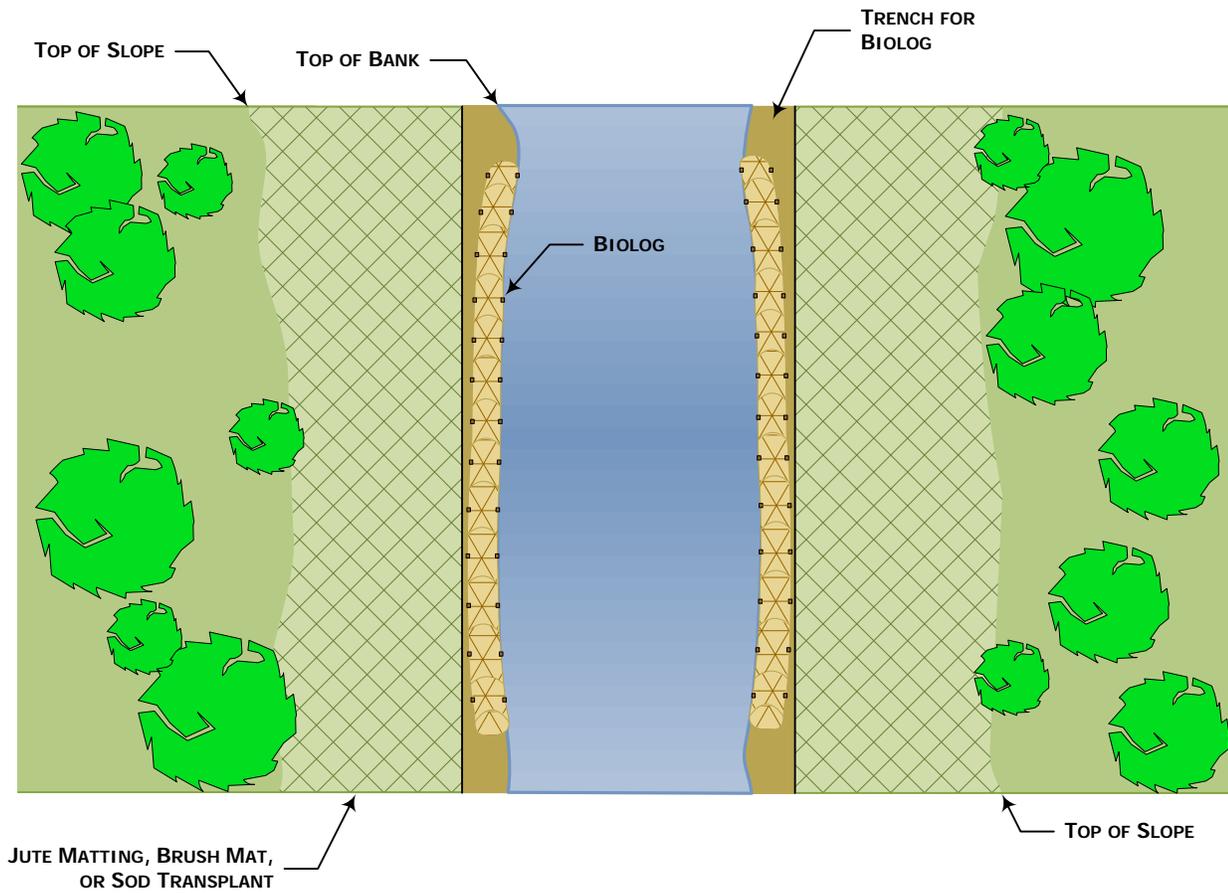
Figure 25
Environmental Protection Plan
 Typical Improved Road Crossing
 Directional Bore Method

DATE: 7/13/1999	
REVISED: 3/14/11	
SCALE: NTS	
DRAWN BY: KMKENDALL	
<small>K:\CLIENT_PROJECTS\D-FIEEL\2011-019\FIG_25_IMPROVED_ROAD_BORE_CROSSING.VSD</small>	

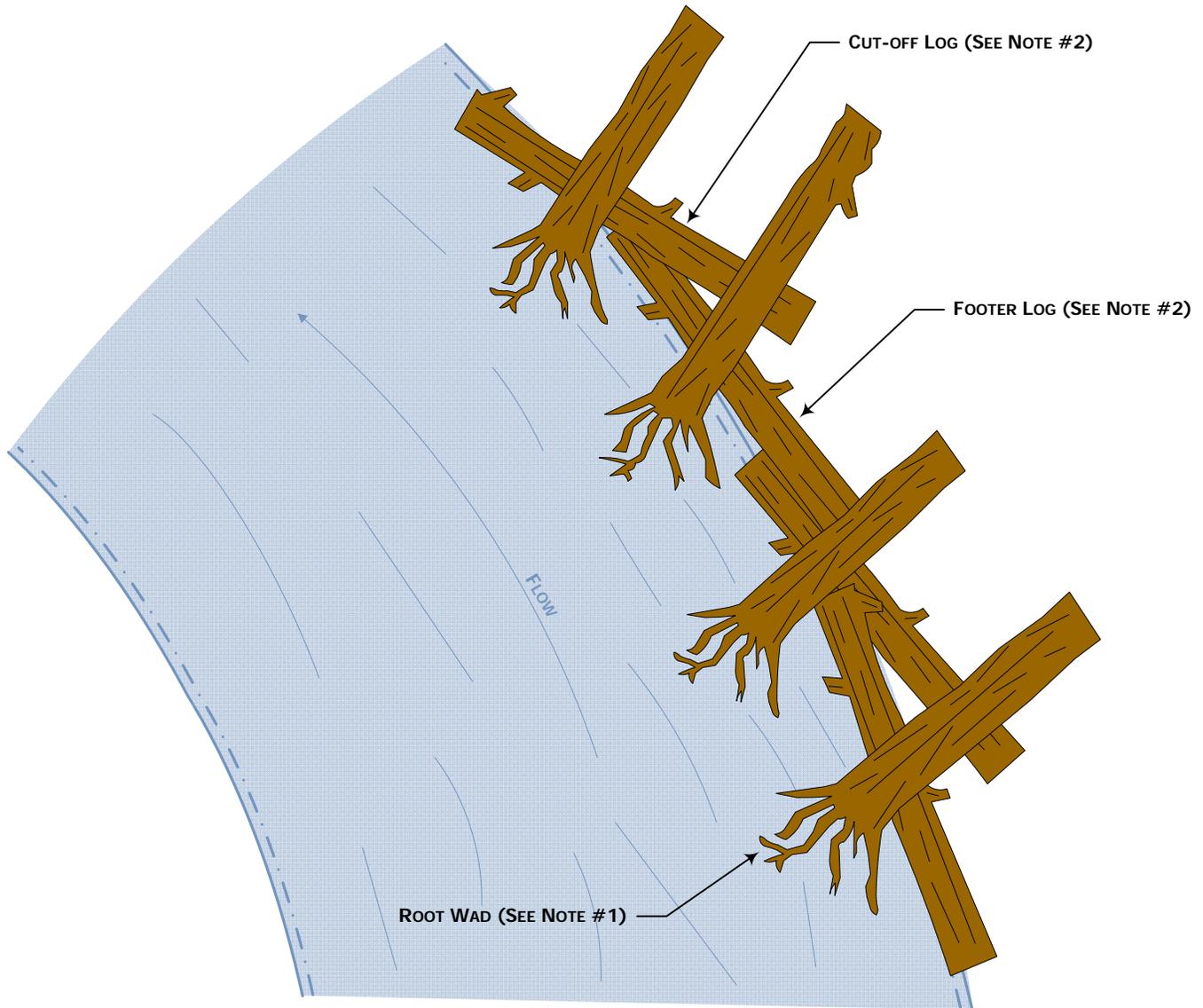
TYPICAL CROSS SECTION – BIOLOG



TYPICAL PLAN VIEW – BIOLOG



TYPICAL PLAN VIEW – NATURAL MATERIAL REVETMENT

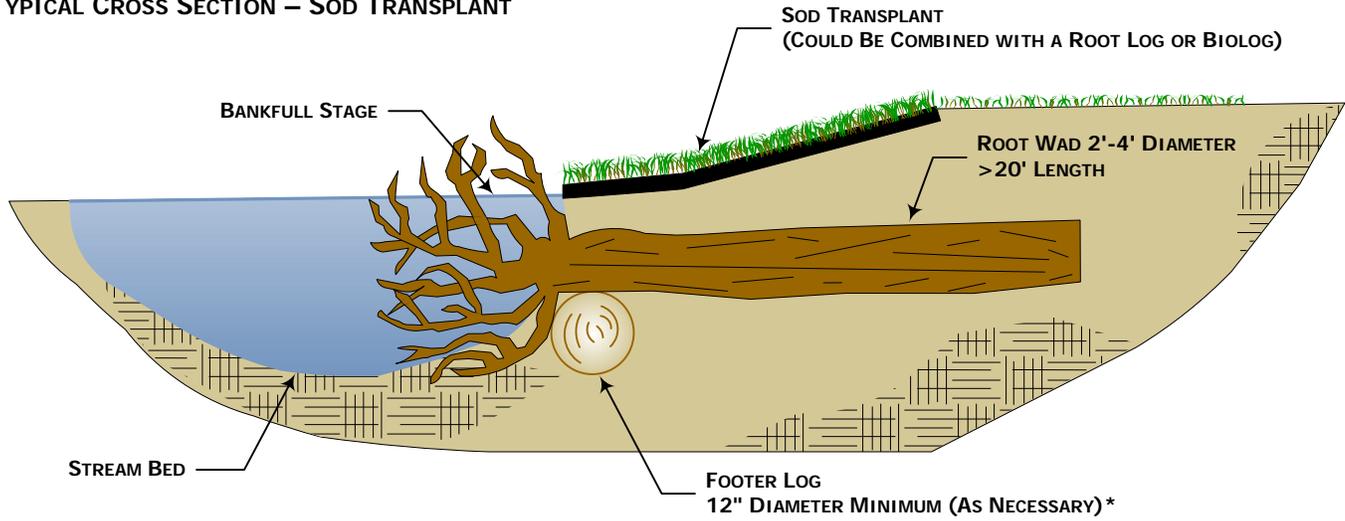


Notes:

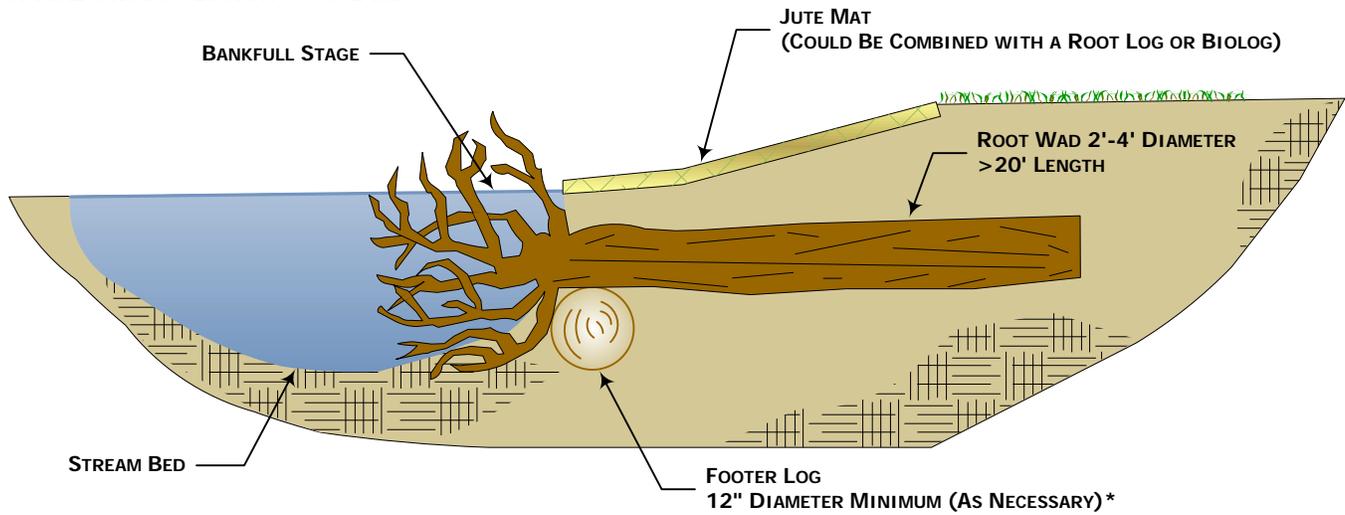
#1 – Root wad logs to be used on steep banks or based on agency recommendations.

#2 - Root wad logs to be anchored appropriately based on site-specific conditions or agency recommendations.

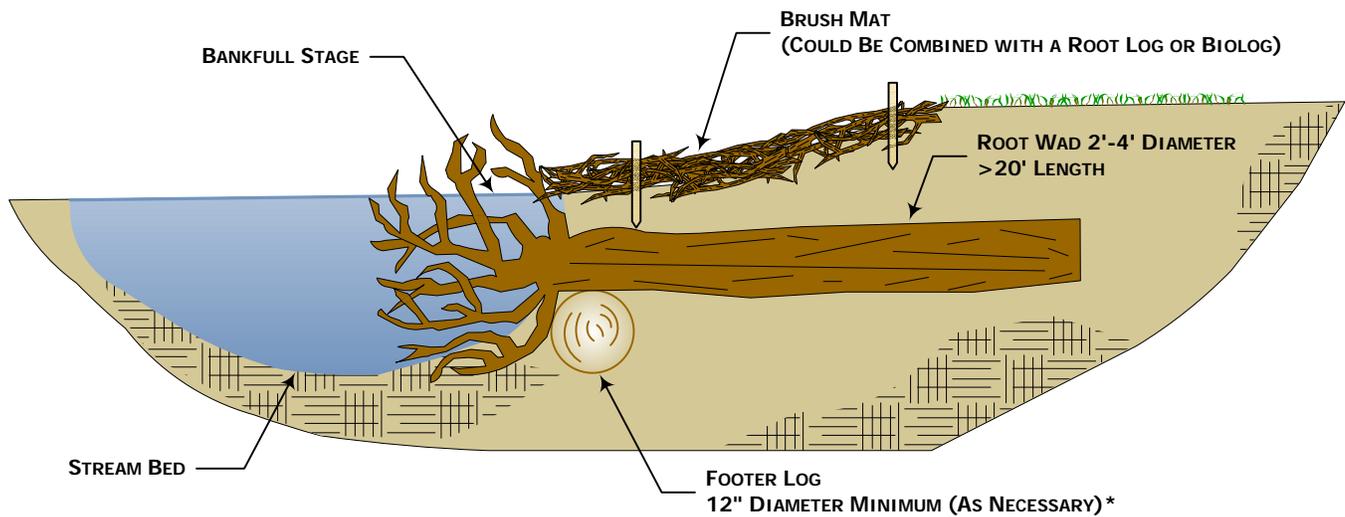
TYPICAL CROSS SECTION – SOD TRANSPLANT



TYPICAL CROSS SECTION – JUTE MAT



TYPICAL CROSS SECTION – BRUSH MAT



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

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

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

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

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

Sandpiper Pipeline Project			
Noxious and Invasive Weed Species			
State/Weed Type	Common Name	Scientific Name	Regulatory Classification
	Water flea	<i>Daphnia lumholtzi</i>	Prohibited
	Zebra mussel	<i>Dreissena polymorpha</i>	Restricted
<p>North Dakota:</p> <p style="padding-left: 20px;">a Listed Regulated Species</p> <p>Minnesota Control Status:</p> <p style="padding-left: 20px;">b Eradicate</p> <p style="padding-left: 20px;">c Control</p> <p style="padding-left: 20px;">d Restricted</p> <p>Abbreviations:</p> <p style="padding-left: 20px;">NW = Noxious Weed</p> <p style="padding-left: 20px;">CONW = County Noxious Weed</p> <p style="padding-left: 20px;">SN = State noxious weed (Minnesota Department of Agriculture)</p> <p style="padding-left: 20px;">PS = State prohibited weed seed (Minnesota Department of Agriculture)</p> <p style="padding-left: 20px;">RN = Restricted noxious weed (Minnesota Department of Agriculture)</p> <p style="padding-left: 20px;">FN = Federal noxious weed (USDA-Animal Plant Health Inspection Service)</p> <p style="padding-left: 20px;">PI = Prohibited exotic species (Minnesota Department of Natural Resources)</p>			

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 <i>if summer seeding</i> (<i>Avena sativa</i>) OR Winter Wheat <i>if dormant (late fall) or spring seeding</i> (<i>Triticum aestivum</i>)	40	50%
Annual Ryegrass (<i>Lolium italicum</i>), Annual Alfalfa (<i>Medicago sativa</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	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 (<i>Pascopyrum smithii</i>)	3.2	20%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (<i>Elytrigia intermedia</i>)	5.2	30%
Alfalfa	1.2	10%
<i>Total</i>	16.6	100%
Associated Companion Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if late fall (dormant) or spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Companion/Cover Crop Total</i>	20	100%
GRAND TOTAL	36.6 pounds	100%

**Sandpiper Pipeline Project
Seed Mixes**

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

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Perennial Ryegrass <i>(Lolium perenne)</i>	2	17%
Canada Wild-rye <i>(Elymus canadensis)</i>	4	33%
Switchgrass <i>(Panicum virgatum)</i> (unimproved native variety)	4	33%
Timothy <i>(Phleum pratense)</i>	2	17%
<i>Total</i>	12	100%
Associated Companion Crop Mix		
Oats <i>if summer seeding (Avena sativa)</i> or Winter Wheat <i>if late fall (dormant) or spring seeding (Triticum aestivum)</i>	16	80%
Annual Ryegrass <i>(Lolium italicum)</i> , OR Slender Wheat Grass <i>(Elymus trachycaulus)</i>	4	20%
<i>Companion/Cover Crop Total</i>	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 <i>(Beckmannia syzigachne)</i>	6	30%
Annual Rye Grass <i>(Lolium perene)</i>	8	40%
Fowl Bluegrass <i>(Poa palustris)</i>	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 <i>(Poa pratensis)</i>	82.5	52%
Perennial Ryegrass <i>(Lolium perenne)</i>	30	19%
Creeping Red Fescue <i>(Festuca rubra)</i>	37.5	23%
Annual Rye Grass <i>(Lolium italicum)</i>	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 (<i>Pascopyrum smithii</i>)	3.2	20%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (<i>Elytrigia intermedia</i>)	5.2	30%
Alfalfa	1.2	10%
<i>Total</i>	16.6	100%
Associated Companion Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if late fall (dormant) or spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	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 (<i>Dactylis glomerata</i>)	6	30%
Vernal Alfalfa (<i>Medicago sativa</i>)	2	10%
Climax Timothy (<i>Phleum pratense</i>)	3	15%
Tetraploid Perennial Ryegrass (<i>Lolium perenne</i>)	4	20%
Alsike Clover (<i>Trifolium hybridum</i>)	2	10%
Medium Red Clover (<i>Trifolium pratense</i>)	3	15%
<i>Total</i>	20	100%
Associated Cover Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if late fall (dormant) or spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
Cover Crop Total	20	100%
GRAND TOTAL	40 pounds	100%

**Sandpiper Pipeline Project
Seed Mixes**

Table 8 – North Dakota Wildlife Area Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (<i>Pascophyrum smithii</i>)	4.0	34.5%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1.0	8.6%
Green needlegrass (<i>Stipa viridula</i>)	2.4	20.7%
Sideoats grama (<i>Bouteloua curtipendula</i>)	2.4	20.7%
Blue grama (<i>Bouteloua gracilis</i>)	0.4	3.4%
Canada wildrye (<i>Elymus Canadensis</i>)	0.6	5.2%
Switchgrass (<i>Panicum virgatum</i>)	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 (<i>Trifolium pretense</i>)	4.5	30%
Alsike Clover (<i>Trifolium hybridum</i>)	4.5	30%
White Clover (<i>Trifolium repens</i>)	4.5	30%
Creeping Red Fescue (<i>Festuca rubra</i>)	1.5	10%
<i>Total</i>	15	100%
Associated Cover Crop Mix		
Oats if summer seeding (<i>Avena sativa</i>) or Winter Wheat if spring seeding (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), Annual Alfalfa (<i>Medicago sativa</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Cover Crop Total</i>	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 (<i>Pascopyrum smithii</i>)	4.0	34.5%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1.0	8.6%
Green needlegrass (<i>Stipa viridula</i>)	2.4	20.7%
Sideoats grama (<i>Bouteloua curtipendula</i>)	2.4	20.7%
Blue grama (<i>Bouteloua gracilis</i>)	0.4	3.4%
Canada wildrye (<i>Elymus Canadensis</i>)	0.6	5.2%
Switchgrass (<i>Panicum virgatum</i>)	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 (<i>Andropogon gerardi</i>)	4	44%
Western Wheatgrass (<i>Pascopyrum smithii</i>)	4	29%
Switchgrass (<i>Panicum virgatum</i>)	0.5	12%
Canada Wildrye (<i>Elymus canadensis</i>)	2	15%
Purple Prairie Clover (<i>Dalea purpureum</i>)	2 (ounces)	
<i>Total</i>	10.5 pounds	100%
Associated Cover Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Cover Crop Total</i>	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.		

**Sandpiper Pipeline Project
Seed Mixes**

Table 12 – North Dakota Roadside Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (<i>Pascopyrum smithii</i>)	3.2	20%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (<i>Elytrigia intermedia</i>)	5.2	30%
Alfalfa	1.2	10%
<i>Total</i>	16.6	100%
Associated Companion Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if late fall</i> (<i>dormant</i>) or <i>spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Companion/Cover Crop Total</i>	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 (<i>Poa pratensis</i>)	22.3	32%
Canada Bluegrass (<i>Poa compressa</i>)	9.8	14%
Switch grass (<i>Panicum virgatum</i>)	2.1	3%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	2.8	4%
Perennial Rye-grass (<i>Lolium perenne</i>)	14.7	21%
Timothy (<i>Phleum pratense</i>)	2.1	3%
Redtop (<i>Agrostis gigantea</i>)	2.1	3%
Creeping Alfalfa (<i>Medicago sativa</i>)	4.2	6%
White clover (<i>Trifolium repens</i>)	2.1	3%
Hairy Vetch (<i>Vicia villosa</i>)	7.8	11%
<i>Total</i>	70 pounds	100%
Associated Cover Crop Mix		
Oats if summer seeding (<i>Avena sativa</i>) or Winter Wheat if spring seeding (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), Annual Alfalfa (<i>Medicago sativa</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Cover Crop Total</i>	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 (<i>Thinopyrum ponticum</i>)	2.2	27.5
Intermediate or pubescent wheat grass (<i>Thinopyrum intermedium</i>)	4.3	53.75
Alfalfa (<i>Medicago sativa</i>)	1.1	13.75
Sweet clover (<i>Melilotus officinalis</i>)	0.4	5
GRAND TOTAL	8 pounds	100%

**Sandpiper Pipeline Project
Seed Mixes**

Table 15 – Minnesota Protected Waters Seed Mix¹

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

**Sandpiper Pipeline Project
Seed Mixes**

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
<i>*Andropogon gerardii</i>	Big bluestem
<i>*Panicum virgatum</i>	Switchgrass
<i>*Calamagrostis canadensis</i>	Bluejoint
<i>*Calamagrostis stricta</i>	Slimsteam reedgrass
<i>*Spartina pectinata</i>	Prairie cordgrass
<i>Koeleria macrantha</i>	Prairie junegrass
<i>Bouteloua curtipendula</i>	Sideoats grama
<i>Nassella viridula</i>	Green needlegrass
<i>Pascopyrum smithii</i>	Western wheatgrass
Forb Species	Common Name
<i>Achillea millefolium</i>	Common yarrow
<i>Anemone Canadensis</i>	Canadian anemone
<i>Artemisia ludoviciana</i>	White sagebrush
<i>Pediomelum argophyllum</i>	Silvery scurfpea
<i>Rudbeckia hirta</i>	Blackeyed susan
<i>Polygala verticillata</i>	Milkwort
<i>Ratibida columnifera</i>	Prairie coneflower
<i>Solidago Canadensis</i>	Canada goldenrod
<i>Symphyotrichum ericoides</i>	White heath aster
<i>Vicia americana</i>	American vetch
<i>Dalea purpurea</i>	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: CEG002199

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

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. **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.** 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.



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 ₂ SO 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: _____

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 (NDDDES)	As Needed	Immediately	NDDDES 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 C

Wetland and Waterbody Delineation Report, Forms, and Representative Photos

INCLUDED IN ELECTRONIC COPY

Appendix D
Waterbody Crossing Table

**Sandpiper Pipeline Project and Line 3 Replacement Project
Wisconsin Waterbody Table**

Milepost	Feature Unique ID Number	Flow Regime ^a	Waterbody	Waterbody Type	Crossing Width ^b	Crossing Depth ^c	Agency Designation	Impairment	Proposed Crossing Method ^d	Alternative Crossing Method ^d	Construction Timing Restriction ^e	Bridge Type ^f	Legal Description	Site-Specific Plan	Comments
602.0	04010201000307 ^g	P	Unnamed Stream	River/Stream	0.0	0.0	None	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 31	No	
603.1	DO007aWB	E	Unnamed Stream	River/Stream	3.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 32	No	
603.1	DO007bWB	E	Unnamed Stream	River/Stream	2.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 32	No	
603.2	DO007bWB	E	Unnamed Stream	River/Stream	2.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 32	No	
603.5	DO008aWB	E	Unnamed Stream	River/Stream	2.0	1.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 33	No	The stream splits into 2 parts north of the maintained utility corridor.
604.0	DO012aWB	P	Unnamed Stream	River/Stream	NA	NA		None	NA	NA	NA	NA	T48N, R15W, Sec. 33	NA	Beaver impounded
604.7	DO020aWB	P	Unnamed Stream	River/Stream	20.0	0.0	None	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 27	No	River bed currently dry due to upstream beaver dam
605.6	DO025aWB	I	Unnamed Stream	River/Stream	3.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 26	No	
607.3	DO034_500bWB	E	Little Pokegema River	River/Stream	2.0	0.0	ASNRI Endangered, Threatened or Special Concern Water	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 24	No	
607.4	DO034_500aWB	P	Little Pokegema River	River/Stream	7.0	0.1	ASNRI Endangered, Threatened or Special Concern Water	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R15W, Sec. 24	No	
608.6	DO041_001bWB	E	Unnamed Stream	River/Stream	1.0	0.0	ASNRI Quality Wetland Stream (T48R14W)	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Very small ephemeral stream. Dry.
608.6	DO041_500aWB	P	Unnamed Stream	River/Stream	15.0	6.0	ASNRI Quality Wetland Stream (T48R14W)	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Bank full. Beaver impounded.
608.7	DO041_506aWB	E	Unnamed Stream	River/Stream	3.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Small ephemeral stream. Dry. Some pools from recent rain.
608.8	DO041_506cWB	E	Little Pokegema River	River/Stream	2.0	0.0	ASNRI Quality Wetland Stream (T48R14W)	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Small ephemeral stream. Dry with small pools from recent rain.
608.8	DO041_506cWB	E	Little Pokegema River	River/Stream	2.0	0.0	ASNRI Quality Wetland Stream (T48R14W)	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Small ephemeral stream. Dry with small pools from recent rain.
608.9	DO041_200aWB	E	Little Pokegema River	River/Stream	1.0	0.0	ASNRI Quality Wetland Stream (T48R14W)	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Very small ephemeral stream. Dry.
608.9	DO041_200cWB	E	Little Pokegema River	River/Stream	2.0	0.0	ASNRI Quality Wetland Stream (T48R14W)	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Small ephemeral stream. Dry.
608.9	DO041_200bWB	P	Little Pokegema River	River/Stream	NA	NA	ASNRI Quality Wetland Stream (T48R14W)	None	NA	NA	NA	NA	T48N, R14W, Sec. 18	NA	
609.0	DO041_200bWB	P	Little Pokegema River	River/Stream	NA	NA	ASNRI Quality Wetland Stream (T48R14W)	None	NA	NA	NA	NA	T48N, R14W, Sec. 18	NA	
609.0	DO041_200bWB	P	Little Pokegema River	River/Stream	NA	NA	ASNRI Quality Wetland Stream (T48R14W)	None	NA	NA	NA	NA	T48N, R14W, Sec. 18	NA	
609.1	DO041_200bWB	P	Little Pokegema River	River/Stream	NA	NA	ASNRI Quality Wetland Stream (T48R14W)	None	NA	NA	NA	NA	T48N, R14W, Sec. 18	NA	
609.1	DO041_200bWB	P	Little Pokegema River	River/Stream	15.0	2.0	ASNRI Quality Wetland Stream (T48R14W)	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Lower perennial stream.
609.1	DO041_508bWB	E	Little Pokegema River	River/Stream	2.0	0.5	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Very small ephemeral stream. Dry.
609.2	DO041_200bWB	P	Little Pokegema River	River/Stream	15.0	2.0	ASNRI Quality Wetland Stream (T48R14W)	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 18	No	Lower perennial stream.
611.4	DO041_534aWB	E	Unnamed Tributary: Pokegema River	River/Stream	3.0	0.0	ASNRI Quality Wetland Stream (T48R14W), ASNRI Endangered, Threatened or Special Concern Water	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 9	No	The waterbody feeds into a larger perennial waterbody that is impacted by beaver activity
611.5	DO041_534_200aWB	P	Unnamed Tributary: Pokegema River	River/Stream	6.0	1.0	ASNRI Quality Wetland Stream (T48R14W), ASNRI Endangered, Threatened or Special Concern Water	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 9	No	Perennial waterbody influenced by beaver activity

**Sandpiper Pipeline Project and Line 3 Replacement Project
Wisconsin Waterbody Table**

Milepost	Feature Unique ID Number	Flow Regime ^a	Waterbody	Waterbody Type	Crossing Width ^b	Crossing Depth ^c	Agency Designation	Impairment	Proposed Crossing Method ^d	Alternative Crossing Method ^d	Construction Timing Restriction ^e	Bridge Type ^f	Legal Description	Site-Specific Plan	Comments
612.5	DO057aWB	P	Pokegema River	River/Stream	25.0	2.5	ASNRI Quality Wetland Stream (T48R14W), ASNRI Endangered, Threatened or Special Concern Water	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 10	Yes	
612.9	DO065_900RdcWB	I	Unnamed	Ditch	1.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 10	No	
613.3	DO074aWB	I	Unnamed Ditch	Ditch	2.5	0.3	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 10	No	
613.3	DO075aWB	E	Unnamed Stream	River/Stream	0.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 11	No	No water low at time of sampling.
614.1	DO094_001aWB	P	Unnamed Stream	River/Stream	4.5	0.5	None	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
614.3	DO100_510aWB	I	Unnamed Ditch	Ditch	1.5	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
614.4	DO106_200bWB	I	Unnamed Ditch	Ditch	3.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
614.4	DO106aWB	I	Unnamed Ditch	Ditch	4.0	0.3	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
614.4	DO106_200aWB	I	Unnamed Ditch	Ditch	3.5	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
614.5	DO106bWB	I	Unnamed Ditch	Ditch	6.0	0.5	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
614.6	DO106bWB	I	Unnamed Ditch	Ditch	6.0	0.5	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
614.6	DO106bWB	I	Unnamed Ditch	Ditch	6.0	0.5	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
615.2	DO110_001aWB	I	Unnamed Ditch	Ditch	2.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T49N, R14W, Sec. 35	No	
615.3	DO112aWB	E	Unnamed Stream	River/Stream	NA	NA	None	None	NA	NA	NA	NA	T49N, R14W, Sec. 36	NA	
TOTAL					173.0	(0.04 Miles)									
Route Alternative A2															
NA	04010201001150 ^g	P	Little Pokegema River	River/Stream	0.0	0.0	ASNRI Endangered, Threatened or Special Concern Water	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 10	Yes	
NA	DO055aWB	P	Unnamed River/Stream	River/Stream	6.0	3.0	ASNRI Quality Wetland Stream	None	Dry Crossing	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 19	No	Stream appears to be flooded due to recent rainfall.
Route Alternative C2															
NA	DO100_510aWB	I	Unnamed Ditch	Ditch	1.5	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
NA	DO106_200bWB	I	Unnamed Ditch	Ditch	3.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
NA	DO106aWB	I	Unnamed Ditch	Ditch	4.0	0.3	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec. 2	No	
NA	DO106bWB	I	Unnamed Ditch	Ditch	6.0	0.5	None	None	Open Cut	Open Cut	April 1-June 1	Span	T48N, R14W, Sec.2	No	
NA	DO110aWB	I	Unnamed Ditch	Ditch	3.0	0.0	None	None	Open Cut	Open Cut	April 1-June 1	Span	T49N, 14W, Sec. 35	No	
NA	Not available														
^a	P = Perennial flow, I = Intermittent flow, E = Ephemeral flow based on field observations.														
^b	Width of the channel in feet between the Ordinary High Water Mark (OHWM) on both channel banks.														
^c	Estimated or measured channel depth in feet from the OHWM to the water level or channel bed.														
^d	Proposed waterbody crossing methods are based on engineering investigations, constructability, and environmental constraints. Open Cut: Open trench method used in conditions of no flow, sometimes referred to as the "wet trench" method. Dry Crossing: 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.														
^e	Timing restrictions are based on anticipated WDNR permit conditions.														
^f	Span bridges may consist of timber construction mats, rail car decks, other bridge decking and may or may not be supported by flumes, clean rock or other supports in the water column. Sediment control for bridging is described in the EPP.														
^g	Designates a segment of the pipeline route that was realigned after the field season ended in the fall 2013; therefore, waterbodies were identified using the National Hydrography Dataset. Crossing widths and depths are estimated. Field surveys will be conducted in the spring 2014 to verify and characterize waterbodies crossed.														

Appendix E
Wetland Crossing Table

**Sandpiper Pipeline and Line 3 Replacement Projects
Wisconsin Wetland Crossing Table**

Feature Unique ID	Approximate Milepost	Milepost In ^a	Milepost Out ^a	Crossing Length (feet) ^a	Cowardin ^b	Eggers and Reed ^c	Circular 39 ^d	Wetland Impact - Construction (acres) ^e	Wetland Impact - Operation (acres) ^f	Permanent Conversion (acres) ^g	Legal Description	Quarter / Quarter Section
DO003a1W	602.4	602.4	602.4	26	PFO	Hardwood Swamp	Type 7	0.05	0.04	0.04	T48, R15, S32	NW 1/4, SW 1/4
DO003g1W	602.4	602.4	602.4	48	PFO	Hardwood Swamp	Type 7	0.06	0.06	0.06	T48, R15, S32	NW 1/4, SW 1/4
DO003b1W	602.4	602.4	602.4	94	PFO	Hardwood Swamp	Type 7	0.08	0.08	0.08	T48, R15, S32	NW 1/4, SW 1/4
DO003b1W	602.4	-	-	-	PSS	Shrub Carr	Type 6	0.01	0.00	0.00	T48, R15, S32	NW 1/4, SW 1/4
DO004a1W	602.5	602.5	602.6	380	PFO	Hardwood Swamp	Type 7	0.64	0.54	0.54	T48, R15, S32	NE 1/4, SW 1/4
DO004a1W	602.5	-	-	-	PEM	Hardwood Swamp	Type 7	0.02	0.01	-	T48, R15, S32	NE 1/4, SW 1/4
DO004e1W	602.6	602.6	602.6	101	PFO	Hardwood Swamp	Type 7	0.11	0.11	0.11	T48, R15, S32	NE 1/4, SW 1/4
DO004d1W	602.6	602.6	602.6	26	PFO	Hardwood Swamp	Type 7	0.02	0.02	0.02	T48, R15, S32	NE 1/4, SW 1/4
DO004c1W	602.7	602.7	602.7	95	PFO	Hardwood Swamp	Type 7	0.10	0.09	0.09	T48, R15, S32	NE 1/4, SW 1/4
DO005a1W	602.8	-	-	-	PSS	Shrub Carr	Type 6	0.03	0.02	0.02	T48, R15, S32	NW 1/4, SE 1/4
DO005a1W	602.8	602.8	602.9	303	PEM	Fresh (Wet) Meadow	Type 2	0.56	0.39	-	T48, R15, S32	NW 1/4, SE 1/4
DO005b1W	602.9	602.9	602.9	29	PEM	Fresh (Wet) Meadow	Type 2	0.15	0.04	-	T48, R15, S32	NW 1/4, SE 1/4
DO005c1W	602.9	-	-	-	PFO	Hardwood Swamp	Type 7	0.06	-	-	T48, R15, S32	NW 1/4, SE 1/4
DO005c1W	603.0	603.0	603.0	45	PEM	Fresh (Wet) Meadow	Type 2	0.29	0.16	-	T48, R15, S32	NW 1/4, SE 1/4
DO006a1W	603.0	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.01	-	-	T48, R15, S32	NE 1/4, SE 1/4
DO007a1W	603.1	603.1	603.1	53	PEM	Fresh (Wet) Meadow	Type 2	0.11	0.04	-	T48, R15, S32	SE 1/4, NE 1/4
DO007b1W	603.1	603.1	603.1	52	PSS	Shrub Carr	Type 6	0.05	0.01	0.01	T48, R15, S32	SE 1/4, NE 1/4
DO007b1W	603.1	603.2	603.2	63	PEM	Fresh (Wet) Meadow	Type 2	0.36	0.16	-	T48, R15, S32	SE 1/4, NE 1/4
w-1086jj	603.2	-	-	-	PFO	TBD	TBD	0.01	-	-	T48, R15, S32	SE 1/4, NE 1/4
DO007c1W	603.2	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.04	0.04	-	T48, R15, S32	SE 1/4, NE 1/4
DO007b1W	603.2	603.2	603.2	90	PUB	Shallow, Open Water	Type 5	0.10	0.04	-	T48, R15, S32	SE 1/4, NE 1/4
DO008a1W	603.3	-	-	-	PSS	Alder Thicket	Type 6	0.13	-	-	T48, R15, S33	SW 1/4, NW 1/4
DO008a1W	603.3	603.3	603.3	274	PEM	Fresh (Wet) Meadow	Type 2	1.37	0.78	-	T48, R15, S33	SW 1/4, NW 1/4
DO008a1W	603.3	-	-	-	PFO	Hardwood Swamp	Type 7	0.27	-	-	T48, R15, S33	SW 1/4, NW 1/4
DO008b1W	603.5	-	-	-	PSS	Shrub Carr	Type 6	0.01	-	-	T48, R15, S33	SW 1/4, NW 1/4
DO008b1W	603.5	603.5	603.5	32	PEM	Fresh (Wet) Meadow	Type 2	0.02	0.01	-	T48, R15, S33	SW 1/4, NW 1/4
DO008d1W	603.6	-	-	-	PFO	Hardwood Swamp	Type 7	0.06	-	-	T48, R15, S33	SE 1/4, NW 1/4
DO008d1W	603.6	603.6	603.6	104	PEM	Fresh (Wet) Meadow	Type 2	0.43	0.20	-	T48, R15, S33	SE 1/4, NW 1/4
DO009a1W	603.7	-	-	-	PFO	Hardwood Swamp	Type 7	0.22	0.00	0.00	T48, R15, S33	NW 1/4, NE 1/4
DO009a1W	603.7	-	-	-	PSS	Alder Thicket	Type 6	0.15	0.00	0.00	T48, R15, S33	NW 1/4, NE 1/4
DO009a1W	603.8	603.7	603.8	1,578	PEM	Fresh (Wet) Meadow	Type 2	3.50	1.57	-	T48, R15, S33	NW 1/4, NE 1/4
DO012a1W	604.0	604.1	604.1	95	PEM	Fresh (Wet) Meadow	Type 2	0.31	0.10	-	T48, R15, S33	NE 1/4, NE 1/4

**Sandpiper Pipeline and Line 3 Replacement Projects
Wisconsin Wetland Crossing Table**

Feature Unique ID	Approximate Milepost	Milepost In ^a	Milepost Out ^a	Crossing Length (feet) ^a	Cowardin ^b	Eggers and Reed ^c	Circular 39 ^d	Wetland Impact - Construction (acres) ^e	Wetland Impact - Operation (acres) ^f	Permanent Conversion (acres) ^g	Legal Description	Quarter / Quarter Section
DO012a1W	604.0	-	-	-	PFO	Hardwood Swamp	Type 7	0.12	0.00	0.00	T48, R15, S33	NE 1/4, NE 1/4
DO012a1W	604.1	-	-	-	PUB	Shallow, Open Water	Type 5	0.01	-	-	T48, R15, S33	NE 1/4, NE 1/4
DO018b1W	604.2	604.2	604.2	82	PFO	Hardwood Swamp	Type 7	0.83	0.23	0.23	T48, R15, S33	NE 1/4, NE 1/4
DO018b1W	604.2	-	-	-	PSS	Hardwood Swamp	Type 7	0.39	0.01	0.01	T48, R15, S33	NE 1/4, NE 1/4
DO018b1W	604.3	604.2	604.2	1,223	PEM	Sedge Meadow	Type 2	2.42	1.54	-	T48, R15, S33	NE 1/4, NE 1/4
DO018a1W	604.5	604.5	604.5	41	PEM	Sedge Meadow	Type 2	0.07	0.02	-	T48, R15, S34	NW 1/4, NW 1/4
DO020d1W	604.6	604.6	604.6	110	PEM	Sedge Meadow	Type 2	0.19	0.08	-	T48, R15, S27	SE 1/4, SW 1/4
DO020c1W	604.6	-	-	-	PFO	Hardwood Swamp	Type 7	0.03	-	-	T48, R15, S27	SE 1/4, SW 1/4
DO020c1W	604.7	604.7	604.7	111	PEM	Fresh (Wet) Meadow	Type 2	0.31	0.12	-	T48, R15, S27	SE 1/4, SW 1/4
w-1087ws3	604.7	-	-	-	PEM	TBD	TBD	0.00	-	-	T48, R15, S27	SE 1/4, SW 1/4
DO020b1W	604.7	604.7	604.7	94	PEM	Sedge Meadow	Type 2	0.36	0.14	-	T48, R15, S27	SE 1/4, SW 1/4
DO020a1W	604.7	604.7	604.7	34	PEM	Fresh (Wet) Meadow	Type 2	0.04	0.00	-	T48, R15, S27	SE 1/4, SW 1/4
DO021a1W	604.8	604.8	604.8	282	PEM	Sedge Meadow	Type 2	0.81	0.34	-	T48, R15, S27	SE 1/4, SW 1/4
DO021a1W	604.8	-	-	-	PSS	Alder Thicket	Type 6	0.25	0.00	0.00	T48, R15, S27	SE 1/4, SW 1/4
DO022a1W	604.9	-	-	-	PSS	Alder Thicket	Type 6	0.16	-	-	T48, R15, S27	SW 1/4, SE 1/4
DO022a1W	604.9	-	-	-	PFO	Hardwood Swamp	Type 7	0.29	0.00	0.00	T48, R15, S27	SW 1/4, SE 1/4
DO022a1W	605.0	604.9	605.0	1,060	PEM	Sedge Meadow	Type 2	2.27	1.05	-	T48, R15, S27	SW 1/4, SE 1/4
DO025c1W	605.3	-	-	-	PFO	Hardwood Swamp	Type 7	0.67	0.02	0.02	T48, R15, S26	NW 1/4, SW 1/4
DO025c1W	605.4	605.3	605.4	1,028	PEM	Fresh (Wet) Meadow	Type 2	2.08	1.05	-	T48, R15, S26	NW 1/4, SW 1/4
DO025b1W	605.6	605.6	605.6	43	PEM	Sedge Meadow	Type 2	0.09	0.03	-	T48, R15, S26	NW 1/4, SW 1/4
DO025a1W	605.6	605.6	605.7	664	PEM	Fresh (Wet) Meadow	Type 2	1.30	0.72	-	T48, R15, S26	NE 1/4, SW 1/4
DO025a1W	605.6	-	-	-	PSS	Alder Thicket	Type 7	0.33	-	-	T48, R15, S26	NE 1/4, SW 1/4
DO025a1W	605.7	-	-	-	PFO	Hardwood Swamp	Type 7	0.08	-	-	T48, R15, S26	NE 1/4, SW 1/4
DO025a1W	605.8	605.8	605.9	156	PEM	Fresh (Wet) Meadow	Type 2	0.28	0.18	-	T48, R15, S26	NE 1/4, SW 1/4
WWI-3	605.9	-	-	-	PFO	TBD	TBD	0.00	-	-	T48, R15, S26	NE 1/4, SW 1/4
DO025a1W	605.9	605.9	605.9	432	PSS	Alder Thicket	Type 7	1.57	0.70	0.70	T48, R15, S26	NE 1/4, SW 1/4
WWI-4	606.0	-	-	-	PFO	TBD	TBD	0.11	0.05	0.05	T48, R15, S26	NW 1/4, SE 1/4
DO025a1W	606.0	606.0	606.0	45	PFO	Hardwood Swamp	Type 7	0.59	0.08	0.08	T48, R15, S26	NE 1/4, SW 1/4
DO029a1W	606.1	606.1	606.1	111	PEM	Fresh (Wet) Meadow	Type 2	0.13	0.12	-	T48, R15, S26	SW 1/4, NE 1/4
w-1088ws4	606.1	-	-	-	PEM	TBD	TBD	0.00	-	-	T48, R15, S26	SW 1/4, NE 1/4
WWI-5	606.1	-	-	-	PFO	TBD	TBD	0.36	-	-	T48, R15, S26	SW 1/4, NE 1/4
w-1088ws4	606.1	-	-	-	PSS	TBD	TBD	0.06	-	-	T48, R15, S26	SW 1/4, NE 1/4

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Wisconsin Wetland Crossing Table**

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DO029b1W	606.2	606.1	606.1	137	PSS	Alder Thicket	Type	3.54	1.47	1.47	T48, R15, S26	SE 1/4, NE 1/4
DO029b1W	606.2	606.1	606.2	3,237	PEM	Fresh (Wet) Meadow	Type 2	4.17	1.41	-	T48, R15, S26	SE 1/4, NE 1/4
w-1088ws3	606.2	-	-	-	PEM	TBD	TBD	0.00	-	-	T48, R15, S26	SW 1/4, NE 1/4
DO029b1W	606.7	-	-	-	PFO	Hardwood Swamp	Type 7	0.01	0.01	0.01	T48, R15, S26	SE 1/4, NE 1/4
DO034a1W	606.9	607.0	607.2	811	PSS	Alder Thicket	Type 6	2.82	1.49	1.49	T48, R15, S24	SE 1/4, SW 1/4
DO034a1W	606.9	607.2	607.2	47	PFO	Hardwood Swamp	Type 7	0.39	0.24	0.24	T48, R15, S24	SE 1/4, SW 1/4
DO034a1W	606.9	606.9	606.9	830	PEM	Fresh (Wet) Meadow	Type 2	1.18	0.44	-	T48, R15, S24	SE 1/4, SW 1/4
WWI-44	607.2	-	-	-	PSS	TBD	TBD	0.00	-	-	T48, R15, S24	SE 1/4, SW 1/4
DO035_200a1W	607.3	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.02	0.01	-	T48, R15, S24	NW 1/4, SE 1/4
DO035_200a1W	607.3	607.3	607.3	79	PFO	Hardwood Swamp	Type 7	0.09	0.08	0.08	T48, R15, S24	NW 1/4, SE 1/4
DO034_505a1W	607.4	-	-	-	PFO	Hardwood Swamp	Type 7	0.01	0.01	0.01	T48, R15, S24	NW 1/4, SE 1/4
DO034_500a1W	607.4	607.3	607.3	97	PFO	Floodplain Forest	Type 7	0.28	0.15	0.15	T48, R15, S24	NW 1/4, SE 1/4
DO034_510b1W	607.5	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.01	0.00	-	T48, R15, S24	NW 1/4, SE 1/4
DO034_510b1W	607.5	607.5	607.5	36	PFO	Hardwood Swamp	Type 7	0.11	0.06	0.06	T48, R15, S24	NW 1/4, SE 1/4
DO034_510a1W	607.5	607.5	607.5	85	PFO	Alder Thicket	Type 6	0.09	0.08	0.08	T48, R15, S24	NW 1/4, SE 1/4
DO034_510a1W	607.5	-	-	-	PEM	Sedge Meadow	Type 2	0.02	0.01	-	T48, R15, S24	NW 1/4, SE 1/4
DO034_515a1W	607.5	607.5	607.5	86	PSS	Alder Thicket	Type 6	0.12	0.11	0.11	T48, R15, S24	NW 1/4, SE 1/4
DO034_515a1W	607.5	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.00	0.00	-	T48, R15, S24	NW 1/4, SE 1/4
DO034_520b1W	607.6	-	-	-	PFO	Hardwood Swamp	Type 7	0.03	-	-	T48, R15, S24	SW 1/4, NE 1/4
DO034_520a1W	607.6	607.6	607.6	198	PEM	Fresh (Wet) Meadow	Type 2	0.27	0.24	-	T48, R15, S24	SE 1/4, NE 1/4
DO034_520a1W	607.7	607.6	607.7	99	PSS	Shrub Carr	Type 6	0.48	0.22	0.22	T48, R15, S24	SE 1/4, NE 1/4
DO034_520a1W	607.7	607.7	607.7	83	PFO	Hardwood Swamp	Type 7	0.06	0.06	0.06	T48, R15, S24	SE 1/4, NE 1/4
DO034_525a1W	607.7	607.8	607.8	53	PSS	Alder Thicket	Type 6	0.04	0.03	0.03	T48, R15, S24	SE 1/4, NE 1/4
DO034_525a1W	607.7	607.7	607.7	89	PFO	Hardwood Swamp	Type 7	0.19	0.12	0.12	T48, R15, S24	SE 1/4, NE 1/4
DO034_525a1W	607.8	607.7	607.8	66	PEM	Sedge Meadow	Type 2	0.19	0.15	-	T48, R15, S24	SE 1/4, NE 1/4
DO034_535a1W	607.8	607.9	607.9	926	PSS	Alder Thicket	Type 6	2.40	1.39	1.39	T48, R15, S24	SE 1/4, NE 1/4
DO034_535a1W	607.8	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.08	0.01	-	T48, R15, S24	SE 1/4, NE 1/4
DO034_535a1W	607.8	608.1	608.1	25	PFO	Hardwood Swamp	Type 7	0.14	0.04	0.04	T48, R15, S24	SE 1/4, NE 1/4
DO041b1W	608.1	608.1	608.1	90	PEM	Sedge Meadow	Type 2	0.10	0.09	-	T48, R14, S19	NW 1/4, NW 1/4
DO041b1W	608.2	608.1	608.2	110	PEM	Sedge Meadow	Type 2	0.15	0.13	-	T48, R14, S19	NW 1/4, NW 1/4
DO041b1W	608.3	608.2	608.2	690	PSS	Alder Thicket	Type 6	2.11	1.19	1.19	T48, R14, S19	NW 1/4, NW 1/4
DO041_500_310a1W	608.4	608.4	608.4	35	PSS	Alder Thicket	Type 6	0.07	0.06	0.06	T48, R14, S18	SW 1/4, SW 1/4

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Wisconsin Wetland Crossing Table**

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DO041_500a1W	608.5	608.4	608.5	500	PSS	Alder Thicket	Type 6	1.75	0.90	0.90	T48, R14, S18	SE 1/4, SW 1/4
DO041_001a1W	608.6	608.6	608.6	64	PFO	Floodplain Forest	Type 7	0.20	0.11	0.11	T48, R14, S18	NE 1/4, SW 1/4
DO041_506a1W	608.6	-	-	-	PFO	Hardwood Swamp	Type 7	0.02	-	-	T48, R14, S18	NE 1/4, SW 1/4
DO041_506b1W	608.7	608.7	608.7	67	PFO	Hardwood Swamp	Type 7	0.13	0.11	0.11	T48, R14, S18	NE 1/4, SW 1/4
DO041_506c1W	608.8	608.7	608.8	111	PFO	Hardwood Swamp	Type 7	0.25	0.17	0.17	T48, R14, S18	NE 1/4, SW 1/4
DO041_506d1W	609.1	609.0	609.0	592	PFO	Floodplain Forest	Type 7	1.08	0.90	0.90	T48, R14, S18	NW 1/4, SE 1/4
DO041_508a1W	609.3	609.2	609.2	378	PSS	Alder Thicket	Type 6	1.51	0.56	0.56	T48, R14, S18	SE 1/4, NE 1/4
DO041_508a1W	609.4	609.3	609.4	275	PEM	Sedge Meadow	Type 2	0.53	0.40	-	T48, R14, S18	SE 1/4, NE 1/4
WWI-8	609.4	-	-	-	PSS	TBD	TBD	0.12	0.00	0.00	T48, R14, S18	SE 1/4, NE 1/4
WWI-9	609.6	-	-	-	PFO	TBD	TBD	0.12	0.02	0.02	T48, R14, S17	NW 1/4, NW 1/4
WWI-10	609.8	609.7	609.9	1,003	PFO	TBD	TBD	2.84	1.63	1.63	T48, R14, S17	NW 1/4, NW 1/4
WWI-12	609.9	609.9	609.9	338	PFO	TBD	TBD	0.95	0.55	0.55	T48, R14, S17	NE 1/4, NW 1/4
WWI-14	610.0	609.9	610.1	614	PSS	TBD	TBD	1.18	0.97	0.97	T48, R14, S08	SE 1/4, SW 1/4
WWI-11	610.0	-	-	-	PFO	TBD	TBD	0.20	-	-	T48, R14, S08	SE 1/4, SW 1/4
WWI-13	610.0	-	-	-	PSS	TBD	TBD	0.08	-	-	T48, R14, S08	SE 1/4, SW 1/4
DO041_520_200a1W	610.3	610.2	610.2	404	PFO	Hardwood Swamp	Type 7	0.37	0.47	0.47	T48, R14, S08	SW 1/4, NE 1/4
WWI-15	610.3	-	-	-	PFO	TBD	TBD	0.33	-	-	T48, R14, S08	NE 1/4, SW 1/4
DO041_520_200a1W	610.5	610.2	610.3	2,438	PSS	Alder Thicket	Type 6	6.79	4.09	4.09	T48, R14, S08	SW 1/4, NE 1/4
WWI-17	610.6	-	-	-	PFO	TBD	TBD	0.09	-	-	T48, R14, S08	SW 1/4, NE 1/4
DO041_520_200a1W	610.7	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.02	0.00	-	T48, R14, S08	SW 1/4, NE 1/4
DO041_522a1W	610.8	611.1	611.1	99	PEM	Alder Thicket	Type 6	0.63	0.40	-	T48, R14, S09	SW 1/4, NW 1/4
DO041_522a1W	610.8	610.8	610.8	2,054	PSS	Alder Thicket	Type 6	4.76	3.03	3.03	T48, R14, S09	SW 1/4, NW 1/4
DO041_522a1W	610.8	610.7	610.8	1,196	PFO	Alder Thicket	Type 6	3.19	1.92	1.92	T48, R14, S09	SW 1/4, NW 1/4
DO041_534_200a1W	611.5	611.5	611.5	58	PEM	Fresh (Wet) Meadow	Type 2	0.15	0.10	-	T48, R14, S09	SE 1/4, NW 1/4
DO041_536a1W	611.5	611.5	611.5	45	PFO	Hardwood Swamp	Type 7	0.59	0.24	0.24	T48, R14, S09	SW 1/4, NE 1/4
DO041_536a1W	611.7	611.6	611.6	642	PSS	Alder Thicket	Type 6	1.36	0.92	0.92	T48, R14, S09	SW 1/4, NE 1/4
WWI-22	611.8	-	-	-	PSS	TBD	TBD	0.01	-	-	T48, R14, S09	SW 1/4, NE 1/4
DO041_538a1W	611.8	611.8	611.8	154	PFO	Hardwood Swamp	Type 7	0.39	0.25	0.25	T48, R14, S09	NE 1/4, SE 1/4
DO041_538a1W	611.8	611.8	611.8	749	PEM	Fresh (Wet) Meadow	Type 2	2.41	1.36	-	T48, R14, S09	NE 1/4, SE 1/4
DO041_538a1W	611.8	611.8	611.8	538	PSS	Shrub Carr	Type 6	0.88	0.71	0.71	T48, R14, S09	NE 1/4, SE 1/4
DO041_544a1W	612.1	-	-	-	PFO	Hardwood Swamp	Type 7	0.05	0.06	0.06	T48, R14, S10	NW 1/4, SW 1/4
DO041_542_300a1W	612.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.00	-	-	T48, R14, S09	NE 1/4, SE 1/4

**Sandpiper Pipeline and Line 3 Replacement Projects
Wisconsin Wetland Crossing Table**

Feature Unique ID	Approximate Milepost	Milepost In ^a	Milepost Out ^a	Crossing Length (feet) ^a	Cowardin ^b	Eggers and Reed ^c	Circular 39 ^d	Wetland Impact - Construction (acres) ^e	Wetland Impact - Operation (acres) ^f	Permanent Conversion (acres) ^g	Legal Description	Quarter / Quarter Section
DO041_544a1W	612.1	612.2	612.2	114	PEM	Sedge Meadow	Type 2	0.31	0.17	-	T48, R14, S10	NW 1/4, SW 1/4
DO041_544a1W	612.1	612.1	612.1	734	PSS	Shrub Carr	Type 6	2.06	1.25	1.25	T48, R14, S10	NW 1/4, SW 1/4
DO041_544a1W	612.4	612.4	612.4	47	PFO	Hardwood Swamp	Type 7	0.01	0.00	0.00	T48, R14, S10	NW 1/4, SW 1/4
DO041_544a1W	612.4	612.4	612.4	57	PSS	Shrub Carr	Type 6	0.02	0.02	0.02	T48, R14, S10	NW 1/4, SW 1/4
DO057a1W	612.5	612.4	612.5	208	PFO	Sedge Meadow	Type 2	0.56	0.21	0.21	T48, R14, S10	NE 1/4, SW 1/4
DO057b1W	612.6	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.11	-	-	T48, R14, S10	NE 1/4, SW 1/4
DO059a1W	612.7	612.7	612.7	62	PEM	Fresh (Wet) Meadow	Type 2	0.08	0.00	-	T48, R14, S10	NW 1/4, SE 1/4
DO059a1W	612.7	-	-	-	PFO	Hardwood Swamp	Type 7	0.04	0.02	0.02	T48, R14, S10	NW 1/4, SE 1/4
DO060a1W	612.7	612.7	612.7	59	PEM	Fresh (Wet) Meadow	Type 2	0.13	0.08	-	T48, R14, S10	NW 1/4, SE 1/4
DO057_200a1W	612.8	-	-	-	PFO	Hardwood Swamp	Type 7	0.02	-	-	T48, R14, S10	NW 1/4, SE 1/4
DO060_220a1W	612.8	-	-	-	PSS	Alder Thicket	Type 6	0.01	0.00	0.00	T48, R14, S10	NW 1/4, SE 1/4
DO063a1W	612.8	612.8	612.8	25	PSS	Shrub Carr	Type 6	0.05	0.02	0.02	T48, R14, S10	NW 1/4, SE 1/4
DO063a1W	612.8	612.8	612.8	184	PEM	Fresh (Wet) Meadow	Type 2	0.23	0.06	-	T48, R14, S10	NW 1/4, SE 1/4
DO064a1W	612.9	612.9	612.9	353	PEM	Fresh (Wet) Meadow	Type 2	0.69	0.31	-	T48, R14, S10	SW 1/4, NE 1/4
DO066_001a1W	613.0	612.9	613.0	108	PEM	Fresh (Wet) Meadow	Type 2	0.30	0.12	-	T48, R14, S10	SE 1/4, NE 1/4
DO066_001a1W	613.0	-	-	-	PFO	Hardwood Swamp	Type 7	0.03	0.00	0.00	T48, R14, S10	SE 1/4, NE 1/4
w-1094ws5	613.0	-	-	-	PEM	TBD	TBD	0.02	0.01	-	T48, R14, S10	SE 1/4, NE 1/4
WWI-30	613.0	613.0	613.0	67	PFO	TBD	TBD	0.17	0.07	0.07	T48, R14, S10	SE 1/4, NE 1/4
w-1094ws4	613.0	-	-	-	PEM	TBD	TBD	0.00	0.00	-	T48, R14, S10	SE 1/4, NE 1/4
DO071a1W	613.0	-	-	-	PSS	Alder Thicket	Type 6	0.57	0.00	0.00	T48, R14, S10	SE 1/4, NE 1/4
DO071a1W	613.1	613.0	613.2	1,020	PEM	Fresh (Wet) Meadow	Type 2	1.71	0.89	-	T48, R14, S10	SE 1/4, NE 1/4
DO071a1W	613.1	-	-	-	PFO	Hardwood Swamp	Type 7	0.72	-	-	T48, R14, S10	SE 1/4, NE 1/4
DO071_001a2W	613.2	613.2	613.2	87	PEM	Fresh (Wet) Meadow	Type 2	0.13	0.08	-	T48, R14, S10	SE 1/4, NE 1/4
DO075_200a1W	613.3	-	-	-	PSS	Alder Thicket	Type 6	0.19	0.03	0.03	T48, R14, S11	NW 1/4, NW 1/4
DO075_200a1W	613.3	613.3	613.3	510	PEM	Fresh (Wet) Meadow	Type 2	0.98	0.44	-	T48, R14, S11	NW 1/4, NW 1/4
DO075_200a1W	613.3	-	-	-	PFO	Hardwood Swamp	Type 7	0.17	-	-	T48, R14, S11	NW 1/4, NW 1/4
DO075_200a1W	613.4	613.4	613.4	475	PEM	Fresh (Wet) Meadow	Type 2	0.99	0.60	-	T48, R14, S11	NW 1/4, NW 1/4
DO075_200a1W	613.5	613.5	613.5	314	PFO	Hardwood Swamp	Type 7	0.68	0.46	0.46	T48, R14, S11	NW 1/4, NW 1/4
DO075_200a1W	613.5	613.4	613.5	740	PSS	Alder Thicket	Type 6	2.67	1.35	1.35	T48, R14, S11	NW 1/4, NW 1/4
WWI-45	613.6	-	-	-	PSS	TBD	TBD	0.04	-	-	T48, R14, S02	SW 1/4, SW 1/4
WWI-31	613.6	-	-	-	PSS	TBD	TBD	0.01	0.00	0.00	T48, R14, S02	SW 1/4, SW 1/4
DO075_200a1W	613.7	-	-	-	PSS	Alder Thicket	Type 6	0.32	-	-	T48, R14, S11	NW 1/4, NW 1/4

**Sandpiper Pipeline and Line 3 Replacement Projects
Wisconsin Wetland Crossing Table**

Feature Unique ID	Approximate Milepost	Milepost In ^a	Milepost Out ^a	Crossing Length (feet) ^a	Cowardin ^b	Eggers and Reed ^c	Circular 39 ^d	Wetland Impact - Construction (acres) ^e	Wetland Impact - Operation (acres) ^f	Permanent Conversion (acres) ^g	Legal Description	Quarter / Quarter Section
DO075_200a1W	613.8	613.7	613.9	1,253	PEM	Fresh (Wet) Meadow	Type 2	2.24	1.11	-	T48, R14, S11	NW 1/4, NW 1/4
DO075_200a1W	613.8	-	-	-	PFO	Hardwood Swamp	Type 7	0.25	-	-	T48, R14, S11	NW 1/4, NW 1/4
DO091a1W	614.0	613.9	614.0	140	PEM	Fresh (Wet) Meadow	Type 2	0.17	0.07	-	T48, R14, S02	SE 1/4, SW 1/4
DO093_200a1W	614.1	614.0	614.1	166	PFO	Hardwood Swamp	Type 7	0.43	0.26	0.26	T48, R14, S02	NE 1/4, SW 1/4
WWI-32	614.2	-	-	-	PFO	TBD	TBD	0.49	0.27	0.27	T48, R14, S02	NE 1/4, SW 1/4
WWI-34	614.2	-	-	-	PFO	TBD	TBD	0.08	0.05	0.05	T48, R14, S02	NE 1/4, SW 1/4
WWI-33	614.2	614.2	614.2	123	PFO	TBD	TBD	0.47	0.20	0.20	T48, R14, S02	NE 1/4, SW 1/4
DO094_001a1W	614.2	-	-	-	PEM	Sedge Meadow	Type 2	0.01	-	-	T48, R14, S02	NE 1/4, SW 1/4
DO100_510a1W	614.4	614.3	614.5	1,771	PSS	Shrub Carr	Type 6	5.09	2.98	2.98	T48, R14, S02	SW 1/4, NE 1/4
DO100_510a1W	614.5	614.5	614.5	79	PEM	Fresh (Wet) Meadow	Type 2	0.11	0.10	-	T48, R14, S02	SW 1/4, NE 1/4
w-8r1096a	614.6	614.6	614.7	159	PEM	TBD	TBD	0.44	0.24	-	T48, R14, S02	SW 1/4, NE 1/4
WWI-39	614.7	614.7	614.7	41	PSS	TBD	TBD	0.40	0.07	0.07	T48, R14, S02	NW 1/4, NE 1/4
w-8r1096c	614.8	614.7	614.9	1,181	PEM	TBD	TBD	2.88	1.87	-	T48, R14, S02	NW 1/4, NE 1/4
DO109_204a1W	614.9	614.9	614.9	207	PSS	Shrub Carr	Type 6	0.81	0.35	0.35	T49, R14, S35	SW 1/4, SE 1/4
DO121a1W	615.0	615.0	615.0	614	PSS	Alder Thicket	Type 6	1.71	0.95	0.95	T49, R14, S36	NW 1/4, SW 1/4
DO121a1W	615.0	615.0	615.0	211	PFO	Hardwood Swamp	Type 7	0.61	0.44	0.44	T49, R14, S36	NW 1/4, SW 1/4
DO121a1W	615.1	615.1	615.1	71	PEM	Fresh (Wet) Meadow	Type 2	0.09	0.06	-	T49, R14, S36	NW 1/4, SW 1/4
DO121a1W	615.1	-	-	-	PFO	Hardwood Swamp	Type 7	1.01	0.16	0.16	T49, R14, S36	NW 1/4, SW 1/4
DO121a1W	615.2	615.1	615.2	4,067	PEM	Fresh (Wet) Meadow	Type 2	6.19	3.13	-	T49, R14, S36	NW 1/4, SW 1/4
DO121a1W	615.2	-	-	-	PSS	Alder Thicket	Type 6	1.67	0.25	0.25	T49, R14, S36	NW 1/4, SW 1/4
DO122a1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.04	-	-	T49, R14, S36	SE 1/4, NW 1/4
DO122b1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.19	0.03	-	T49, R14, S36	NE 1/4, NW 1/4
DO123b1W	616.1	616.1	616.1	24	PEM	Fresh (Wet) Meadow	Type 2	0.07	0.03	-	T49, R14, S36	NW 1/4, SW 1/4
DO124_200a1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.05	-	-	T49, R14, S36	NW 1/4, NE 1/4
DO123a1W	616.1	-	-	-	PUB	Shallow, Open Water	Type 5	0.80	-	-	T49, R14, S36	NW 1/4, NE 1/4
DO123a1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.05	-	-	T49, R14, S36	NW 1/4, NE 1/4
DO123_300b1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.02	-	-	T49, R14, S36	NW 1/4, NE 1/4
DO123_300c1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.01	-	-	T49, R14, S36	NW 1/4, NE 1/4
DO123_300d1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.02	-	-	T49, R14, S36	NW 1/4, NE 1/4
DO123_300e1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.03	-	-	T49, R14, S36	NW 1/4, NE 1/4
DO123_300f1W	616.1	-	-	-	PEM	Fresh (Wet) Meadow	Type 2	0.05	-	-	T49, R14, S36	NW 1/4, NE 1/4
			TOTAL	44,505				118.17	58.93	35.86		

**Sandpiper Pipeline and Line 3 Replacement Projects
Wisconsin Wetland Crossing Table**

Feature Unique ID	Approximate Milepost	Milepost In ^a	Milepost Out ^a	Crossing Length (feet) ^a (8.4 miles)	Cowardin ^b	Eggers and Reed ^c	Circular 39 ^d	Wetland Impact - Construction (acres) ^e	Wetland Impact - Operation (acres) ^f	Permanent Conversion (acres) ^g	Legal Description	Quarter / Quarter Section
Route Alternative A2												
DO041b1W	-	-	-	105	PEM	Sedge Meadow	Type 2	0.23	0.15	-	T48, R14, S19	NW 1/4, NW 1/4
DO041_544a1W	-	-	-	-	PFO	Hardwood Swamp	Type 7	0.23	0.02	0.02	T48, R14, S10	NW 1/4, SW 1/4
DO041k1W	-	-	-	86	PFO	Hardwood Swamp	Type 7	0.72	0.32	0.32	T48, R14, S17	SE 1/4, SW 1/4
DO053a1W	-	-	-	-	PSS	Alder Thicket	Type 6	4.48	2.11	2.11	T48, R14, S16	NW 1/4, NE 1/4
DO041k1W	-	-	-	476	PEM	Fresh (Wet) Meadow	Type 2	1.18	0.50	-	T48, R14, S17	SE 1/4, SW 1/4
DO041_544a1W	-	-	-	151	PEM	Sedge Meadow	Type 2	0.35	0.13	-	T48, R14, S10	NW 1/4, SW 1/4
DO041_544a1W	-	-	-	500	PSS	Shrub Carr	Type 6	1.34	0.60	0.60	T48, R14, S10	NW 1/4, SW 1/4
DO041k1W	-	-	-	6,300	PSS	Alder Thicket	Type 6	15.06	6.50	6.50	T48, R14, S17	SE 1/4, SW 1/4
DO053a1W	-	-	-	3,977	PEM	Fresh (Wet) Meadow	Type 2	5.23	2.08	-	T48, R14, S16	NW 1/4, NE 1/4
WWI-21	-	-	-	-	PSS	TBD	TBD	0.07	-	-	T48, R14, S16	SW 1/4, NW 1/4
WWI-20	-	-	-	436	PFO	TBD	TBD	1.64	0.44	0.44	T48, R14, S16	SW 1/4, NW 1/4
WWI-19	-	-	-	186	PSS	TBD	TBD	0.69	0.26	0.26	T48, R14, S17	SE 1/4, NE 1/4
WWI-7	-	-	-	318	PFO	TBD	TBD	0.81	0.47	0.47	T48, R14, S19	NW 1/4, NW 1/4
w-1092ws5	-	-	-	223	PEM	TBD	TBD	0.31	0.02	-	T48, R14, S16	SW 1/4, NW 1/4
w-1093ws1	-	-	-	518	PEM	TBD	TBD	1.12	0.40	-	T48, R14, S16	SE 1/4, NW 1/4
w-1092ws5	-	-	-	175	PSS	TBD	TBD	0.62	0.40	0.40	T48, R14, S16	SW 1/4, NW 1/4
w-1093ws1	-	-	-	-	PSS	TBD	TBD	0.38	0.17	0.17	T48, R14, S16	SE 1/4, NW 1/4
ar1093.3	-	-	-	-	PEM	TBD	TBD	0.04	-	-	T48, R14, S16	SW 1/4, NW 1/4
WWI-40	-	-	-	551	PFO	TBD	TBD	1.14	0.85	0.85	T48, R14, S19	NE 1/4, NW 1/4
WWI-42	-	-	-	756	PSS	TBD	TBD	2.14	1.24	1.24	T48, R14, S19	NW 1/4, NE 1/4
WWI-43	-	-	-	-	PFO	TBD	TBD	0.05	0.00	0.00	T48, R14, S19	NW 1/4, NE 1/4
Route Alternative B2												
DO075_200a1W	-	-	-	-	PSS	Alder Thicket	Type 6	0.07	-	-	T48, R14, S11	NW 1/4, NW 1/4
DO075_200a1W	-	-	-	303	PEM	Fresh (Wet) Meadow	Type 2	0.27	0.18	-	T48, R14, S11	NW 1/4, NW 1/4
w-1095ws2	-	-	-	191	PEM	TBD	TBD	0.49	-	-	T48, R14, S11	NW 1/4, NW 1/4
w-1095ws2	-	-	-	736	PSS	TBD	TBD	1.73	0.93	0.93	T48, R14, S11	NW 1/4, NW 1/4
Route Alternative C2												
DO100_510a1W	-	-	-	719	PSS	Shrub Carr	Type 6	2.25	1.33	1.33	T48, R14, S02	SW 1/4, NE 1/4
DO121a1W	-	-	-	178	PEM	Fresh (Wet) Meadow	Type 2	0.20	0.17	-	T49, R14, S36	NW 1/4, SW 1/4
DO100_510a1W	-	-	-	768	PEM	Fresh (Wet) Meadow	Type 2	2.28	1.39	-	T48, R14, S02	SW 1/4, NE 1/4

**Sandpiper Pipeline and Line 3 Replacement Projects
Wisconsin Wetland Crossing Table**

Feature Unique ID	Approximate Milepost	Milepost In ^a	Milepost Out ^a	Crossing Length (feet) ^a	Cowardin ^b	Eggers and Reed ^c	Circular 39 ^d	Wetland Impact - Construction (acres) ^e	Wetland Impact - Operation (acres) ^f	Permanent Conversion (acres) ^g	Legal Description	Quarter / Quarter Section
DO121a1W	-	-	-	-	PSS	Alder Thicket	Type 6	0.05	0.01	0.01	T49, R14, S36	NW 1/4, SW 1/4
WWI-39	-	-	-	6	PSS	TBD	TBD	0.06	0.03	0.03	T48, R14, S02	NW 1/4, NE 1/4
w-8r1096a	-	-	-	142	PEM	TBD	TBD	0.46	0.22	-	T48, R14, S02	SW 1/4, NE 1/4
<p>^a Crossing length of proposed pipeline centerline across wetlands. No milepost or crossing length indicates the wetland is within the construction workspace, but is not crossed by the proposed pipeline.</p> <p>^b PEM = Palustrine Emergent; PSS=Palustrine Scrub Shrub; PFO = Palustrine Forested (Cowardin et al, 1979).</p> <p>^c Eggers, Steve D., and Donald M. Reed. 1997. Wetland plants and communities of Minnesota and Wisconsin. U.S. Army Corps of Engineers, St. Paul District. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/plants/mnplant/index.htm (Version 03SEP1998).</p> <p>^d Type 1 = Seasonally flooded basin or flat; Type 2 = Inland fresh meadow; Type 3 = Inland shallow marsh; Type 4 = Inland deep marsh; Type 5 = Inland open fresh water; Type 6 = Shrub swamp; Type 7 = Wooded swamp; Type 8 = Bog (Circular 39 Classification, 1956)</p> <p>^e Area of wetland impact within the construction workspace based typically on a 85-foot-wide workspace, including temporary dredge and fill areas, travel lanes, and staging areas.</p> <p>^f Area affected by operation include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.</p> <p>^g Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.</p>												

Appendix F
Wetland Mitigation Plan

Wetland Mitigation Compensation Site Plan

Crawford Creek Mitigation Site

SEH No. ENBRI 126976

February 2014

Crawford Creek Mitigation Site
Wetland Mitigation Compensation Site Plan

Prepared for:
Enbridge

SEH No. ENBRI 126976

February 2014

I hereby certify that this report was prepared by me or under my direct supervision.

Prepared by: *Natalie White*
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SEH Biologist

Prepared by: *Joel Asp*
Joel Asp, BS
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Allyz Kramer, MS, PWS
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218.279.3000

Compensatory Mitigation Site Plan Executive Summary

Site Name: Crawford Creek Compensatory Wetland Mitigation Site

Location of Compensatory Mitigation Site: The site is located in northern Douglas County, Lake Superior Basin (WMU); Nemadji River Watershed; 10-digit Hydrologic Unit Code (HUC) 0401030105 (Lower Nemadji); 12-digit HUC 040103010503; in the NE 1/4 of Section 23, Township 48 North, Range 14 West in the Town of Superior. The site is located on the east side of Darrow Road, south of the intersection of Darrow Road and County Highway C. The site is immediately north of the existing Superior Terminal Enhancement Project (STEP) Wetland Mitigation Site.

Project-Specific Mitigation: The Crawford Creek Compensatory Wetland Mitigation Site is proposed as project-specific mitigation for wetland impacts associated with Enbridge's Line 3 Replacement and Sandpiper Pipeline Projects in Wisconsin.

General Description of Design Concept for the Compensatory Mitigation Site: The wetland mitigation site plan includes restoration and enhancement of forested wetland, shrub-carr, and fresh (wet) meadow habitats, as well as preservation of wetlands adjacent to Crawford Creek. Hydrology and wetland characteristics will be restored by blocking the man-made ditches and preventing channelized flow of water through the site into Crawford Creek. Minimal earthwork is planned and the only ground disturbance is proposed for placing 16 ditch plugs covering approximately 11,000 square feet (0.25 acres) and removal of existing soil stockpiles. Using the existing surrounding vegetation as a guide, as well as replacing impacted habitat types as closely as practicable, the vegetation planting plan includes clusters of shrubs and trees within a native wet meadow matrix. The primary goal of the wetland restoration is the reestablishment of more natural wetland hydrology and development of a diverse assemblage of wetland communities. The primary goal of preservation of land adjacent to Crawford Creek is prevention of fragmentation of habitat and clearing of natural vegetation that contributes to erosion and sedimentation in the Crawford Creek and Nemadji River watersheds.

Surrounding land uses: The site is bounded by Darrow Road on the west, rural residential property on the north, undeveloped forested wetland adjacent to Crawford Creek to the east, and an existing Enbridge wetland mitigation site (STEP Wetland Mitigation Site) on the south.

Planned hydrology (expected water depth): Hydrologic depths will vary throughout the site and include temporarily/seasonally inundated areas and saturated soil areas. The hydrologic source is surface water/sheet flow. Average water depth in proposed wetland areas is between saturation at one (1) foot below the soil surface and one (1) foot of temporary inundation above the ground surface. Other areas are planned to remain upland with saturation below one (1) foot below ground surface.

Planned construction date: 2014/2015.

Executive Summary (Continued)

Table ES-1 is a summary of wetland impacts by Project.

Table ES-1 Summary of Wetland Types Affected		
Line 3 Project		
Wetland Type	Wetland Impacts – Temporary Construction Impacts (acres)	Wetland Impacts – Permanent Type Conversion (acres)
PFO – Floodplain Forest/Forested Swamp	5.94	3.31
PEM – Fresh (Wet) Meadow/Sedge Meadow/Marsh	4.30	-
PSS – Shrub Swamp	11.69	8.99
PUB – Deep Marsh/Shallow Open Water	0.00	-
Project Total	21.93	12.30
Sandpiper Project		
Wetland Type	Wetland Impacts – Temporary Construction Impacts (acres)	Wetland Impacts – Permanent Type Conversion (acres)
PFO – Floodplain Forest/Forested Swamp	17.18	7.54
PEM – Fresh (Wet) Meadow/Sedge Meadow/Marsh	46.18	-
PSS – Shrub Swamp	41.21	18.18
PUB – Deep Marsh/Shallow Open Water	0.11	-
Project Total	104.68	25.72
Totals, Both Projects	126.61	38.02

Executive Summary (Continued)

Table ES-2 is a summary of proposed mitigation credits by wetland type.

Table ES-2				
Proposed Compensation Technique and Proposed Credits				
Compensation Technique			Proposed Credits	
Preservation by Wetland Type			Preservation Area (acres)	Proposed Credit Value (0.125:1 ratio)
PFO – Floodplain Forest			3.70	0.46
PEM – Fresh (Wet) Meadow			0.02	0.00
PSS – Shrub Swamp			1.70	0.21
PFO – Hardwood Swamp			3.50	0.44
Subtotal			8.92	1.11
Upland			Area (Acres)	Proposed Credit Value
Upland Buffer Preservation (0.1:1 ratio)			10.08	1.01
Upland Buffer Enhancement (0.25:1 ratio)			6.42	1.61
Restoration by Wetland Type			Compensation Area (acres)	Proposed Credit Value (1:1 ratio)
PEM – Fresh (Wet) Meadow			9.50	9.50
PSS – Shrub Swamp			7.00	7.00
PFO – Hardwood/Conifer Swamp			3.00	3.00
Enhancement by Wetland Type			Compensation Area (acres)	Proposed Credit Value (1:1 ratio)
Type 2 – Fresh (Wet) Meadow			3.50	3.50
Totals	Permanent Wetland Type Conversion Impacts (Line 3 and Sandpiper, acres)	Needed Credits (0.25:1 ratio for permanent type conversion)	Site Acreage	Proposed Credits
	38.02	9.51	48.42	26.73

Executive Summary (Continued)

Table ES-3 describes the estimated credits that would be established for project-specific wetland mitigation needed for Enbridge's Line 3 Replacement and Sandpiper Pipeline Projects in Wisconsin.

Table ES-3			
Estimated Credits by Compensation Technique			
Compensation Technique	Acres	Credit Ratio	Estimated Credits
Wetland Restoration	19.50	1:1	19.50
Wetland Enhancement	3.50	1:1	3.50
Wetland Preservation	8.92	0.125:1	1.11
Upland Buffer Enhancement	6.42	0.25:1	1.61
Upland Buffer Preservation	10.08	0.1:1	1.01
Total Crawford Creek	48.42	-	26.73

Table of Contents

Title Page
Certification Page
Compensation Site Plan Executive Summary
Table of Contents

	Page
1.0 Introduction and Purpose	1
2.0 Plan Developers and Expertise	1
3.0 General Description of Site Plan	2
4.0 Location of Site.....	3
5.0 Detailed Baseline Conditions	4
5.1 Site Survey.....	4
5.2 On Site Land Use.....	4
5.3 Zoning Designations	4
5.4 Nearby Land Use	4
5.5 Historical or Archaeological Resources	4
5.6 Geomorphic and Soils Assessment	5
5.7 Hydrological Assessment.....	5
5.8 Floristic Assessment	6
5.9 Faunal Assessment	6
5.10 Web Soil Survey and WWI Mapping of the Site.....	6
5.11 Wetland Delineation	7
5.12 Rare Plant Survey	8
5.13 Wetland Functional Assessment.....	14
5.14 Floodplain	14
5.15 State Navigable Waters	14
5.16 Ecological Importance.....	14
6.0 Project Plan Sheets	15
7.0 Design Features.....	15
7.1 Proposed Construction Activities	16
7.2 Proposed Hydrology	16
7.3 Wetland Vegetation Establishment Plan.....	16
7.4 Site Constraints.....	18
7.5 Site Preparation	18
7.6 Erosion and Sedimentation Control	18
7.7 Impacts to Existing Jurisdictional Wetlands	18
8.0 Goals and Objectives for the Site	18
8.1 Goal: Establish Wetland Area	19
8.2 Goal: Establish Plant and Wildlife Habitat.....	19
Objectives:	19
8.3 Goal: Protect Water Quality and Improve Hydrologic Integrity.....	20

Table of Contents (Continued)

Objectives	20
9.0 Performance Standards	20
9.1 Wetland Establishment	20
9.2 Vegetation Establishment	21
9.3 Wildlife Use	22
10.0 Site Monitoring Plan	22
10.1 Construction Inspection	22
10.2 As-Built Report.....	22
10.3 Post-Construction Monitoring.....	23
10.4 Specific Assessment Methods	23
10.5 Vegetation.....	24
10.6 Hydrology.....	24
10.7 Soil.....	24
10.8 Interim Wetland Delineation and Final Monitoring	24
11.0 Management Plan for the Site	25
11.1 Contingency for Control of Exotic-Invasive Plants	25
11.2 Contingency for Failure to Establish Wetland Hydrologic Regimes	25
12.0 Long-Term Protection of Site	25
13.0 Implementation Schedule	26
14.0 Financial Assurances.....	26
15.0 Bibliography.....	1

Table of Contents (Continued)

List of Tables

Table 1	Existing Wetland Areas by Classification.....	7
Table 2	Proposed Wetland Areas by Classification.....	7
Table 3	Target Plant Species	9
Table 4	Rare Plant Occurrences	11

List of Figures

Figure 1	Project Location Map
Figure 2	Aerial Photograph
Figure 3	Floodplain Map
Figure 4	Web Soil Survey Map
Figure 5	Wisconsin Wetlands Inventory Map
Figure 6	Invasive Plant Occurrences
Figure 7	Rare Plant Occurrences

List of Appendices

Appendix A	Wetland Delineation Report
Appendix B	Project Plan Sheets
Appendix C-1	Superior RAM Functional Assessment
Appendix C-2	Superior RAM Performance Standards
Appendix D	Seed Mix and Seeding Rates

Wetland Mitigation Compensation Site Plan

Crawford Creek Mitigation Site

1.0 Introduction and Purpose

This Wetland Mitigation Compensation Site Plan describes the mitigation plan required for unavoidable wetland impacts resulting from the proposed construction of the Enbridge Line 3 Replacement and Sandpiper Pipeline Projects (referred to herein as the “Projects”) in the Lake Superior Watershed in Wisconsin. The mitigation site is located in 10-digit Hydrologic Unit Code (HUC) 0401030105 (Lower Nemadji) and 12-digit HUC 040103010503.

The purpose of this site plan is:

- To identify the expertise and qualifications of Enbridge and its consultants in designing and managing the proposed compensation project work;
- To outline the construction plan, project goals and objectives, monitoring plan, success criteria, and management plan; and,
- To provide evidence that the compensation site in its entirety will be maintained and preserved in perpetuity.

Enbridge is the landowner of the proposed mitigation site. Enbridge acquired the site at the same time as the property immediately to the south, where the existing Superior Terminal Enhancement Project (STEP) Wetland Mitigation Site was constructed. Both the STEP site and the proposed site described in this application have similar design considerations and expectations of success. **Figure 1** provides a project location map showing the boundary of the proposed Crawford Creek site, as well as the STEP Wetland Mitigation Site and the nearby Nemadji Wetland Mitigation Site. **Figure 2** provides an aerial photograph of the Crawford Creek Wetland Mitigation Site.

2.0 Plan Developers and Expertise

Enbridge developed this compensation site plan with assistance from Short Elliott Hendrickson Inc. (SEH[®]). The team for plan development, construction management, and ongoing monitoring and maintenance includes Enbridge staff and contracted engineers and scientists:

Paul Lehman – Environmental Analyst, Enbridge Major Projects

Paul is the Enbridge Environmental Analyst overseeing the project for Enbridge.

Allyz Kramer, MS, PWS – Scientist | SEH Project Manager

Allyz is a Professional Wetland Scientist (#1886) and Minnesota Certified Wetland Delineator (#1023) with 16 years of experience in natural resources. Allyz brings expertise in wetland delineation, permitting, and mitigation design; restoration ecology; plant community

inventories and rare plant surveys; natural resources management and planning; surface and subsurface water quality monitoring; and natural resources inventories. Allyz will be the SEH project manager for the site.

April Ryan, PE – SEH Water Resources Engineer

April is a Sr. Water Resources Engineer (MN #47121) with over nine years experience in a wide range of hydrology/hydraulic (H/H) analysis, design, and modeling for private, non-profit, municipal, state and federal entities. April is well versed in a number of H/H modeling software including: XP-SWMM, HydroCAD, WinSLAMM, P8, RUSELL, HY8, and HEC-RAS. April is often involved in the preparation of reports, plans, specification documents, and site inspections. April has extensive experience implementing stormwater utilities and addressing NPDES permitting requirements (MS4, industrial, and construction). April will be involved with the hydrological analysis and modeling of the existing and proposed site conditions.

Emily Erdahl, EI – SEH Water Resources Graduate Engineer

Emily is a Water Resources Graduate Engineer with experience in water resources engineering. Emily graduated from the University of Minnesota Duluth with a bachelor's degree in Civil Engineering with a focus in Water Resources. Her responsibilities include water resources design and environmental inspections of construction sites. Emily will be involved with the hydrological analysis and modeling of the existing and proposed site conditions.

Natalie White, MS – SEH Scientist

Natalie is a Biologist with six years of experience in wetland delineation, wetland functional assessments, threatened and endangered species survey, water regulatory permitting, and mitigation site monitoring. Natalie will be involved in site layout and site plan development for the project, as well as development of the monitoring protocol. Natalie is a qualified wetland delineator with formal training in wetland delineation according to the U.S. Army Corps of Engineers (USACE) 1987 *Manual*, and is a Minnesota Certified Wetland Delineator (#1226).

Joel Asp, BS – SEH Scientist

Joel is a Restoration Ecologist with SEH. Prior to SEH, Joel worked for Prairie Restorations, Inc. as a Restoration Specialist. Joel has 18 years of experience in site preparation, vegetation planning, habitat development, mitigation bank site planning, habitat evaluation, and invasive plant species control. Joel has been involved in the site design, vegetation planning, and development of the monitoring and contingency plans for the existing Nemadji River Compensatory Wetland Mitigation project site on the west side of Darrow Road. Joel will also be involved in vegetation planning activities. Joel is a qualified wetland delineator and has had formal initial and follow-up training in wetland delineation according to the U.S. Army Corps of Engineers (USACE) 1987 *Manual*. Joel is a Minnesota Certified Wetland Delineator – In Training (#5087).

3.0 General Description of Site Plan

The total site area is approximately 48.42 acres. About 19.00 acres on the east side of the site are undeveloped land adjacent to Crawford Creek. The remaining 29.40 acres are a hayfield with man-made ditches, adjacent to Darrow Road. A 2008 wetland delineation (included as **Appendix A**) classified 12.42 acres of the Crawford Creek site as wetland, 3.50 acres of which are located within the ditched hay field. In addition, approximately 25.90 acres in the hay field that have been drained by man-made ditches had neither adequate hydrology nor

hydrophytic vegetation necessary to meet wetland criteria. The total acreage of wetland anticipated once the site is complete is 31.92 acres (23.00 acres in the hayfield and 8.92 acres in the preservation area).

The wetland types **currently** found on the site are:

Type 1: Floodplain Forest
Type 2: Fresh (Wet) Meadow
Type 6: Shrub-Carr
Type 7: Hardwood Swamp

Restoration goals for the site are the following wetland types **expected** to develop when the mitigation is complete:

Type 1: Floodplain Forest
Type 2: Fresh (Wet) Meadow
Type 6: Shrub-Carr
Type 7: Hardwood Swamp

Enbridge proposes the following wetland compensation techniques:

- **Wetland restoration**, at a rate of 1:1, which includes restoring hydrology to former wetland areas through blocking of man-made ditches in order to capture precipitation and overland flow. Vegetation establishment includes planting and seeding of native wetland herbaceous vegetation, shrubs, and trees.
- **Wetland enhancement**, at a rate of 1:1, which includes the termination of agricultural activities, restoring more natural hydrology through blocking of man-made ditches, and vegetation enhancement through planting and seeding of native wetland herbaceous vegetation, shrubs, and trees.
- **Wetland preservation**, at a rate of 0.125:1, in the wooded area near Crawford Creek, will protect hardwood swamp, shrub-carr, and fresh (wet) meadow above steep slopes along the creek, and forested floodplain habitat along the creek.
- **Upland buffer**, at a rate of 0.25:1 to preserve upland vegetation adjacent to restored wetlands and on steep slopes adjacent to Crawford Creek.

Expected functions of the proposed site:

- Restore wetland characteristics to the area not meeting wetland criteria;
- Restore native vegetation and habitat types previously fragmented due to farming activity;
- Provide enhanced and diverse habitats for plants, mammals, birds, amphibians, reptiles, and insects; and,
- Provide refuge to state/federal threatened and endangered plants.

4.0 Location of Site

The site is located in northern Douglas County, Lake Superior Basin Water Management Unit (WMU); 10-digit Hydrologic Unit Code (HUC) basin 0401030105 (Lower Nemadji); 12-digit HUC basin 040103010503; in the NE 1/4 of Section 23, Township 48N, Range 14W in the Town of Superior (**Figure 1**). The site is within the Lake Superior Coastal Plain Ecological Landscape. The site is located on the east side of Darrow Road, south of the intersection of Darrow Road and County Trunk Highway C. The site is approximately 2,000 feet as measured directly from the Carlson Airport (a small facility with one landing strip).

5.0 Detailed Baseline Conditions

5.1 Site Survey

SEH completed a topographic and boundary survey of the property in August 2008 using one-foot contours (refer to Exhibit A in **Appendix B**).

5.2 On Site Land Use

Historic and Current Land Use

The field was ditched to drain surface water sometime prior to the 1970s, and has been used for hay production since the 1970s. The field is still in hay production to date. At the time of construction of the Nemadji River Wetland Mitigation Site in 2010, soil removed for excavation of wetland basins was stockpiled in upland areas within the proposed Crawford Creek Wetland Mitigation Site. These stockpiles were then stabilized and seeded, and are still present on site. A portion of one stockpile was used as a source of material for constructing ditch plugs on the STEP Phase I Wetland Mitigation Site.

Adjacent Land Use

The area surrounding the proposed compensatory mitigation site consists of active hayfield, an existing wetland mitigation site, and existing forested wetlands. Two residential homes, associated buildings and barns, and a horse pasture are located nearby. Darrow Road forms the west boundary of the site.

There are two existing Enbridge wetland mitigation sites (the Nemadji Mitigation Site and STEP Mitigation Site) located across Darrow Road to the west, and south of the proposed restoration area, respectively. The Nemadji Mitigation Site consists of approximately 113 acres of wetland and upland with natural overland flow toward the Nemadji River. The STEP Mitigation Site consists of approximately 19 acres of mostly wetland habitat with a topographical gradient and surficial flow path towards Crawford Creek.

5.3 Zoning Designations

The site is zoned agricultural (A1) by Douglas County. The site is not within mapped floodplain of the Nemadji River or Crawford Creek (**Figure 3**). All areas proposed for mitigation construction activities lie greater than 300 feet from Crawford Creek, and are therefore outside the shoreland zone. Only areas proposed for preservation are located within 300 feet of the creek.

5.4 Nearby Land Use

Land use near the site is agricultural, rural residential, and forested.

5.5 Historical or Archaeological Resources

Enbridge's consultant, The 106 Group Ltd, conducted a historical and archaeological investigation that encompassed the properties on both the east and west sides of Darrow Road in the summer of 2008. The 106 Group Ltd. prepared a separate report, which described the findings of the historical and archaeological investigation. The 106 Group Ltd. Submitted the report to the Department of State. The Department of State then forwarded the document to the State Historical Preservation Office (SHPO) for SHPO review. The 106 Group Ltd found no new or previously identified archaeological sites and no properties deemed eligible for listing on the National Register of Historic Places.

5.6 Geomorphic and Soils Assessment

The soils on-site include one consociation and one soil sub-order as mapped by the Web Soil Survey (2013). The predominant soil type is an Amnicon-Cuttre complex (262B), which is classified as a moderately-well to somewhat-poorly drained, clayey till soil with hydric inclusions. The east side of the site along Crawford Creek is mapped as Udorthents – ravines and escarpments on 25 to 60 percent slopes (92F), which is a recently eroded, non-hydric soil found on steep slopes. This soil type is found on steep upland slopes between wetland habitat higher in the landscape and floodplain forest along Crawford Creek below. **Figure 4** is a copy of the soil survey map.

The soils in the hay field area have been disturbed by decades of agricultural practices such as discing and plowing. SEH recorded buried A horizons in some areas during the 2008 field delineation of wetlands. SEH classified the hay field as a problem area during the wetland delineation due to mixed soil horizons and red clay parent material. Using methodology according to the NRCS publication Field Indicators of Hydric Soils version 4.0 (1998), SEH observed the TF2 (Red Parent Material) hydric soil indicator for problematic soils in sample test pits.

Wetlands exist to the south and east of the site. Test pits from 2008 field work, mapped soils, and adjacent wetlands identified by the Wisconsin Wetlands Inventory (**Figure 5**) provide evidence that upland areas of the ditched field were historically wetland prior to drainage activities. A typical soil profile taken within the site was comprised of:

- 0-2 inches of an organic/duff layer;
- underlain by a surface horizon from 2-5 inches of blocky clay with a Munsell (Gretag-Macbeth 1994) matrix color of 10YR 3/2;
- underlain by clay from 5-6 inches with a matrix color of 10YR 5/1 with 15% redox concentrations with a color of 10YR 5/6;
- underlain by blocky clay from 6-7 inches with a matrix color of 10YR 3/1 with 15% redox concentrations with a color of 10YR 5/6;
- underlain by clay from 7-11 inches with a matrix color of 10YR 5/1 with 20% redox concentrations with a color of 10YR 5/4; and
- the final 11-24 inches sampled consisted of red clay with a matrix color of 7.5YR 4/3 with 10% redox concentrations with a color of 7.5YR 5/4.

This soil profile was taken from an upland area with a hydric listed soil, and meets the technical hydric soil indicator TF2: Red Parent Material. Data sheets for this and other test pits are contained in the wetland delineation report (refer to **Appendix A**).

5.7 Hydrological Assessment

Hydrology for the site is currently supported through overland flow. The amount of surface water entering the site once construction is complete should be the same as existing, as the watershed area and conditions will be unchanged. SEH expects the construction of plugs to disable the function of the ditches, and to retain surface water that currently passes through the site. Currently, water flows into the site from the STEP Mitigation Site on the south site boundary. This flow discharges into man-made ditches that ultimately drain north and east into Crawford Creek. By slowing and capturing the surface water that currently passes through the site in the ditch channels, additional hydrology will be present to support the wetland restoration.

5.8 Floristic Assessment

Fresh (wet) meadow wetland plant communities are present in the man-made ditches on site. These include a relatively diverse assembly of species including fowl meadow grass (*Poa palustris*), lake sedge (*Carex lacustris*), dark green bulrush (*Scripus atrovirens*), water horehound (*Lycopus sp.*), common rush (*Juncus effusus*), Torrey's rush (*Juncus torreyi*), common beggars tick (*Bidens frondosa*), Canadian rush (*Juncus canadensis*), path rush (*Juncus tenuis*), saplings of slender willow (*Salix petiolaris*), blue joint grass (*Calamagrostis canadensis*), and graceful sedge (*Carex gracillima*). SEH documented multiple occurrences of Vasey's rush (*Juncus vaseyi*) and slender spike rush (*Eleocharis nitida*) in these fresh (wet) meadow communities in a 2008 survey of the site. They also documented the dominant tree species in the forested wetlands just outside the site to the south and east. These included American elm (*Ulmus americana*), tamarack (*Larix laricina*), black spruce (*Picea mariana*), and balsam fir (*Abies balsamea*). Historic vegetation on-site was likely more similar to the adjacent forested wetlands. Fresh (wet) meadow and shrub-carr wetland plant communities are also common in the area, and may have comprised part of the historic site vegetation. SEH had not observed changes in the plant communities on site during subsequent site visits (2012 and 2013).

In the preservation area, dominant tree species in the upland forest on slopes consists of white pine (*Pinus strobus*), balsam fir, and white spruce (*Picea glauca*). This area is mostly dominated by native species, but non-native invasive valerian (*Valeriana officinalis*) is present in the floodplain forest along Crawford Creek.

Plant species observed in the upland portions of the site during the 2008 wetland delineation included Canada thistle (*Cirsium arvense*), field horsetail (*Equisetum arvense*), red clover (*Trifolium pratense*), common dandelion (*Taraxacum officinale*), graceful sedge, bird's foot trefoil (*Lotus corniculatus*), smooth brome (*Bromus inermis*), timothy (*Phleum pratense*), woodland strawberry (*Fragaria virginiana*), white clover (*Trifolium repens*), and ragweed (*Ambrosia artemisiifolia*).

The non-native invasive species reed canary grass (*Phalaris arundinacea*) is present in the area. It is present in scattered patches at a relatively low abundance between the man-made ditches, and at higher cover on the soil stockpiles present on site (**Figure 6**). Reed canary grass has been treated with herbicide on site in the past, and continued management activities will be necessary to ensure ongoing control. Methodologies for invasive species management are discussed in more detail in **Section 7.3** below.

5.9 Faunal Assessment

In discussion prior to the construction of the Nemadji River Wetland Mitigation Site, the previous landowner reported anecdotal observations of deer, coyotes, eagles, bears, and rabbits within the project site. During SEH's wetland mitigation monitoring visits at the west side of Darrow Road, wildlife sightings included northern harriers, killdeer, Canada geese, and various other songbirds and waterfowl (SEH 2011, 2012, 2013). SEH observed deer and bear tracks and scat in the area as well.

5.10 Web Soil Survey and WWI Mapping of the Site

The Douglas County Soil Survey Map (refer to **Figure 4**) shows the Amnicon-Cuttre complex as the predominant mapped soil unit in the site. The complex is a clayey till soil with hydric inclusions. This mapped soil unit extends out of the site into adjacent wetland areas that have not been ditched for agricultural purposes.

The Wisconsin Wetlands Inventory (WWI) (refer to **Figure 5**) shows shrub-carr and forested wetlands to the east of the area. The mapped WWI wetlands end sharply at the borders of the ditched and hayed area, further indicating that these wetlands likely extended across the site prior to the construction of the man-made ditches.

5.11 Wetland Delineation

SEH completed a wetland delineation was completed on the site in August 2008 in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual*. The USACE representative (Jason Berkner) and WDNR representative (Steve LaValley) for the site reviewed the delineation in August 2008. Steve LaValley conducted an on-site wetland boundary review on September 29, 2008. At that time, Mr. LaValley verbally concurred with the flagged wetland boundaries. The wetland delineation data sheets indicate the dominant species of vegetation and the soil and hydrologic characteristics at representative locations within and adjacent to each basin. **Appendix A** contains the wetland delineation report. A summary of existing wetland areas by classification is included in **Table 1** below. **Table 2** summarizes proposed wetland areas.

**Table 1
Existing Wetland Areas by Classification**

Wetland Classification – Hayfield	Acres
PEM: Fresh (Wet) Meadow	3.50
Subtotal – Hayfield Area	3.50
Wetland Classification – Preservation Area	Acres
PFO: Floodplain Forest	3.70
PEM: Fresh (Wet) Meadow	0.02
PSS: Shrub-Carr	1.70
PFO: Hardwood Swamp	3.50
Subtotal – Preservation Area	8.92
Total All Classifications	12.42

**Table 2
Proposed Wetland Areas by Classification**

Wetland Classification – Hayfield	Acres
PEM: Fresh (Wet) Meadow	13.00
PSS: Shrub-Carr	7.00
PFO: Hardwood/Conifer Swamp	3.00
Subtotal – Hayfield Area	23.00
Wetland Classification – Preservation Area	Acres
PFO: Floodplain Forest	3.70
PEM: Fresh (Wet) Meadow	0.02
PSS: Shrub-Carr	1.70
PFO: Hardwood Swamp	3.50
Subtotal – Preservation Area	8.92
Total All Classifications	31.92

5.12 Rare Plant Survey

SEH conducted a rare plant survey on site on October 1 and 6, 2008, according to the Wisconsin Department of Natural Resources – Bureau of Endangered Resources (WDNR-BER), *Guidelines for Conducting Rare Plant Surveys* (WDNR 2005). The rare plant survey included species on the WDNR-BER list of rare plants known to occur in the City of Superior, as provided by Craig Anderson, Botanist, WDNR-BER. Species not included on the list were not targeted in the survey. The referenced information indicated that target species thought to occur within the site included Vasey’s rush (*Juncus vaseyi*), arrowhead sweet coltsfoot (*Petasites sagittatus*), and slender spike rush (*Eleocharis nitida*).

Prior to conducting the rare plant surveys, SEH contacted Steve LaValley, WDNR Water Management Specialist, and Ryan Magana, WDNR Northern Region Ecologist, to verify that the results of conducting a survey the first week of October would be acceptable to the WDNR – BER. Both Steve LaValley and Ryan Magana felt that this would be acceptable since it had been a warm fall and there had been no recorded hard frosts in Douglas County. SEH Natural Resource Scientists Pamela Rice and Lindsay Hogfeldt met with Steve LaValley the afternoon of September 29, 2008 at the site. They determined at that time that individual plant species were readily identifiable and that there had been no damage due to frost. In addition, during the course of the on-site meeting several clumps of Vasey’s rush were identified and their condition assessed. Their overall condition was good with fruiting structures present and readily identifiable.

Table 3 below lists target plant species for the rare plant survey.

**Table 3
Target Plant Species**

Rare species very dependent on the Superior area			
Species	State and/or Federal Status and Rank	Habitat	Optimum ID Dates
<i>Carex nigra</i>	State SC-S1	Wet fields, pastures, disturbed	July to Mid September
<i>Eleocharis nitida</i>	State END-S2	Bogs, pools, disturbed places	July to Early September
<i>Juncus vaseyi</i>	State SC- S3	Meadows, bogs	July to Late August
<i>Ranunculus cymbalaria</i>	State THR-S2	Disturbed, shallow water	June to Late August
Rare Species moderately dependent on the Superior area			
<i>Ophioglossum pusillum</i>	State SC-S3	Open fens, marsh edges, pastures, grassy shores, ditches	Mid spring to Early Summer
<i>Petasites sagittatus</i>	State THR-S3	Wet meadows, marshes, sedge meadows, open swamps	Mid May (flowers) to Sept. (leaves)
Rare species occurring in the Superior area with a primary state distribution elsewhere in Wisconsin			
<i>Calamagrostis stricta</i>	State SC-S3	Wet meadows, shallow marshes, shores, streambanks	Early July to mid Sept.
<i>Deschampsia flexuosa</i>	State SC- S3	Dry woods, fields, sandhills	Early June to Late August
<i>Platanthera orbiculata</i>	State SC-S3	Mesic to wet coniferous and deciduous forest, fen forest	Mid June to Mid August
<i>Salix planifolia</i>	State THR-S2	Shrub-carr and Alder Thickets, edges	Early June to Mid Sept.
<i>Ranunculus gmelinii</i>	State END-S2	Shallow water, meadows/marshes	Late June to Early Sept.
Species list, occurrence information, and state rank provided in tabular form by WDNR-BER, Craig Anderson, 2005. Optimum ID determined based on information presented in Diagnostic Characteristics and simplified keys, including habitat descriptions, for rare plants found in the vicinity of the City of Superior, Wisconsin; WDNR-BER			

SEH conducted the rare plant survey using a combination of random meander and systematic survey (transects) techniques. The systematic survey was conducted in the wetland habitat within the man-made ditches, and random meander survey was conducted elsewhere on site. SEH searched each wetland area within the subject property, including any potentially different wetland habitat types occurring within an individual wetland, for target rare plant species known to occur in each habitat type. SEH thoroughly searched all target species habitats within the subject property.

Wetland habitat types observed within the project site included wet meadow wetlands (primarily ditches) and a small fringe of shrub-carr. The wet meadows were located within

the open hay field. The areas of shrub-carr were located along the southern and eastern edge of the site.

At the time of the survey, leaves of arrowhead sweet coltsfoot, target willows (*Salix* species), and leaves and stems of the Vasey's rush and slender spike rush were still expected to be identifiable. The investigator flagged any late season suspect occurrences that could not be positively identified in the field for verification during the next field season. SEH did not conduct an evaluation of species lying dormant or contained within the seed bank.

SEH conservatively search shrub habitats for arrowhead sweet coltsfoot and tea leaf or diamond leaf willow (*Salix planifolia*). Surveys in shrub habitats included habitat transition areas such as forested edges, since arrowhead sweet coltsfoot has been observed at the interface between shrub habitats and meadows, marshes, or forests. Tea leaf willow is also expected to be found more along the outer perimeter or edge of a habitat than in dense shrub thickets.

The wet meadow areas, which were primarily wet ditches located within the hay field, were being actively cut/mowed for grass hay during the 2008 growing season. SEH surveyed these areas for Vasey's rush, arrowhead sweet coltsfoot, slender spike rush, seaside crowfoot (*Ranunculus cymbalaria*) and small yellow water crowfoot (*Ranunculus gmelinii*). They also surveyed the adjacent road side ditches intensely for Vasey's rush, slender spike rush, arrowhead sweet coltsfoot, seaside crowfoot and small yellow water crowfoot.

Search intensity was based on the habitat conditions and dominant vegetation associations present in each of the areas. Through the course of the survey, SEH took notes to document specific vegetation encountered within the different habitat types and/or locations within the subject property, as well as any other notable features or conditions that could warrant further investigation.

Rare Plant Survey Results – Eastern Field Area

SEH observed one target species within the Crawford Creek site: Vasey's rush, found in the ditches [linear fresh (wet) meadow wetlands] and in the adjacent fresh (wet) meadow wetland areas. SEH marked each occurrence in the field with a pink pin flag that was identified with a species abbreviation and an element occurrence number. SEH used a start and end flag to mark populations where larger areas of scattered individuals or clumps of rare plants were present. **Table 4** below includes the element occurrence number, the rare plant species, date of observation, and occurrence notes. SEH also recorded the occurrence locations using a hand-held global positioning system (GPS) unit. **Figure 7** shows occurrence locations. In addition, SEH photographed the occurrences and collected three voucher specimens.

The majority of the rare plant occurrences were located within the wet ditches. At the time of the survey, all of the occurrences were located in areas with saturated soils, and a majority of the locations were also inundated with surface water.

**Table 4
Rare Plant Occurrences**

Occurrence No.	Species	Occurrence Notes
1	<i>Juncus vaseyi</i>	Located in E/W Ditch 9; saturated soils with standing water; 12 fruiting stems in 5 square foot area.
2	<i>Juncus vaseyi</i>	Located in E/W Ditch 9; saturated soils with standing water; 2 clumps no fruiting stems.
3	<i>Juncus vaseyi</i>	Located in E/W Ditch 9; saturated soils with standing water; 2 clumps with 23 fruiting stems.
4	<i>Juncus vaseyi</i>	Located in E/W Ditch 9; saturated soils with standing water; scattered individual plants with 48 fruiting stems within a 12' long by 5' wide area.
5	<i>Juncus vaseyi</i>	Located in E/W Ditch 9; saturated soils with standing water; individual plants with 7 fruiting stems within a 3 square foot area.
6	<i>Juncus vaseyi</i>	Located in E/W Ditch 9; saturated soils with standing water; ten clumps with approx. 80 fruiting stems within a 32' long by 3' wide area.
1	<i>Eleocharis nitida</i>	Intersection of E/W Ditch 9 and 6; saturated soils and large area of standing water; one individual plant.
7	<i>Juncus vaseyi</i>	Located in southern wet field area between the N/S Ditch 5 and 6; saturated soils and large area of standing water; 24 identifiable individual plants in a 10' by 5' area, but area was recently cut potential for other individuals.
2	<i>Eleocharis nitida</i>	Located in N/S Ditch 5; saturated soils, standing water in a deeper depressional area; 12 identified individuals in a 90' by 10' area.
8	<i>Juncus vaseyi</i>	Located in N/S Ditch 5; saturated soils, standing water; 2 clumps with 12 fruiting stems.
9	<i>Juncus vaseyi</i>	Located in N/S Ditch 5; saturated soils, standing water; 3 clumps with 22 fruiting stems in a 12' by 6' area.
10	<i>Juncus vaseyi</i>	Located in N/S Ditch 5; saturated soils, standing water; 13 clumps with 130 fruiting stems in a 10' by 6' area.
11	<i>Juncus vaseyi</i>	Located in N/S Ditch 5; saturated soils, standing water; 3 clumps with 35 fruiting stems.
12	<i>Juncus vaseyi</i>	Located in N/S Ditch 5; saturated soils, standing water; 1 clump with 9 fruiting stems.
3	<i>Eleocharis nitida</i>	Located in N/S Ditch 4; 3 individual plants along edge of ditch.
4	<i>Eleocharis nitida</i>	Located in N/S Ditch 4; four large clumps and 3 individual plants in a 12' by 3' area along edge of ditch.
13	<i>Juncus vaseyi</i>	Located in N/S Ditch 4; saturated soils, standing water; 1 clump with 8 fruiting stems.
14	<i>Juncus vaseyi</i>	Located in N/S Ditch 4; saturated soils, standing water; 1 clump with 8 fruiting stems.
5	<i>Eleocharis nitida</i>	Located in N/S Ditch 4; 8 individual plants within 25' along the edge of ditch.

**Table 4
Rare Plant Occurrences**

Occurrence No.	Species	Occurrence Notes
15	<i>Juncus vaseyi</i>	Located in N/S Ditch 2; saturated soils, 2 clumps with 25 fruiting stems.
16	<i>Juncus vaseyi</i>	Located in N/S Ditch 2; saturated soils, standing water; 1 clump with 28 fruiting stems.
17	<i>Juncus vaseyi</i>	Located in N/S Ditch 2; saturated soils, standing water; 10 clumps with 82 fruiting stems within a 10' by 3' area.
18	<i>Juncus vaseyi</i>	Located in N/S Ditch 2; saturated soils, standing water; 2 clumps with 26 fruiting stems in a 3' by 3' area.
19	<i>Juncus vaseyi</i>	Located in N/S Ditch 2; saturated soils, standing water; 1 clump with 15 fruiting stems.
20	<i>Juncus vaseyi</i>	Located in N/S Ditch 2; saturated soils, standing water; 2 clumps with 39 fruiting stems.
21	<i>Juncus vaseyi</i>	Located in N/S Ditch 1; saturated soils, standing water; 1 clump with 26 fruiting stems.
22	<i>Juncus vaseyi</i>	Located in N/S Ditch 1; saturated soils, standing water; 2 clumps with 55 fruiting stems in a 5' by 3' area.
23	<i>Juncus vaseyi</i>	Located in N/S Ditch 1; saturated soils, standing water; 2 clumps with 57 fruiting stems in a 3' by 3' area.
24	<i>Juncus vaseyi</i>	Located in N/S Ditch 1; saturated soils, standing water; 2 clumps with 12 fruiting stems in a 3' X 1' area.
25	<i>Juncus vaseyi</i>	Located in N/S Ditch 1; saturated soils, standing water; 1 clump with 5 fruiting stems.
26	<i>Juncus vaseyi</i>	Located in N/S Ditch 1; saturated soils, standing water; 4 clumps with 40 fruiting stems in a 3' by 2' area.
27	<i>Juncus vaseyi</i>	Located in N/S Ditch 1; saturated soils, standing water; 2 clumps with 22 fruiting stems in a 1' by 1' area.
28	<i>Juncus vaseyi</i>	Located in N/S Ditch 1; saturated soils, standing water; 1 clump with 13 fruiting stems.
29	<i>Juncus vaseyi</i>	Located in N/S Ditch 6 between E/W Ditch 7 and 8; standing water; 2 clumps with 7 fruiting stems.
30	<i>Juncus vaseyi</i>	Located in N/S Ditch 6 between E/W Ditch 7 and 8; standing water; 1 clump with 4 fruiting stems.
31	<i>Juncus vaseyi</i>	Located at the intersection of N/S Ditch 6 and E/W Ditch 6; standing water; 2 clumps with 124 fruiting stems.
32	<i>Juncus vaseyi</i>	Located in E/W Ditch 7, which had been mowed; saturated soils; 5 clumps with no fruiting stems.
33	<i>Juncus vaseyi</i>	Located in E/W Ditch 7, which had been mowed; saturated soils; 1 clumps with 20 fruiting stems in a 2' by 2' area.
34	<i>Juncus vaseyi</i>	Located in E/W Ditch 7, which had been mowed; saturated soils; 4 clumps with 48 fruiting stems in a 5' by 3' area.

**Table 4
Rare Plant Occurrences**

Occurrence No.	Species	Occurrence Notes
35	<i>Juncus vaseyi</i>	Located in E/W Ditch 6, which had been mowed; saturated soils; positive identification of 2 clumps, but could be up to 8 clumps; identification was completed using the red coloration at the base of the stems.
36	<i>Juncus vaseyi</i>	Located in E/W Ditch 5, which had been mowed; saturated soils; 2 clumps with 22 fruiting stems in a 2' by 2' area.
37	<i>Juncus vaseyi</i>	Located in N/S Ditch 6 between E/W Ditch 5 and 6; saturated soils and standing water; 1 clump with 28 fruiting stems in a 2' by 2' area.
38	<i>Juncus vaseyi</i>	Located in N/S Ditch 6 between E/W Ditch 5 and 6; saturated soils and standing water; 1 clump with 9 fruiting stems in a 1' by 1' area.
39	<i>Juncus vaseyi</i>	Located in N/S Ditch 6 between E/W Ditch 5 and 6; saturated soils and standing water; 1 clump with 1 fruiting stems in a 1' by 1' area.
40	<i>Juncus vaseyi</i>	Located in N/S Ditch 6 between E/W Ditch 5 and 6; saturated soils and standing water; 1 clump with 4 fruiting stems in a 2' by 1' area.
41	<i>Juncus vaseyi</i>	Located in N/S Ditch 6 between E/W Ditch 4 and 5; saturated soils and standing water; 1 clump with 9 fruiting stems in a 2' by 2' area.
42	<i>Juncus vaseyi</i>	Located at the intersection of N/S Ditch 6 and E/W Ditch 4; saturated soils and standing water; 1 clump with 3 fruiting stems in a 1' by 1' area.
43	<i>Juncus vaseyi</i>	Located at the intersection of E/W Ditch 2; saturated soils; 2 clumps with 40 fruiting stems in a 3' by 3' area.
44	<i>Juncus vaseyi</i>	Located at the intersection of N/S Ditch 6; saturated soils; 1 clump with 3 fruiting stems in a 1' by 1' area.

SEH did not identify other rare plant species on the portions of the property east of Darrow Road.

Rare Plant Survey Documentation

SEH completed official documentation of the occurrences of these state listed species at the time of observation in accordance with the WDNR – BER guidelines and based on recommendations from Craig Anderson, WDNR Botanist. Mr. Anderson determined that it was not necessary to complete individual Element of Occurrence and Natural Heritage Inventory data sheets on each population observed, but requested that the coordinates of each surveyed occurrence be placed in a spreadsheet and provided to WDNR – BER electronically. In addition, SEH sent collected specimens to WDNR – BER for final verification and recording.

Based on the random nature of the survey, the general size of appropriate habitats, and the intensity of the search in appropriate habitats there is a low probability that occurrences were missed. Occurrences that may have been missed include species such as seaside crowfoot and

small yellow water crowfoot, which are best surveyed from June through early September when the plants are in flower and the vegetative structures have not started to senesce. However, it did not appear that the site conditions and habitat were best suited for the occurrence of seaside or small yellow water crowfoot.

5.13 Wetland Functional Assessment

SEH conducted a functional assessment using the Superior Routine Assessment Methodology (RAM) in spring 2009 using both field observations and Geographical Information System (GIS) information available from Douglas County.

The wetlands (ditches) within the field scored low to medium for plant community integrity due to a small amount of reed canary grass. The remaining functions scored low due to the man-made ditching, hay production, and very low impervious surface and developed areas surrounding the wetlands.

Appendix C-1 contains the Superior RAM functional assessment sheets used to conduct the functional assessments.

5.14 Floodplain

There are no Federal Emergency Management Agency (FEMA) mapped floodplains within the site (**Figure 3**).

5.15 State Navigable Waters

Crawford Creek, a state navigable water, flows through the eastern portion of the mitigation site proposed for preservation credit.

5.16 Ecological Importance

The site is located within the Nemadji River watershed, which contains many streams, creeks, and wetlands. Agricultural practices, including man-made ditches, altered the natural landscape in the area and contribute to erosion and sedimentation in the watershed.

The site drains to Crawford Creek, which is a tributary of the Nemadji River just south of the City of Superior. Crawford Creek is a total of eight miles in length. The stream has been identified as impaired under Section 303d of the Clean Water Act for chronic aquatic toxicity related to polycyclic aromatic hydrocarbons (PAHs) and creosote, from contaminated sediment and an industrial point source discharge (WDNR 2012). Furthermore, Crawford Creek is designated an Area of Special Natural Resource Interest (ANSRI due to its flow path through wetlands in the City of Superior's Special Area Management Plan (SAMP), downstream of the site.

The site is located within the St. Louis River Area of Concern (AOC), designated under the Great Lakes Water Quality Agreement of 1987. Locations designated as AOCs are environmentally degraded areas with defined goals for remediation and restoration, eventually leading to removal of the impairments that prompted the AOC designation. The Nemadji River watershed basin, within the St. Louis River AOC, covers a total of 433 square miles (277,400 acres). Within the basin, 69% of the land cover is forest lands, 18% is croplands and pasture, 11% is wetlands and lakes, and 2% is other land cover categories (Carlton County Water Plan Advisory Committee 2000¹). The Nemadji River flows north to Superior Bay and ultimately to Lake Superior through the Superior Entry Navigational

¹ The Carlton County land cover data includes the portion of the Nemadji River watershed within Douglas County.

Channel. The Nemadji River is listed as impaired for sediment and total suspended solids (WDNR 2012). The factors causing the impairment include highly erodible clay soils in the basin, combined with soil erosion accelerated by human alterations such as clearing of natural vegetation and increases in impervious surfaces. This impairment of the Nemadji River contributes to the St. Louis River AOC Beneficial Use Impairment (BUI): Excessive Loading of Sediment and Nutrients. Strategies for removing this BUI focus on the turbidity and sediment carried by the Nemadji River and tributaries including Crawford Creek. Sediment transport from these waterways carries contaminants and nutrients to Lake Superior, as well as smothering spawning bed habitat for many warm water fish species at the mouth of the Nemadji River. In 2009 monitoring of Crawford Creek, turbidity and total suspended solids were high, and transparency tube readings were low (WDNR 2010). Strategic forest management and wetland protection are identified as preferred approaches for long term sediment and nutrient management in the *2010 Water Quality Management Plan Update* (WDNR 2010) to the St. Louis and Lower Nemadji River Watershed Plan.

Crawford Creek has been identified in management planning, including the *2010 Water Quality Management Plan Update* (WDNR 2010), as requiring remediation for contaminated sediment, and has been identified as potentially impaired by erosion and sediment loading. Preservation of wetlands adjacent to Crawford Creek could benefit planned downstream remediation projects by preventing further erosion and sediment mobilization into the stream.

Figure 5 illustrates the existing shrub-carr and forested wetland to the south and east of the site. The proposed wetland mitigation would enhance existing wetlands and restore hydrology to ditched wetlands, providing additional stormwater runoff retention before the site drains to Crawford Creek. Mitigation activities on site would also improve wildlife habitat and provide habitat suitable for state listed rare plant species. The site location immediately across Darrow Road from the previously established Nemadji River Compensatory Mitigation Site provides a greater opportunity for both of these sites to integrate into the surrounding landscape, and provide more benefit than possible at an isolated site of similar size.

6.0 Project Plan Sheets

Appendix B includes the proposed hydrology plan, preliminary grading plan, and planting plan (Exhibits A, B, and C, respectively).

7.0 Design Features

The design includes restoration of ditched areas not meeting wetland characteristics, enhancement of existing hayed wetlands, and preservation of wetlands near Crawford Creek. Design objectives include low maintenance measures which minimize the need for engineered structures requiring active upkeep and management. The design allows a state listed plant species (Vasey's rush, previously documented in the man-made ditches on-site) to serve as a potential seed source for the restored wetland areas. The goals also include design to fit with the natural landscape by restoring ditched areas using minimal grading and earthwork.

Enbridge will avoid impacts to existing wetlands and threatened and endangered plants to the greatest extent practicable. **Section 7.7** addresses temporary impacts to wetlands within the site.

In the 19 acres of less-disturbed area adjacent to Crawford Creek, Enbridge proposes to preserve native, perennial vegetation on steep slopes and in the floodplain of Crawford Creek,

as well as treat non-native invasive species. Preserving this area that lies between restored wetlands and Crawford Creek prevents fragmentation of habitat in the landscape. Nearby land use includes rural residential lots with lawns and out-buildings, grazing/haying, and logging. These land uses include clearing of woody vegetation within 150-200 feet of the creek, including in some parcels adjacent to the mitigation site. The *2010 Water Management Plan Update* (WDNR 2010) identified clearing of natural vegetation in the Nemadji River watershed (including tributaries such as Crawford Creek) as a key contributor to the BUI for Excessive Loading of Sediment and Nutrients (refer to **Section 0**). If not preserved as part of the Crawford Creek mitigation site, tree clearing for lawn, agriculture, or logging is a potential future land use in the proposed preservation area.

7.1 Proposed Construction Activities

The plan for the Crawford Creek Wetland Mitigation Site includes wetland communities that fit the existing natural landscape surrounding the site. Enbridge proposes minimal earthwork in order to maintain the natural topographic variation and to decrease the potential for introducing invasive plant species. Enbridge will remove the existing soil stockpiles currently located on site. Material from the soil stockpiles will be used to construct the ditch plugs. Enbridge will dispose of excess material of in accordance with all applicable state and local requirements.

7.2 Proposed Hydrology

Overland flow from the STEP Wetland Mitigation Site will provide hydrology to the Crawford Creek site. Blocking the drainage capabilities of the man-made ditches will re-establish hydrology in the field. Restoration of more natural hydrology resulting from the ditch plugs will enhance existing wetlands.

Existing wetlands to the south of the site are anticipated to provide hydrology necessary for upland areas of the site to redevelop wetland characteristics. Water is proposed to flow across the site to the north and east, and eventually into Crawford Creek. Because water leaving the restored wetlands will re-enter the existing flow path into swales and eventually into Crawford Creek outside the restoration area, the proposed work is not anticipated to cause flooding impacts to residences and other land uses outside of Enbridge property.

The average depth of water proposed for the site is saturation within the top 12 inches of the ground surface, with up to one (1) foot of inundation immediately upstream of ditch plugs (refer to Exhibit A included in **Appendix B**).

7.3 Wetland Vegetation Establishment Plan

The first step in the planting plan is conducting a normal cut and bale of the hay field. Vegetation on the soil stockpiles can be prepared by mowing or burning. The first crop of hay (vegetation biomass) should be removed by approximately July 4, 2014. Prior to the harvest, areas of reed canary grass will be marked on a map for an application of a non-selective herbicide. The herbicide application should occur when the re-growth of reed canary grass (after the cut and bale, or after mowing/burning on the soil stockpiles) is between 12-18 inches tall. The expected timeframe for this herbicide application would be mid- to late-July, depending on local growing conditions and the actual date the first crop of hay was cut. The herbicide application should only be completed in the areas where reed canary grass is present. Some desirable native plant species are already present in areas of the site. Targeting the herbicide application to the areas of invasive weed species will give the native species present the potential to persist and spread following the installation of the ditch plugs and the

resulting increased hydrology. A complete site overspray is not currently proposed since the upland species present (i.e., timothy grass and red clover) are less tolerant of the increased hydrology and decrease in cover over time.

Invasive valerian in the preservation area will be treated using spot sprays with glyphosate or other non-specific herbicide.

A native wet meadow mix will be seeded in areas disturbed for removal of soil stockpiles and placement of ditch plugs. The mix will be seeded at the recommended rate (refer to **Appendix D** for mix and rates) in the designated areas as shown on Exhibit C in **Appendix B**.

Ditch plugs will be constructed in early- to mid-September to capture fall hydrology. The contractor will conduct construction activities in dry conditions to the greatest extent practicable in order to minimize the impacts of compaction and rutting of the site soils. Weed-free straw mulch or other erosion control best management practices (BMPs) will be applied to areas disturbed during construction of the plugs to provide temporary erosion and sediment control.

Locally collected shrub live stakes will be installed in early spring 2015. The live stakes should be approximately 3 to 5 feet long and ¾ to 1-½ inch in diameter. The stakes will be cut so the top of the stake is flat and the bottom angled. The angled cut end will then be driven into the ground so the lower 12 inches of the stake are located within a saturated soil zone.

Trees will be planted in spring 2015 using WDNR tree planting guidelines. Some smaller tree stock (10-18 inches in height) will be interspersed with more mature stock (12-24 inches in height for conifers and 24-72 inches for deciduous trees). Larger trees will be planted along the roadside for improved aesthetics when viewed from the roadway. Density and species composition of the clusters is listed below.

Proposed Tree Cluster Planting:

1,400 trees/acre = cluster sizes and approximate locations shown on Exhibit C of Appendix B.

T-1 Cluster:

1. Black spruce (*Picea mariana*) = 400 trees/acre
2. Balsam fir (*Abies balsamea*) = 600 trees/acre
3. Red maple (*Acer rubrum*) = 400 trees/acre

T-2 Cluster:

1. Tamarack (*Larix laricina*) = 600 trees/acre
2. Yellow birch (*Betula alleghaniensis*) = 400 trees/acre
3. Red maple (*Acer rubrum*) = 400 trees/acre

Proposed Shrub Cluster Planting (SS):

420 shrubs/acre = cluster sizes and approximate locations shown on Exhibit C of Appendix B.

1. Meadow willow (*Salix petiolaris*) = 140 stakes/acre
2. Pussy willow (*Salix discolor*) or Bebb's willow (*Salix bebbiana*) = 140 stakes/acre
3. Red osier dogwood (*Cornus sericea*) = 140 stakes/acre

7.4 Site Constraints

Natural ecological succession is expected beyond the standard monitoring period. Enbridge does not intend to control changes in the vegetation structure within each designed habitat type due to natural succession over time. Wet meadow areas may naturally colonize with trees and shrubs, and shrub-carr areas may colonize with trees.

While enhancement of hydrologic, stormwater-flood attenuation, and water quality functions of the site are intended based on an expected increase in development in the surrounding area, Enbridge does not hold any liability in the event of extreme failures or changes in the design standards of this site due to developments permitted within the same subwatershed.

7.5 Site Preparation

SEH noted areas of reed canary grass at site visits and at the adjacent STEP and Nemadji River Mitigation Sites (refer to **Figure 6** for approximate area of occurrences on the Crawford Creek site). Prior to construction of the proposed wetland restoration, Enbridge plans to control reed canary grass on the east and west sides of Darrow Road using spot herbicide application (refer to **Section 7.3** for more details on control methods). Herbicide application, as well as additional management activities such as mowing, will take place as needed during the subsequent monitoring years.

Contractors will be required to clean all equipment before entering the site to avoid bringing invasive plant propagules/seeds onto the site.

7.6 Erosion and Sedimentation Control

Erosion control methods planned for the site include minimizing disturbed areas. Seeding preparation will be achieved using methods described in **Section 7.3**, to minimize areas of open soil. Silt fence or coir logs will be installed around disturbed soil areas at the soil stockpiles to be removed. Removal of the soil stockpiles will require a WDNR construction stormwater permit. A stormwater notice of intent (NOI) will be submitted and approval obtained prior to the beginning of this activity.

Any straw, hay, mulch, coir logs, or erosion control blankets used on-site will be clean of weed seeds or other invasive plant species propagules.

7.7 Impacts to Existing Jurisdictional Wetlands

Any incidental impacts to existing wetlands within the project site are subject to the requirements of Section 281.36, Wis. Statutes, and NR 299 and NR 103, Wisconsin Administrative Code. Enbridge avoided impacts to existing wetlands to the maximum extent practicable while maintaining the integrity of the site plan. The total area of ditch plugs to be placed within existing wetlands is 11,000 ft² (0.25 acres); the 0.25 acres of wetland impacts are expected to be temporary, as these areas are proposed to redevelop wetland characteristics.

8.0 Goals and Objectives for the Site

The overarching goal for the site is to restore drained wetland habitat and enhance ditched and degraded wetland communities so that these areas may become effectively integrated into the surrounding natural wetlands and the nearby STEP Wetland Mitigation Site. The site is designed to have high value for wildlife and plant habitat integrity. The site may also help reduce peak flows and soil erosion and contribute to improved water quality in the Nemadji River watershed.

Functional goals for each of the habitat types are based on the Superior Rapid Assessment Methodology (RAM). Wetland functions used in the Superior RAM include plant and wildlife habitat, water quality and hydrologic integrity, and public values (aesthetics, recreational, cultural, scientific, and educational).

8.1 Goal: Establish Wetland Area

Wetlands should develop in areas currently drained by man-made ditches.

Objectives:

- **Wetland delineation in Year 5 of monitoring should demonstrate establishment of wetlands as described in the site plans.** All wetland habitats within the site should successfully meet the criteria for being classified as a wetland according to the 1987 *Corps of Engineers Wetlands Delineation Manual* and *Regional Supplement: Northcentral and Northeast Region* (USACE 2012). Enbridge will perform a wetland delineation during the 5th year of monitoring.
- **Site should be constructed to specifications in the site plan.** The site plan includes blocking of man-made ditches to restore sufficient hydrology to meet the restoration goals and technical criteria for wetland habitat. Minimal excavation and grading of the site will preserve natural topography outside the ditches.
- **Site should reflect habitat diversity as described in this plan.** At the end of the monitoring period, the restored wetland areas should be established or establishing as fresh (wet) meadow, shrub-carr, and forested habitats. In accordance with the *Guidelines for Compensatory Wetland Mitigation in Wisconsin* (WNDR 2013) and Chapter NR 350.09 of Wisconsin Administrative Code, a minimum five (5) year monitoring period is proposed.
- **Hydrologic establishment.** Due to the nature of the native lacustrine clay soils at the site, hydrological characteristics will not be measured using shallow groundwater monitoring wells or piezometers, but will be observed in pits dug with a tile spade at regular monitoring visits. The development of wetland hydrology may also be inferred based on the establishment of hydrophytic vegetation during monitoring. Hydrophytic vegetation [indicator status FAC or wetter, as designated by the *National Wetland Plant List* (USACE 2012)] should comprise approximately 80% of the total vegetation in wetland habitats as a result of a wetland delineation performed during the 5th year of monitoring.

8.2 Goal: Establish Plant and Wildlife Habitat

Successful native vegetation should establish through use of plantings and seeding, encouragement of the natural seed bank, and protection of the site from disturbance.

Objectives:

- **The site should be comprised of no less than 85% native plant species at the end of the monitoring period.** Native species must constitute greater than or equal to 85% areal cover. Only native permanent vegetation will be used on-site. Only temporary seed mixes with easily succeeded, early successional species will be used to provide rapid cover and discourage expansion or establishment of reed canary grass. Invasive species will comprise no more than 15% of areal cover on-site at the end of the monitoring period.
- **Reed canary grass should comprise no more than 10% of the total herbaceous cover at the end of the monitoring period.** Removal and control of reed canary grass is expected to improve plant habitat integrity. Populations of reed canary grass will be assessed prior to site plan implementation. The areal extent of each population of reed canary grass will be calculated and mapped. At each monitoring interval the populations

will be reassessed and percent change calculated. The total reduction in reed canary grass cover area will be included in the monitoring report.

- **The site should provide suitable habitat for appropriate state listed plant species,** should a need arise that would allow for the transplantation or natural introduction of target species to the site. Additional fresh (wet) meadow and shrub-carr wetlands are expected to provide suitable habitat for the one species already documented on-site, Vasey's rush. Restoration of shrub-carr wetland should provide potential habitat for arrowhead sweet coltsfoot (*Petasites sagittatus*), a listed species dependent on the Superior area and adapted to the target habitat.
- **The site should provide wildlife habitat for birds, mammals, and reptiles/amphibians.** Overall, the site is expected to provide wildlife forage, nesting, resting, and hibernating habitat for resident animals as well as those just passing through. The site is also expected to provide significant nesting, resting, and cover sites for resident and migratory songbirds and small mammals. Wildlife sightings will be documented at all monitoring visits, including observations of animal signs and audible calls.

8.3 Goal: Protect Water Quality and Improve Hydrologic Integrity

Wetland restoration on-site is expected to contribute to improving water quality in the Nemadji River watershed through increasing runoff detention time in the restored wetland, allowing particles to settle, and reducing erosion potential downstream from the site.

Objectives

- **Cessation of Agricultural Land Use.** Cessation of use of the property for agricultural production will be attained immediately upon implementation of this plan. Removal of remnant pasture/upland grassland plants for weed control or site preparation shall not be considered "agricultural land use."
- **Improvement of soil stabilization through native wetland vegetation establishment.** This objective will be achieved by establishing a permanent vegetation cover and eliminating vegetation removal, except in the case of invasive species control activities.

9.0 Performance Standards

Performance standards will be measured during site development, during each regular monitoring event, and at any opportunity throughout establishment and subsequent maturation of the site.

The following performance standards are a subset of the goals and objectives outlined in **Section 8.0** above and are intended to be quantitative assessments to determine the success and the applicable credit award for mitigation site implementation.

9.1 Wetland Establishment

The site should reflect habitat diversity as described in this plan. Fresh (wet) meadow communities shall be established at the end of the monitoring period. Shrub-carr and forested communities shall be established, or trending to these wetland types, at the end of the monitoring period.

Due to the presence of clay soils, Enbridge does not propose measurement of hydrological characteristics using shallow subsurface monitoring wells, but rather through investigation in pits dug with a tile spade at annual monitoring visits. In accordance with criteria in the 1987 *Corps of Engineers Wetlands Delineation Manual* and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012),

observations in pits should demonstrate indicators of wetland hydrology within 12-inches of the ground surface for at least 14 days within the growing season. Development of wetland hydrology may also be inferred based on establishment of hydrophytic vegetation. During the 5th year of monitoring, hydrophytic vegetation (indicator status FAC or wetter) shall comprise greater than 75% absolute areal cover of the site.

9.2 Vegetation Establishment

In Year 1, site preparation, seeding, planting and mulching must be accomplished according to the Compensatory Mitigation Site Plan. Interim (Year 2 to Year 4 or greater) performance standards will be assessed at monitoring visits. These interim standards are:

- Year 2: No more than 20% of total site area can be bare soil. If necessary, additional erosion control measures must be implemented.
- Year 3:
 - Shrub species must be present in densities of at least 270 stems per acre within shrub-carr planting clusters, and densities of at least 200 stems per acre within shrub-carr planting clusters at Year 5. Survival rates below these criteria must require replanting(s) until this standard is met. This target will achieve the adequate shrub density to qualify as a shrub-carr wetland.
 - There must be an average stand density of 840 tree seedlings/acre with at least 3/4-inch basal caliper and 3-foot height within forested wetland planting clusters after three full growing seasons. Tree species stem densities below these criteria require replanting(s) until this standard is met. This target will achieve the adequate tree density to qualify as a forested wetland.
 - A Floristic Quality Assessment (FQA) will be conducted with Floristic Quality Index (*FQI*) and mean coefficient of conservatism (mean *C*) calculated for each plant community. These *FQI* and mean *C* values will provide a baseline, and subsequent years of monitoring should record an increase in *FQI* and mean *C* values. This data will be collected and included in the respective monitoring reports; however, these values are not proposed to be used as performance standards to determine final success of the site.
 - Percent areal cover by invasive and/or non-native species must decrease as monitoring progresses. Control of invasive and/or non-native plant species must be implemented as necessary
- Year 3 and beyond:
 - Wetland areas must have 85% or greater areal cover by native, non-invasive, species. Any areas not meeting the above targets must be reseeded/replanted as necessary.
 - Removal and control of non-native invasive wetland plants is expected to improve plant habitat integrity on-site. Non-native, invasive populations of wetland plant species will be assessed prior to site plan implementation. The areal extent of each population will be calculated and mapped. At each monitoring interval the populations of all non-native invasive species on site

will be reassessed and percent change calculated. The total reduction in invasive species areal cover will be included in each monitoring report.

Final Vegetation Performance Standards: At the final year of monitoring (Year 5, or later should the USACE and WDNR determine that additional monitoring is necessary),

- Wetland areas should have 85% or greater areal cover by native, non-invasive, species. Reed canary grass shall not comprise more than 10% areal cover over the entire site.
- At final monitoring, the forested communities must attain an average stand density of 588 tree seedlings/acre with 1-inch basal caliper and 4-foot or greater height within forested wetland planting clusters. Tree species stem densities below these criteria require replanting(s) until this standard is met. This target will achieve the adequate tree density to qualify as trending towards a forested wetland.
- At final monitoring, the site must have densities of at least 200 stems per acre within shrub-carr planting clusters. This target will achieve the adequate tree or shrub density to demonstrate that the communities are trending towards shrub-carr wetland. Any areas not meeting the above targets must be reseeded and/or replanted as necessary.
- The site will be evaluated using the Superior Routine Assessment Method (RAM) for evaluating wetland functions. At final monitoring, the site will achieve a rating of High for Plant Community Integrity, Medium for Hydrologic Integrity, Wildlife Habitat Integrity, Flood and Stormwater Attenuation, Protection of Water Quality, and Low for Aesthetics /Recreation /Education /Cultural /Science functions. The anticipated “Low” score is largely due to the site being in private, rather than public, ownership. The site must meet minimum numerical scores that correspond with the High, Medium, or Low ratings – these numerical scores are shown, with scores for this site in its existing condition for comparison, in **Appendix C-2**.

9.3 Wildlife Use

During the monitoring period, wildlife sightings will be recorded and habitat condition documented to verify that the conditions established are favorable to integrating this site into the surrounding landscape.

10.0 Site Monitoring Plan

10.1 Construction Inspection

Enbridge will retain a qualified inspector to ensure that the plans are implemented as designed, or that contingency plans, where necessary, are developed and implemented in accordance with the site’s mitigation goals and objectives.

10.2 As-Built Report

Within 60 days of the completion of construction, Enbridge will provide an as-built report to the USACE and WDNR. This report will summarize the construction activities and note any changes to the construction plan. Enbridge will identify immediate corrective actions along with a timeline for when the work will be completed. This as-built report will serve as the basis for construction inspection and subsequent years of monitoring and reporting. The outline for the As-Built Report is as follows:

1. Identify site, designer, and owner.
2. Identify the construction contractor.
3. Dates of construction including completion date.

-
4. Describe any changes to the original plan.
 5. Describe problems encountered during construction and what was done to correct the problem.
 6. List any follow-up corrective actions needed, provide a schedule and list who is responsible.
 7. Provide the as-built plan sheets.
 8. Provide site photographs and establish photo reference points to be used at all subsequent years of monitoring.

10.3 Post-Construction Monitoring

Enbridge will monitor the mitigation site during at least four (4) separate growing seasons beginning with the first full growing season after completion of the majority of the construction and planting. The first year of monitoring is anticipated in 2015. Enbridge will submit monitoring reports to the WDNR and the USACE at the end of the 1st, 2nd, 3rd, and 5th growing seasons after submittal of the as-built report. Enbridge may reduce or increase the frequency, intensity and/or duration of monitoring should the WDNR or the USACE determine that the site is either successfully established or stabilized, or if additional time is necessary to achieve success.

Monitoring activities and reporting shall include the following:

1. A restatement of the compensation site plan goals, objectives, and performance standards.
2. Identification of any structural failures or external disturbances on-site.
3. A description of management activities and corrective actions implemented during the past year.
4. A summary of and full presentation of the data collected during the past year.
5. Photographs from fixed points during the growing season to illustrate changes in plant establishment and coverage.
6. A site map showing the location of data collections.
7. An assessment of the presence and level of occurrence of invasive species.
8. List of observed animals or animal signs.
9. An assessment of the degree to which performance standards are being met.
10. Proposed corrective actions to improve attainment of performance standards.
11. A narrative summary of the results and conclusions of the monitoring.

10.4 Specific Assessment Methods

At the first monitoring visit after construction, various observation locations will be established throughout the site and marked using a global positioning system (GPS) unit. This will allow the same locations to be revisited at all subsequent monitoring events. Additional observation sites may be added as necessary. Standard monitoring will consist of evaluation of site characteristics and photographing the site at each documented observation location.

At each monitoring point, wetland characteristics will be assessed according to the procedure described in the 1987 *Corps of Engineers Wetlands Delineation Manual* and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012). Additionally, a functional assessment (Superior RAM) will be completed for the site. Data sheets for wetland characteristic observations and functional assessment observations will be included in the monitoring report.

10.5 Vegetation

Vegetation will be observed in accordance with methodology in the 1987 *Corps of Engineers Wetlands Delineation Manual*:

- Identify each tree occurring within a 30-ft radius of the observation point;
- Identify each sapling/shrub occurring within a 15-ft radius of the observation point; and,
- Herbaceous species will be measured inside a 5-ft by 5-ft quadrat placed with one corner touching the observation point.

Each tree and sapling/shrub is recorded based on the number of stems of each species. Only individuals rooted in the 15-ft radius plot will be included. Herbaceous species with foliage extending into the quadrat will be identified and percent cover estimated.

A timed-meander vegetation sampling method will be employed across the site, including all wetland plant community types and upland areas. All vegetation layers will be observed and all identifiable species recorded. Absolute cover percentages will be estimated for vegetation as a whole, and for individual species.

An assessment of floristic quality will be calculated from data gathered at each sampling point. The Wisconsin Floristic Quality Assessment method will be used to determine Floristic Quality Index (*FQI*) and the mean coefficient of conservatism (mean *C*) at each sampling point which will be reported on the vegetative sampling data sheets. Vegetation sampling will be conducted twice in the first two monitoring years, once in late spring and again in late summer/early fall. In subsequent monitoring years, vegetation sampling will occur once in each scheduled monitoring year, between late June and the end of August. All vegetative sampling sheets will be included as an attachment in the monitoring report.

10.6 Hydrology

One test pit not less than 16 inches deep will be sampled at each observation point to document establishment of hydrology characteristics. Hydrologic conditions such as depth of water or saturated soils will be documented at each vegetation sample point. Due to the presence of clay soils throughout the site, continuous surficial hydrology monitoring using electronic instrumentation or use of shallow groundwater monitoring wells/piezometers is not necessary and is not proposed. Rather, observations of water or saturation in soil pits will be documented, as well as the depth and location of any surface water observed on-site.

10.7 Soil

One test pit, not less than 16 inches deep will be sampled at each of the established observation locations to document establishment of soil characteristics. Each soil profile will be characterized, including soil texture and Munsell color for each layer within the sample.

10.8 Interim Wetland Delineation and Final Monitoring

Year 3 monitoring activities will include a wetland delineation conducted in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012) in order to evaluate whether the needed acreage of restored and enhanced wetland has been achieved. Final monitoring will be completed in order to assess the success of the project based on the final performance standards in **Section 9.0**. This final monitoring is anticipated to take place in Year 5, but may be later if the USACE and WDNR determine that the site needs more time to successfully establish.

11.0 Management Plan for the Site

An adaptive management plan will be implemented to assist in the establishment of the seeded and planted native plant species. Management for invasive species is further described in **Section 11.1**, below.

Regular monitoring events will be conducted in accordance with the monitoring plan outlined in **Section 10.0**. In addition to specific observation points, the monitors will walk the entire site to identify problems or additional areas of interest beyond the established observation points. If data collected at observation points or at any point along the observation path indicate that the area is not progressing toward meeting site goals, then contingency plans or alternative management methods will be implemented.

The site will be maintained as a wildlife habitat and for natural resource function. The site will not be logged or otherwise harvested. Motorized and non-motorized vehicular travel will be prohibited within the mitigation site.

11.1 Contingency for Control of Exotic-Invasive Plants

For invasive plant species management, the appropriate control method will be selected based on the invasive species type and abundance. An integrated plant maintenance plan is the combined implementation of timed mowing, herbicide application and/or prescribed burn activities. These tasks will be implemented as appropriate to enhance the establishment of native vegetation and suppress the establishment of invasive species, consistent with the goals defined in this site plan.

Weedy plant species that will be controlled include reed canary grass and purple loosestrife (*Lythrum salicaria*). Other non-native species will be monitored and evaluated for control as needed. Control methods include mowing, application of herbicide and/or prescribed burning. Enbridge will consult the methods for invasive plant control according to Jacobson (2006) as well as native land management professionals.

Annual and biennial weed species that threaten the establishment of the native vegetation will be controlled using mowing or other approved invasive control measures. Perennial weed species may be controlled by a combination of mowing and herbicide application as appropriate. Herbicide applications will be conducted via broadcast overspray, wicking, or spot application.

11.2 Contingency for Failure to Establish Wetland Hydrologic Regimes

Areas that fail to establish primary or secondary wetland hydrology indicators due to excess elevation will be graded and reseeded and/or replanted to ensure successful integration into the surrounding wetland. Enbridge will develop and implement a maintenance plan based on an evaluation of the extent of any failure to develop wetland hydrology. The WDNR and USACE will review and approve any contingency work deemed necessary prior to implementation. Design alterations implemented to correct for hydrologic failures will be included in regular monitoring reports.

12.0 Long-Term Protection of Site

Enbridge is responsible for the long-term protection of the site. This will ensure the site will not be intentionally degraded or filled. Enbridge intends to extend the conservation easement covering the STEP Mitigation Site to the south, to also protect the Crawford Creek Mitigation Site.

13.0 Implementation Schedule

The implementation schedule for planting and construction activities described in **Section 7.3** is displayed in **Table 5** below. The majority of construction is proposed for fall 2014, with tree and shrub installation planned for 2015.

**Table 5
Implementation Schedule**

Phase	Task	Timeline
Pre-Construction		
	Agency Coordination	Ongoing
	Plan Approval	Spring 2014
Construction		
	Cut and bale hay (1 st cut)	June 2014
	Herbicide application for reed canary grass	July 2014
	Cut and bale hay (2nd cut)	August 2014
	Stake ditch plug locations	August 2014
	Install silt fence/other erosion control	September 2014
	Install ditch plugs, remove soil stockpiles	September 2014
	Broadcast seed native mixes	September 2014
Shrub & Tree Plantings		
	Stake planting clusters	Early spring 2015
	Shrub live-stake harvest and planting	Early spring 2015
	Tree planting	Late spring 2015
Maintenance Activities (As Needed)		
	Year 2	2016
	Year 3	2017
	Year 4	2018
	Year 5	2019
	(additional years may apply)	
Monitoring		
	Year 1: Vegetation, Hydrology, Soil	2015
	Year 2: Vegetation	2016
	Year 3: Vegetation, Hydrology, Soil	2017
	Year 5: Vegetation, Hydrology, Soil, Wetland Delineation	2019
	Year 7 (if necessary): Vegetation	2021
	Year 10 (if necessary): Vegetation, Hydrology, Soil, Wetland Delineation	2024

14.0 Financial Assurances

Enbridge is financially responsible for the site. Details of required financial assurance are currently in process between Enbridge and the WDNR and USACE.

The USACE and WDNR will conduct a final construction inspection following Enbridge's submission of the as-built report. If corrective actions are required, the USACE and WDNR will provide Enbridge with a list of those activities and deadlines for completion. Once the construction and all corrective actions are complete, the USACE and WDNR will issue a letter of compliance.

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Figures

Figure 1 – Project Location Map

Figure 2 – Aerial Photograph

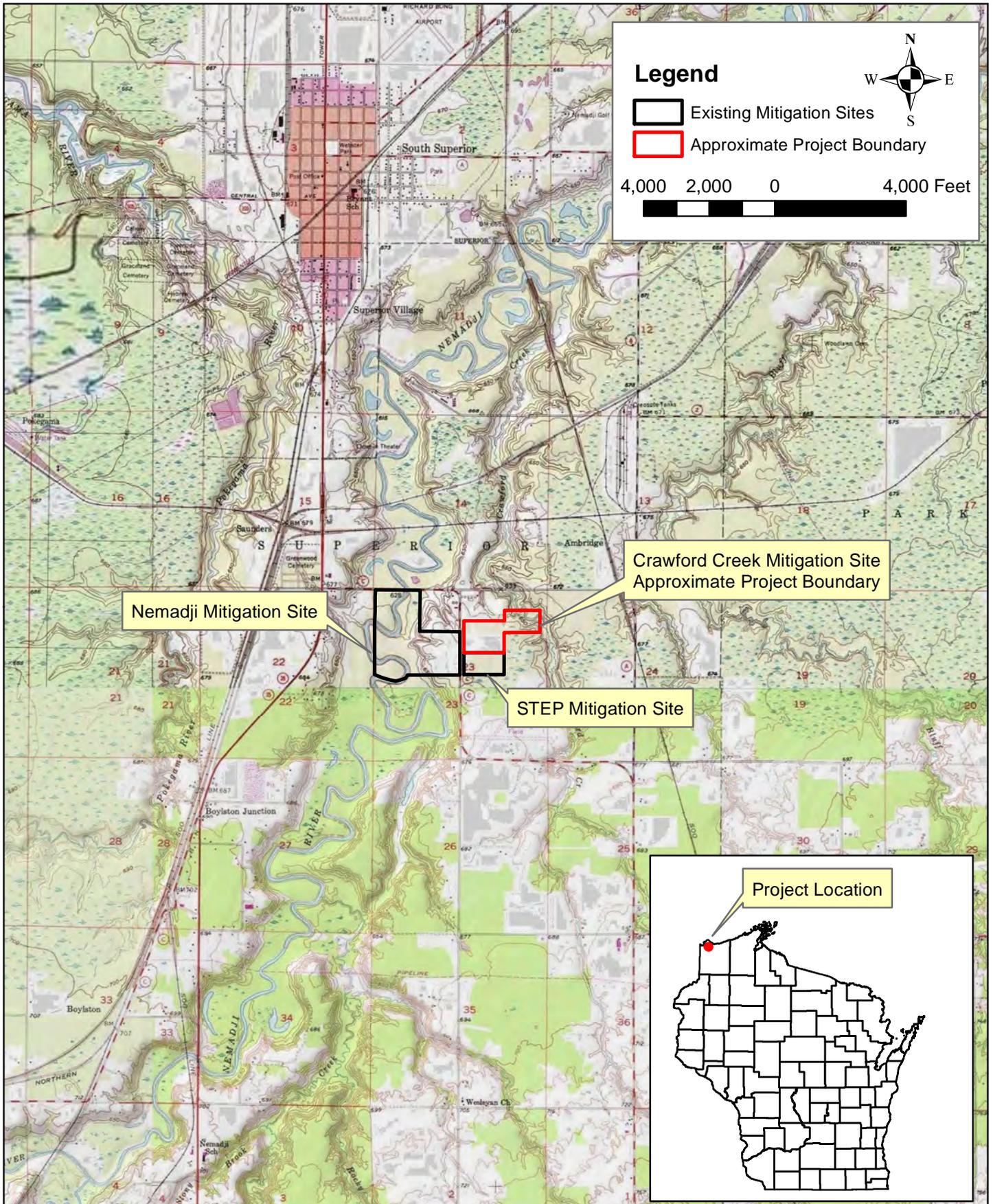
Figure 3 – Floodplain Map

Figure 4 – Web Soil Survey Map

Figure 5 – Wisconsin Wetlands Inventory Map

Figure 6 – Invasive Plant Occurrences

Figure 7 – Rare Plant Occurrences



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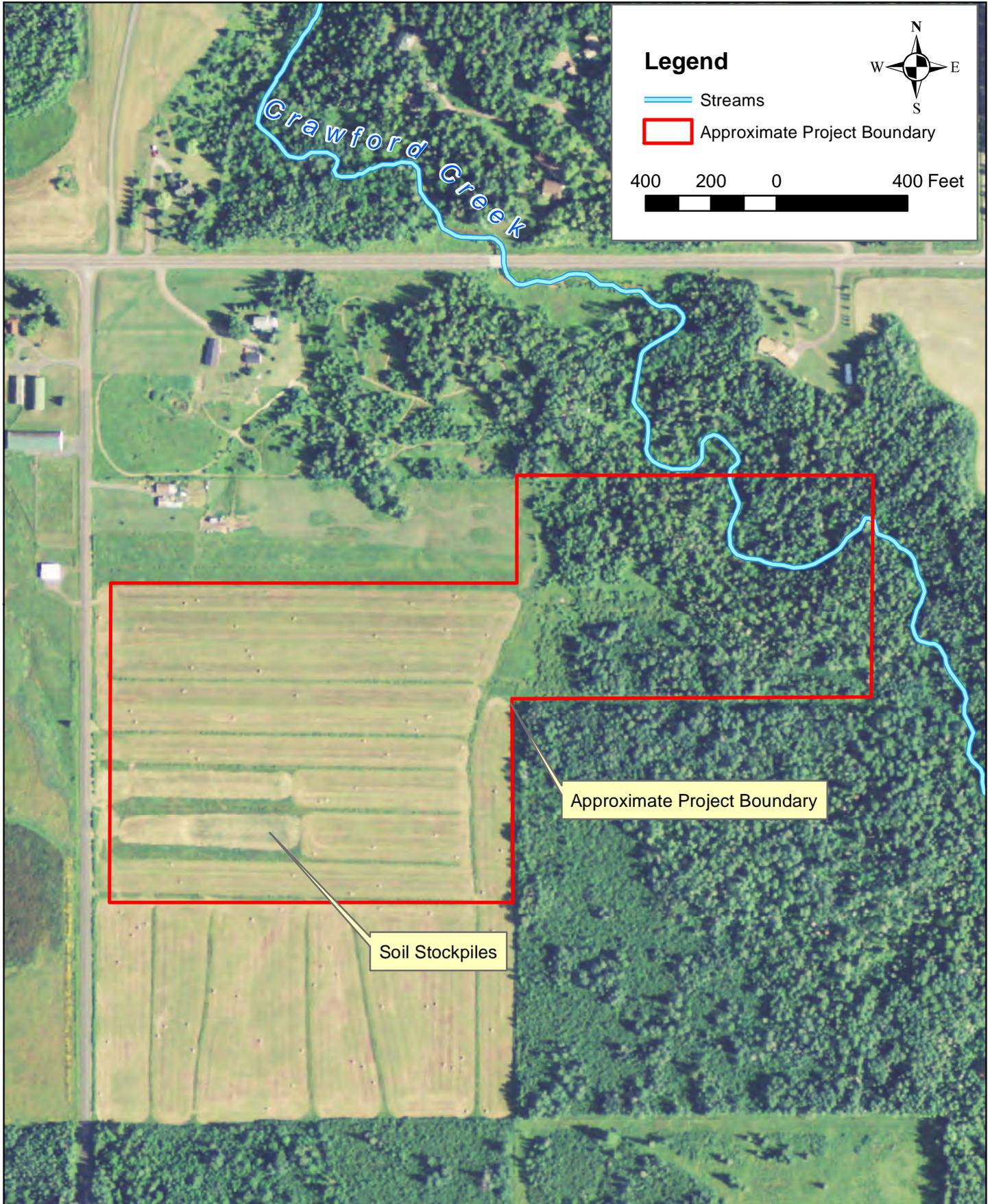
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Project: ENBR1 126976
 Print Date: 1/20/2014
 Map by: nwhite
 Projection: NAD83, UTM 15N
 Source: ESRI, SEH

PROJECT LOCATION MAP
 CRAWFORD CREEK
 WETLAND MITIGATION SITE
 Douglas County, Wisconsin

Figure
 1

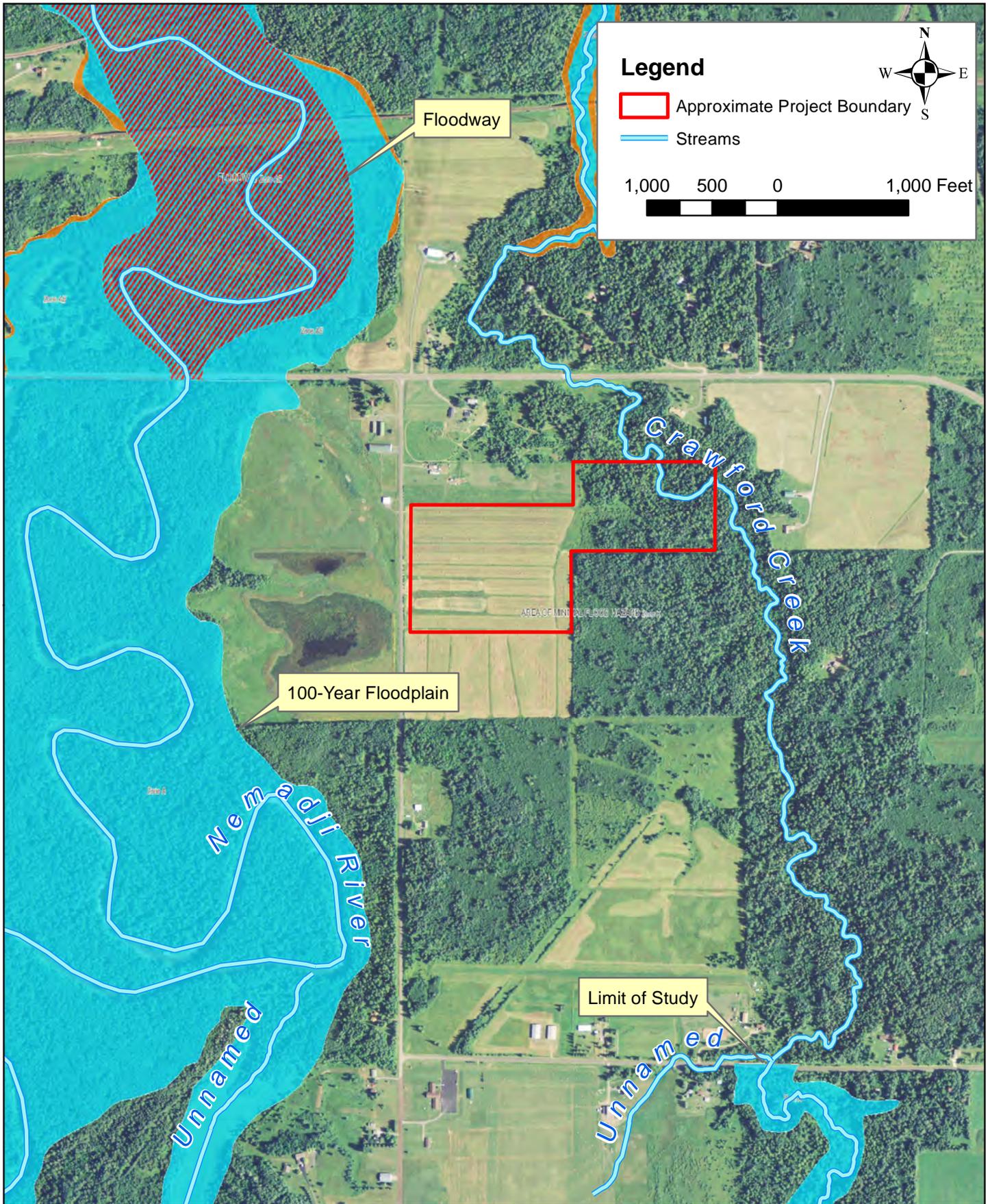
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Path: S:\AEE\ENBRI\126976\GIS\Fig 2 Aerial Photo.mxd

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Path: S:\AEE\ENBR1126976\GIS\Fig 3 Floodplain.mxd



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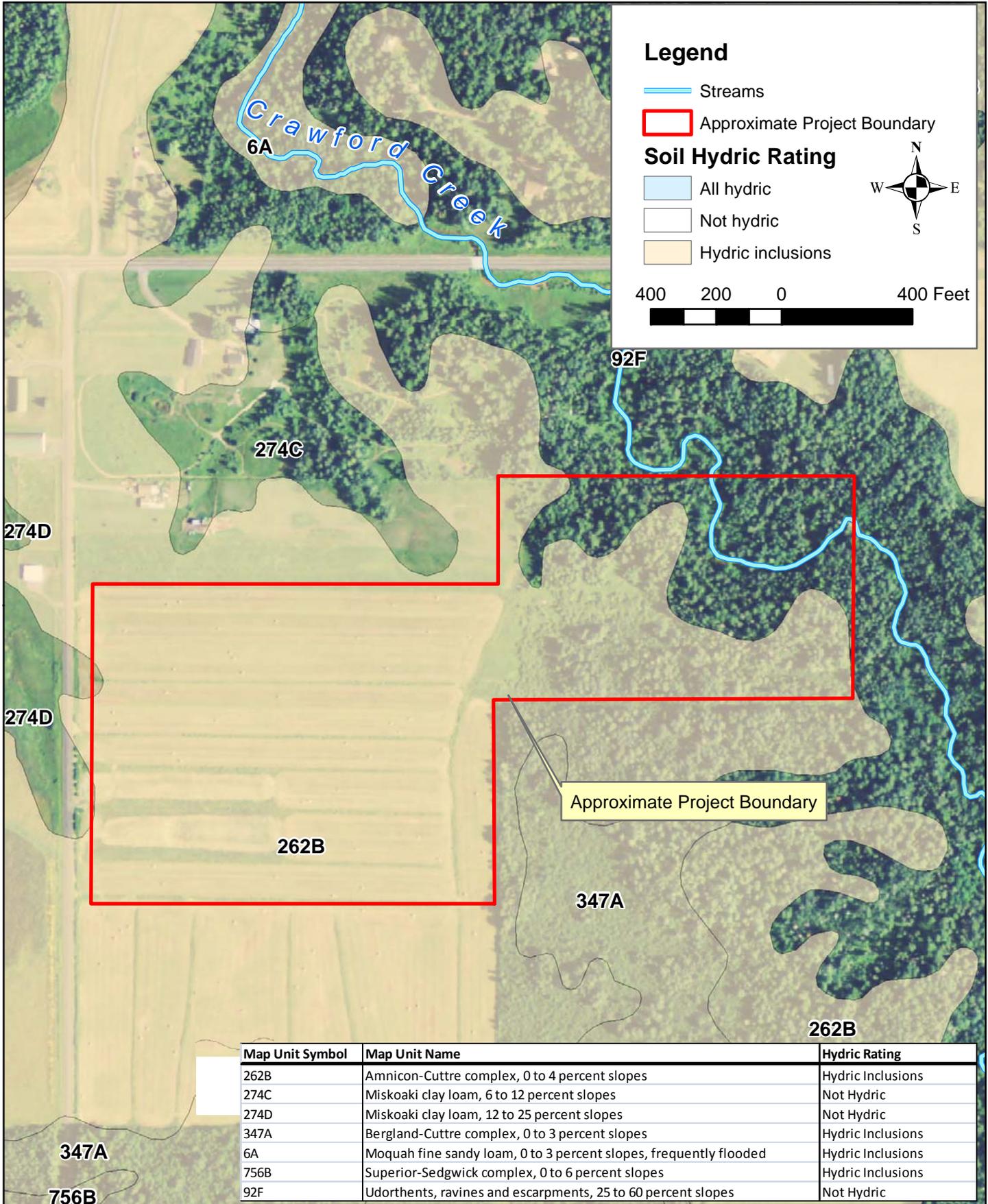
Project: ENBR1 126976
 Print Date: 1/23/2014

Map by: nwhite
 Projection: NAD83, UTM 15N
 Source: NAIP, FEMA, SEH

FLOODPLAIN MAP
CRAWFORD CREEK
WETLAND MITIGATION SITE
Douglas County, Wisconsin

Figure
3

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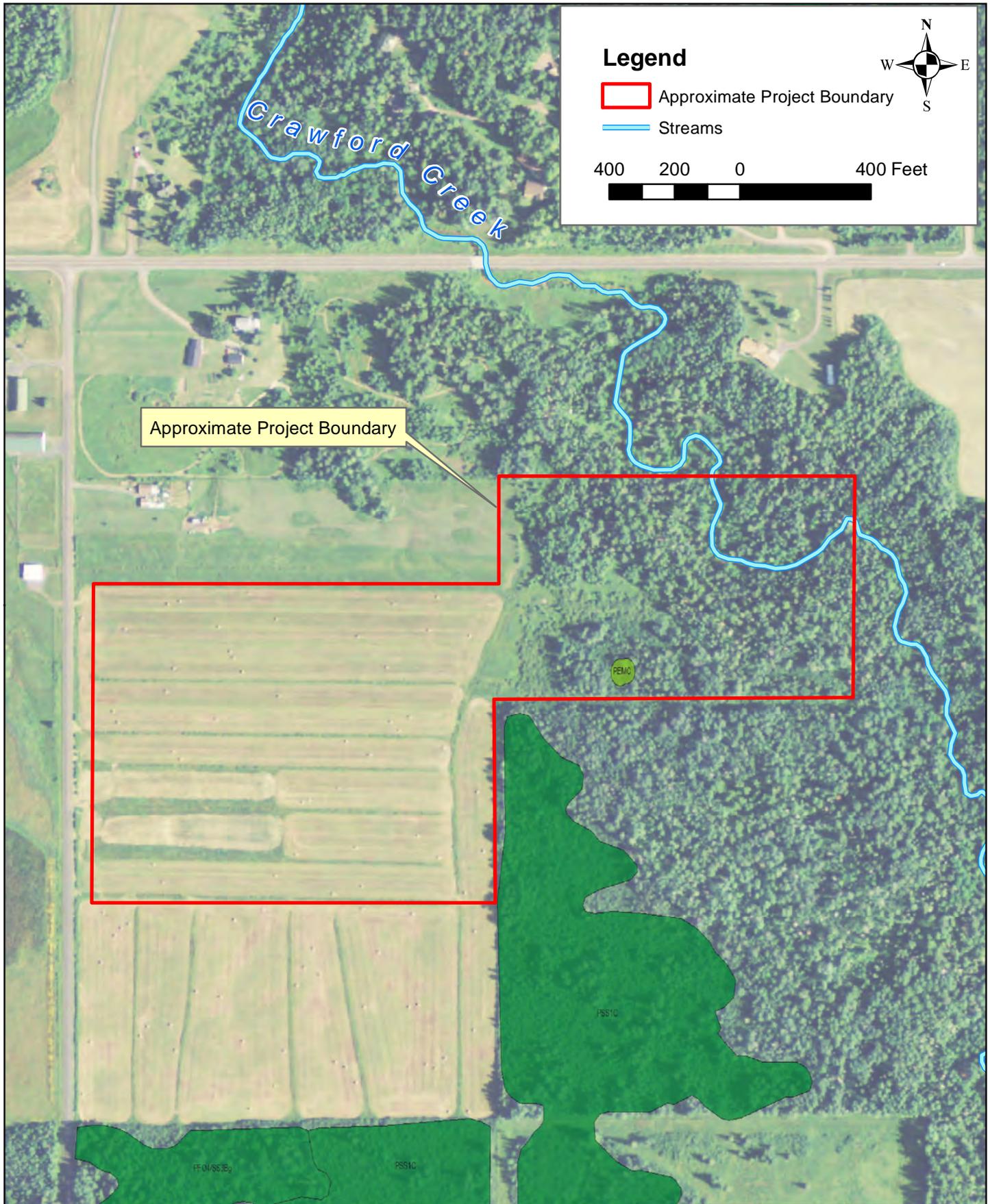


Map Unit Symbol	Map Unit Name	Hydric Rating
262B	Amnicon-Cuttre complex, 0 to 4 percent slopes	Hydric Inclusions
274C	Miskoaki clay loam, 6 to 12 percent slopes	Not Hydric
274D	Miskoaki clay loam, 12 to 25 percent slopes	Not Hydric
347A	Bergland-Cuttre complex, 0 to 3 percent slopes	Hydric Inclusions
6A	Moquah fine sandy loam, 0 to 3 percent slopes, frequently flooded	Hydric Inclusions
756B	Superior-Sedgwick complex, 0 to 6 percent slopes	Hydric Inclusions
92F	Udorthents, ravines and escarpments, 25 to 60 percent slopes	Not Hydric

Path: S:\A\ENBRI\126976\GIS\Fig 4 Soil Map.mxd

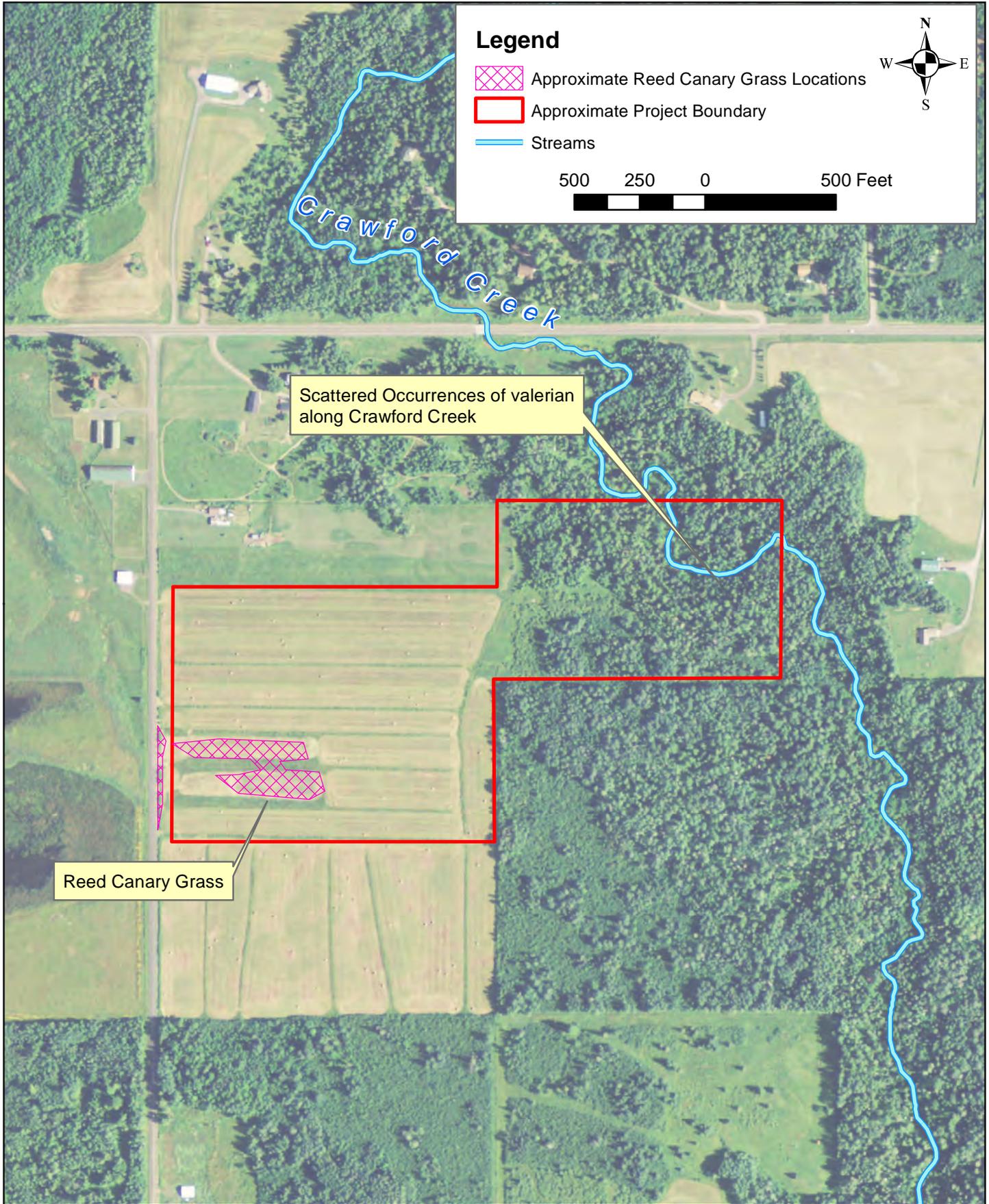
	418 W SUPERIOR ST, SUITE 200 DULUTH, MN 55802 PHONE: (218) 279-3000 FAX: (888) 908-8166 TF: (800) 325-2055 www.sehinc.com	Project: ENBRI 126976 Print Date: 1/20/2014 Map by: nwhite Projection: NAD83, UTM 15N Source: NAIP, NRCS, SEH	WEB SOIL SURVEY MAP CRAWFORD CREEK WETLAND MITIGATION SITE Douglas County, Wisconsin	Figure 4
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	<small>This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.</small>			



Path: S:\AEE\ENBRI\126976\GIS\Fig 6 Invasive Plants.mxd

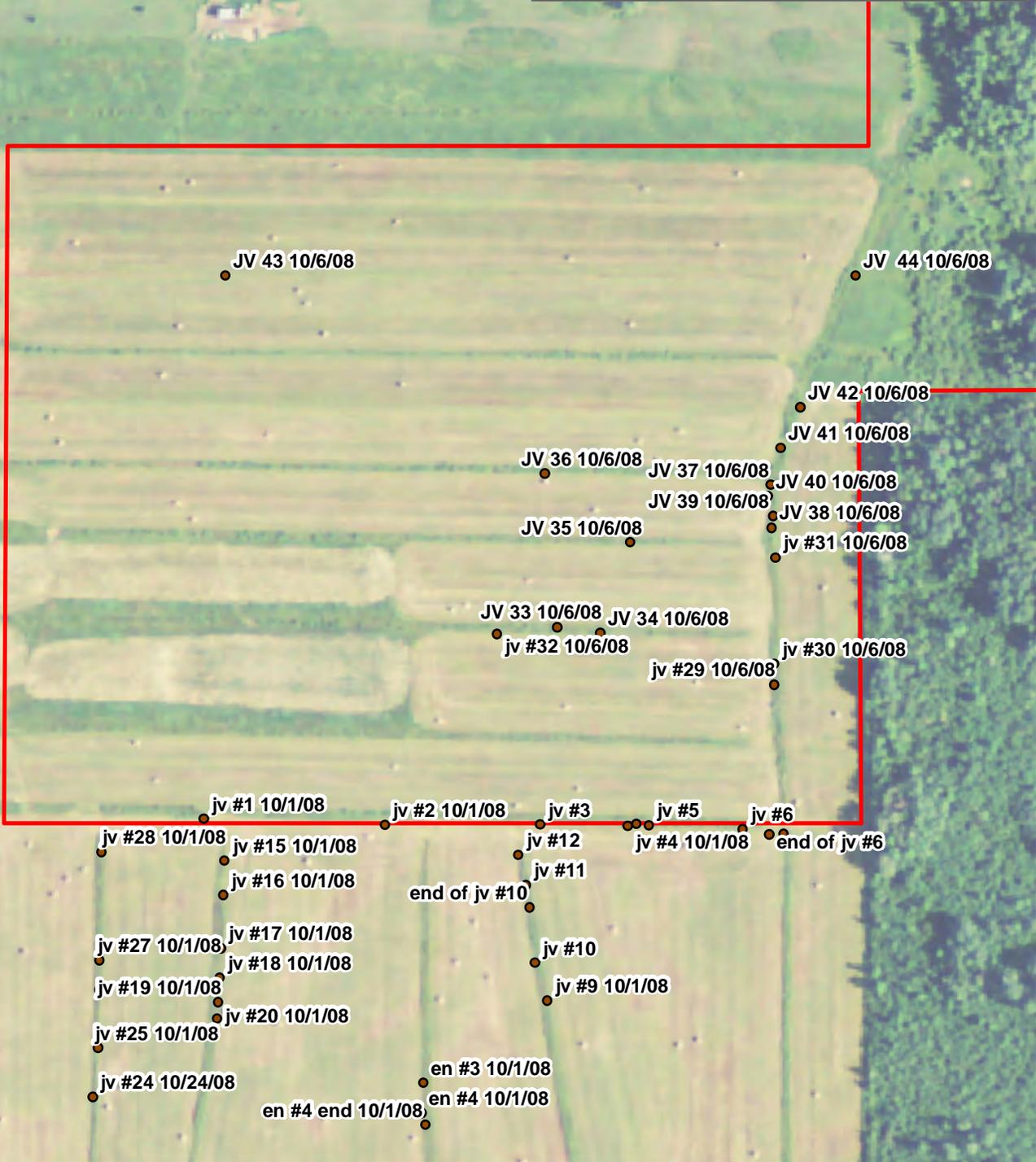
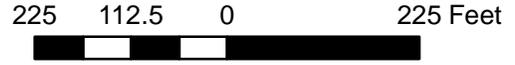
	418 W SUPERIOR ST, SUITE 200 DULUTH, MN 55802 PHONE: (218) 279-3000 FAX: (888) 908-8166 TF: (800) 325-2055 www.sehinc.com	Project: ENBRI 126976 Print Date: 1/24/2014	INVASIVE PLANT OCCURRENCES CRAWFORD CREEK WETLAND MITIGATION SITE Douglas County, Wisconsin	Figure 6
		Map by: nwhite Projection: NAD83, UTM 15N Source: NAIP, USFWS, SEH		

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No rare plant occurrences were observed in the eastern preservation area.
 "JV" indicates *Juncus vaseyi* occurrence,
 "EN" indicates *Eleocharis nitida* occurrence.

Legend

- Rare Plant Occurrences
- Approximate Project Boundary



Path: S:\AEE\ENBRI126976\GIS\Fig 7 Rare Plants.mxd



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 Source: NAIP, USFWS, SEH

RARE PLANT OCCURRENCES
 CRAWFORD CREEK
 WETLAND MITIGATION SITE
 Douglas County, Wisconsin

Figure
 7

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Appendix A

Wetland Delineation Report

Wetland Delineation Report

Nemadji River Compensatory Wetland Mitigation Site

Superior, Wisconsin

SEH No. ENBRI0804.00

February, 2009



Building a Better World
for All of Us™

Engineers | Architects | Planners | Scientists

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Nemadji River Compensatory Wetland Mitigation Site
Wetland Delineation Report
Superior, Wisconsin

SEH No. ENBRI0804.00

Prepared for:
Enbridge Energy, Limited Partnership

February 2009

The procedures described in this report and the field methods used constitute an official wetland delineation in accordance with the 1987 U.S. Army Corps of Engineers *Wetlands Delineation Manual*.

The field delineation was completed by Lindsay Hogfeldt, Whitney Horky and Troy Schultz. The methodology meets the standards and criteria described in the manual, and conforms to the applicable standards and regulations in force at the time the fieldwork was completed. The results reflect conditions present at the time of the delineation.

I hereby certify that this report was prepared by me or under my direct supervision

Prepared by: 

Lindsay Hogfeldt, Graduate Scientist

Reviewed by: 

Scott Weyandt, Professional Engineer

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Table of Contents

Certification Page
Table of Contents

	Page
Introduction	1
Site Description.....	1
Wetland Delineation.....	2
Wetlands Definition.....	2
Methodology	2
Resource Review	2
Field Procedures.....	2
Wetland Classification.....	4
Results	4
Regulatory Considerations	6
Bibliography	7

List of Tables

Table 1	Wetland Characteristics.....	6
---------	------------------------------	---

List of Figures

Figure 1 – Wetland Boundary Maps

List of Appendices

Appendix A	RODM Data Sheets
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Wetland Delineation Report

for Nemadji River Compensatory Wetland Mitigation Site

Enbridge Energy, Limited Partnership

Introduction

The purpose of this study was to investigate the project area, identify areas meeting the technical criteria for wetlands, delineate the jurisdictional extent of the wetland basins, and classify the wetland habitat. This field delineation will be the basis on which wetland impacts from the proposed project will be determined.

This report describes the methodology and results of the field delineation performed on August 20, 2008 and August 26, 2008. Figures referred to in the text are included at the end of the report.

Site Description

The Nemadji River Compensatory Wetland Mitigation Site is approximately 180 acres in size and is located in Section 23 in Township 48 North, Range 14 West in the Town of Superior, Douglas County, Wisconsin. Approximately 69 acres are on the east side of Darrow Road while approximately 113.6 acres are on the west side of Darrow Road and are bounded on the north by County Hwy C, on the east by residential and undeveloped property, on the south by forested undeveloped property, and on the west by the Nemadji River and undeveloped property.

The entire site is predominately open field but contains forested areas on both sides of Darrow Road. The open field on the east side of Darrow Road is used for hay production while the west side is primarily used for horse pasture.

It appears the open field area on the east side of Darrow Road was historically wetland. Many man-made ditches were dug to drain the field for agricultural purposes. Today the open field is bounded by wetland on the south and east side.

The west side of Darrow Road consists of field, horse pasture, natural drainage channels, and the Nemadji River forested floodplain. The Nemadji

River forested floodplain, to the south of the project site, is owned by Douglas County as a County Forest Special Use Area and was designated as a State Natural Area in 1997.

Upland species observed during the on-site evaluation include *Aster macrophyllus* (large leaf aster), *Solidago canadensis* (Canada goldenrod), *Rubus ideas* (wild red raspberry), *Cirsium arvense* (Canada thistle), *Equisetum arvense* (field horsetail), *Trifolium pretense* (red clover), *Taraxacum officinale* (common dandelion), *Carex gracillima* (graceful sedge), *Lotus corniculatus* (bird's foot trefoil), *Bromus inermis* (smooth brome), *Phleum pretense* (timothy), *Fragaria virginiana* (woodland strawberry) and *Ambrosia artemisiifolia* (ragweed).

Wetland Delineation

Wetlands Definition

Wetlands are defined jointly by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) as follows:

“Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

According to USACE, one positive indicator (except in certain situations) from each of three elements must be in order to make a positive wetland determination, which are as follows:

- Greater than 50 percent dominance of hydrophytic plant species.
- Presence of hydric soil.
- The area is either permanently or periodically inundated, or soil is saturated to the surface during the growing season of the dominant vegetation.

Methodology

Resource Review

Aerial photographs, topographic maps, the Wisconsin Wetlands Inventory (WWI) map, and the USDA Soil Survey for Douglas County were reviewed prior to visiting the site to locate potential wetland habitats. These sources showed two wetland areas within the project site and wetland areas surrounding the project site. The WDNR indicates the entire field portion of the project site has wetland potential.

Field Procedures

The project site was examined on August 20, 2008 and August 26, 2008 for areas meeting wetland criteria in accordance with the *Corps of Engineers Wetlands Delineation Manual* (USACE, 1987). The 1987 Manual requires that soil inundation or saturation occur within a major portion of the root zone (typically within 12 inches of the root zone), and that all three wetland parameters (as discussed above) be present.

The Routine Onsite Determination Method (RODM) was applied for this delineation. Field notes, samples, and photographs were taken at representative locations in each wetland basin. Collected information was transferred to RODM data sheets, which are included in Appendix A. Photographs of the site and representative sample locations will be retained on file at SEH. Each data sheet is referenced to a sample location along the identified wetland boundary by the plot ID number. Numbers ending in “W” identify data collected within the wetland boundary. Numbers ending in “U” identify data collected outside the wetland boundary in an upland area.

Wetland boundaries were located and marked with pink pin flags and pink “WETLAND BOUNDARY” flagging tape to allow for surveying and mapping. The wetland boundary is considered the highest extent of the wetland; areas above the boundary fail to meet the three required wetland parameters while areas below the flagged boundary meet the wetland parameters required by the USACE field delineation methodology. The location of the delineated wetland boundaries were surveyed and mapped. The results of the delineation are shown on the surveyed wetland boundary maps, following the regulatory considerations portion of this report. Numerous transects were completed during the field evaluation to assist in determining the wetland boundary. Additional transects were completed throughout the site to assist in locating the wetland boundary, but were not recorded. In total, 52 sample point locations were recorded.

Hydrophytic/Wetland Vegetation

Hydrophytic or wetland plant species nomenclature follows the *National List of Plant Species that Occur in Wetlands* (U.S. Department of the Interior, 1988). Identification was aided when necessary with field guides for the region. Wetland types and observed hydrophytic/wetland plant species are discussed in the results portion of this report.

Hydric/Wetland Soils

Soils were observed for hydric soil characteristics. Soils were examined in pits dug with a spade shovel. Pits were dug to a depth necessary to confirm hydric soil characteristics, up to a maximum depth of 24 inches. Soil color determinations were made using MUNSELL Soil Color Charts (Gretag-Macbeth, 1994). Site soil characteristics were compared to those mapped and described in the USDA Soil Survey Map for Douglas County. Six mapped soil types are mapped within the project area. The Amnicon-Cuttre complex (262B) is classified as a moderately well drained, partially hydric, clayey till soil and is the most predominate soil on the east side of Darrow Road. The Udorthents, ravines and escarpments (92F) soil does not have a classification for drainage or a hydric rating. The Bergland-Cuttre complex (347A) is classified as a poorly drained, partially hydric soil, with a clayed lacustrine deposit parent material. Miskoaki clay loam (274D) is classified as a well drained, non hydric soil. Arnheim mucky silt loam (5A) is classified as poorly drained, partially hydric, and occurs in floodplains. Udifluvents, loamy to clayey (292B) does not have a drainage classification and is partially hydric.

Hydrology

Subsurface wetland hydrology indicators were examined using the soil pits and/or cores as deep as 18 inches to confirm soil saturation in the upper 12 inches of the soil surface. Site specific wetland hydrological indicators are discussed in the results portion of the report.

Wetland Classification

Classification of each wetland basin is included on the RODM data sheets in Appendix A. Wetland classification follows the methods described in *Wetlands and Deepwater Habitats of the United States* (Cowardin, et al., 1979) that is used by the USFWS NWI. The Circular 39 classification (Shaw and Fredine, 1956) is also provided.

Results

During the on-site evaluations, the temperature ranged from 75 to 90 degrees and was sunny everyday. The field delineation was conducted under temperature and precipitation conditions that were normal as compared to the historical average for the region according to the Midwestern Regional Climate Center (MRCC). Most of the vegetation was identifiable, including all dominant species.

Four wetland areas were identified, delineated and classified within the project site area. The RODM data sheets indicate the dominant species of vegetation and the soil and hydrologic characteristics at representative locations around each basin. Table 1 is a summary of the size and classification of each wetland basin.

Eastern Field Area

The eastern field area is a total of 48.61 acres and contains 8.32 acres of wetland. All wetland areas are classified as a Type 2 – Inland Fresh Wet Meadow (PEM). This area consists of man-made ditches and has been subject to years of plowing, disking, seeding, and hay production.

Dominant wetland vegetation in the herbaceous layer consisted of soft stem green bulrush (*Scirpus atrovirens*), emerging meadow willow (*Salix petiolaris*), tall buttercup (*Ranunculus acris*), wild mint (*Mentha arvensis*), lake sedge (*Carex lacustris*), woolgrass (*Scirpus cyperinus*), Canada bluejoint grass (*Calamagrostis Canadensis*), upright sedge (*Carex stricta*), Canada anemone (*Anemone Canadensis*), white turtlehead (*Chelone glabra*), cow parsnip (*Heracleum maximum*), black willow (*Salix nigra*), reed canary grass (*Phalaris arundinacea*), common rush (*Juncus effusus*), flat-top aster (*Aster umbellata*), and flag iris (*Iris germanica*).

Dominant wetland vegetation in the shrub layer consisted of speckled alder (*Alnus incana*).

Dominant wetland vegetation in the tree layer, southeast of the field (outside the project area), consisted of American elm (*Ulmus Americana*), tamarack, black spruce (*Picea mariana*), and balsam fir (*Abies balsamea*).

While completing the wetland delineation, the following indicators of wetland hydrology were observed throughout the eastern field wetland areas:

drainage patterns, saturation in the upper 12 inches, multiple trunks, and FAC neutral vegetation test.

Crawford Creek Area

The Crawford Creek area is a total of 19.03 acres and contains 8.95 acres of wetland.

Dominant wetland vegetation in the herbaceous layer consisted of Canada bluejoint grass, American red raspberry, giant goldenrod, woodland horsetail (*Equisetum sylvaticum*), sedge species (*Carex spp.*), water horsetail (*Equisetum fluviatile*), ostrich fern (*Matteuccia struthiopteris*), and Canada anemone.

Dominant wetland vegetation in the shrub layer consisted of speckled alder and meadow willow.

Dominant wetland vegetation in the tree layer consisted of balsam fir, black spruce, and black ash (*Fraxinus nigra*).

While completing the wetland delineation, the following indicators of wetland hydrology were observed throughout the Crawford Creek wetland areas: drainage patterns, drift lines, multiple trunks, and buttressing.

Western Field Area

The western field area is west of Darrow Road and is a total of 62.22 acres and contains 0.63 acres of existing wetland. These wetland areas are located in the low areas of the abandoned horse track.

Dominant wetland vegetation in the herbaceous layer consisted of reed canary grass, meadow willow, moss species, tall buttercup, upright sedge, and soft stem green bulrush.

While completing the wetland delineation, the primary wetland indicator drainage patterns in wetland was observed the western field wetland area.

Nemadji River Forested Floodplain Area

The Nemadji River forested floodplain area is west of Darrow Road and is a total of 71.24 acres which surrounds the Nemadji River.

Dominant wetland vegetation in the herbaceous layer consisted of lake sedge, soft stem green bulrush, narrow-leaf cattail (*Typha angustifolia*), flat-top aster, Canada bluejoint grass, and cow parsnip.

Dominant wetland vegetation in the shrub layer consisted of red osier dogwood (*Cornus sericea*).

Dominant wetland vegetation in the tree layer consisted of silver maple (*Acer saccharinum*), black ash, and American elm.

While completing the wetland delineation, the following indicators of wetland hydrology were observed throughout the Nemadji River forested floodplain wetland area: drainage patterns, saturation in the upper twelve inches, water marks, multiple trunks, and buttressing.

**Table 1
Wetland Characteristics**

Wetland Area	Size (acres)	Cowardin Classification	Circular 39 Classification
Eastern Field Area	8.32	Type 2	PEM
Crawford Creek Area	8.95	Type 1, 2, 6, 7	PEM, PSS, PFO
Western Field Area	0.63	Type 2	PEM
Nemadji River Forested Floodplain Area	71.24	Type 1	PFO

Regulatory Considerations

The local U.S. Army Corps of Engineers (Jason Berkner) and Wisconsin DNR (Steve LaValley) representatives reviewed the delineation in August 2008 during the delineation and an on-site wetland boundary concurrence was completed by Steve LaValley on September 29, 2008, at which time Mr. LaValley verbally agreed to the flagged wetland boundaries.

In our professional opinion, the wetlands in the project area are regulated by agencies at the state, and federal levels including the USACE and the EPA at the federal level and the Wisconsin Department of Natural Resources at the state level.

Construction plans that propose any direct alteration or indirect impact to wetlands or watercourses within the project area will require permits from the appropriate regulatory agencies. Violation of wetland regulations can result in substantial civil and/or criminal penalties.

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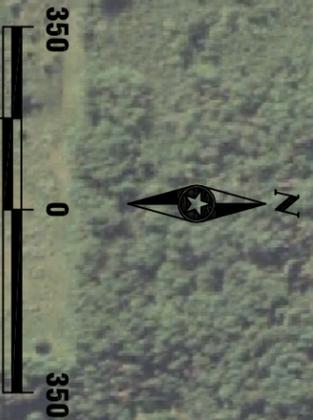
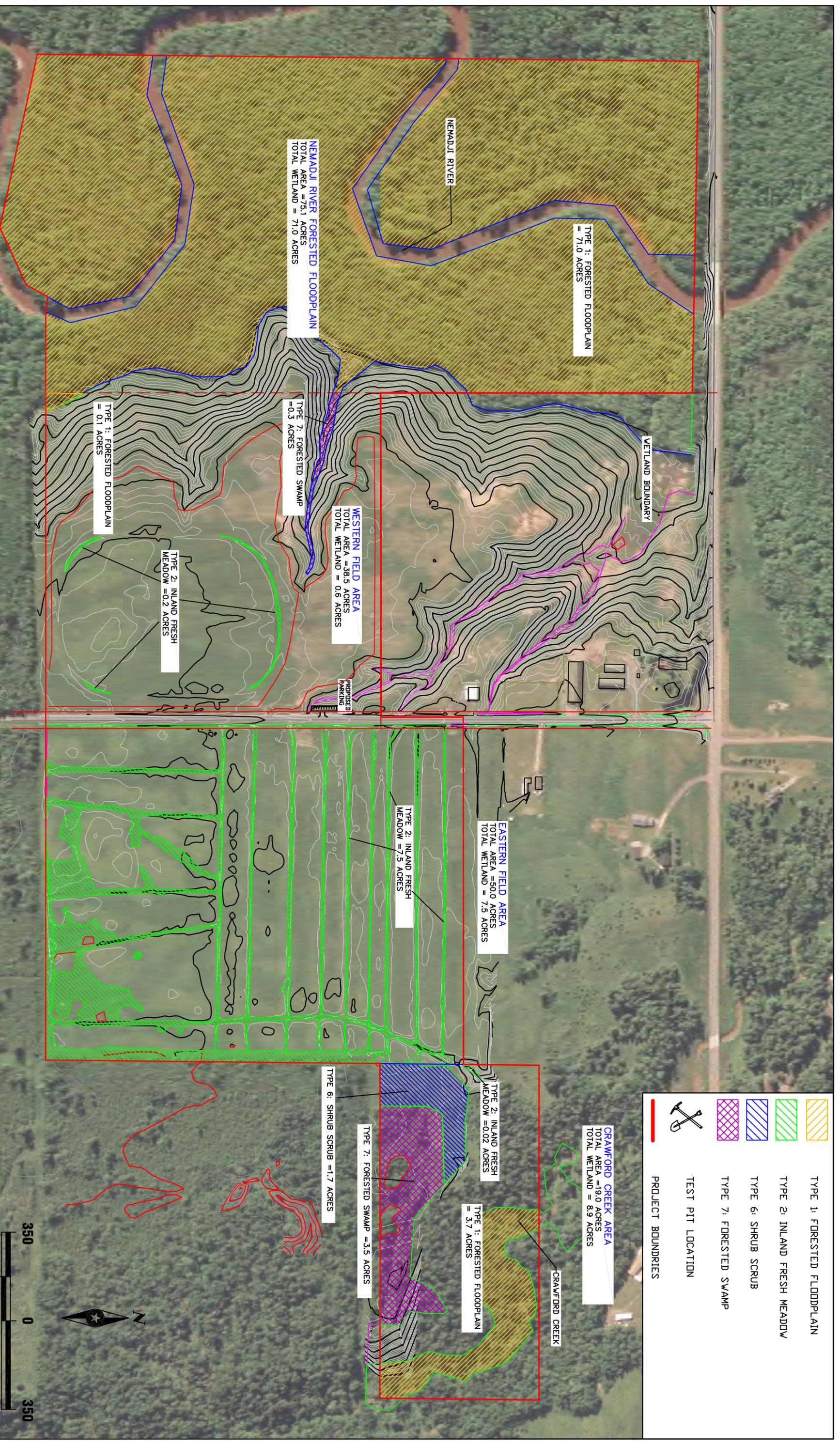
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List of Figures

Figure 1 – Wetland Boundary Maps

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-  TYPE 1: FORESTED FLOODPLAIN
-  TYPE 2: INLAND FRESH MEADOW
-  TYPE 6: SHRUB SCRUB
-  TYPE 7: FORESTED SWAMP
-  TEST PIT LOCATION
-  PROJECT BOUNDRIES



DESIGN TEAM	
1	
2	
3	
4	
NO.	BY
	DATE
REVISIONS	

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF WISCONSIN

Signature: SCOTT WENDT Date: E-27263

Printed Name: SCOTT WENDT Reg. No. E-27263

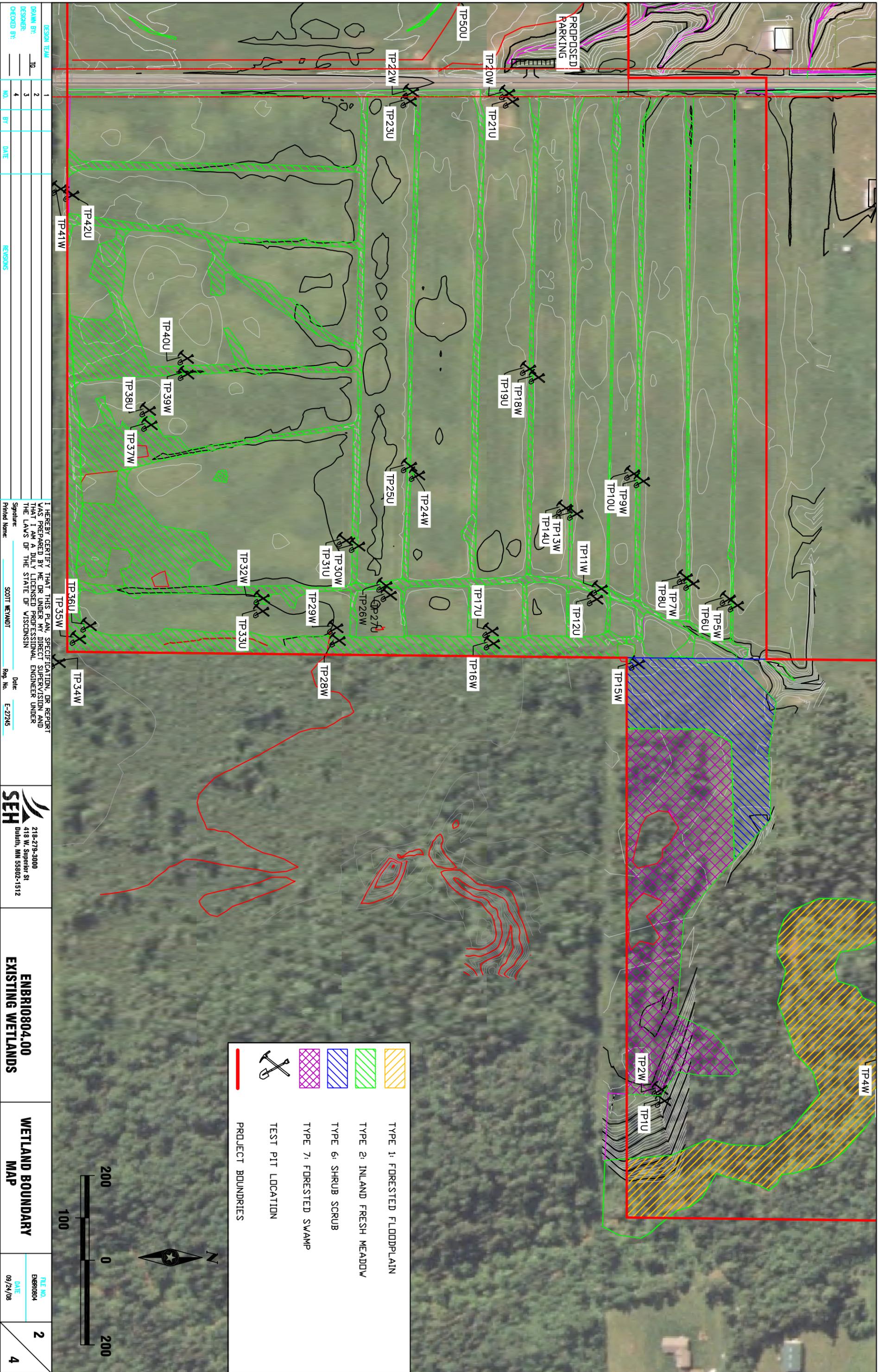


ENBR10804.00
EXISTING WETLANDS

WETLAND
BOUNDARY MAP

FILE NO.	DATE
ENBR10804	09/24/08
1	
4	

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	TYPE 1: FORESTED FLOODPLAIN
	TYPE 2: INLAND FRESH MEADOW
	TYPE 6: SHRUB SCRUB
	TYPE 7: FORESTED SWAMP
	TEST PIT LOCATION
	PROJECT BOUNDRIES

DESIGN TEAM		
DESIGN BY:	TC	
DESIGNER:	3	
CHECKED BY:	4	
NO.	BY	DATE

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF WISCONSIN.

Signature: _____
 Printed Name: SCOTT MEYANOT
 Reg. No. E-27265
 Date: _____

218-279-3000
 418 W. Superior St
 Duluth, MN 55802-1512

ENBR10804.00
EXISTING WETLANDS

WETLAND BOUNDARY
MAP

FILE NO. ENBR10804	2
DATE 09/24/08	

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Appendix A

RODM Data Sheets

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**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-20-2008</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP1U</u>	Transect No. <u>1</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Aster macrophyllus (large leaf aster)	H	50	UPL
2. Solidago canadensis (Canada goldenrod)	H	20	UPL
3. Rubus idaeus (wild red raspberry)	H	10	FACU+
4. Cirsium arvense (Canada thistle)	H	10	FACU-
5. Equisetum arvense (field horsetail)	H	10	FAC
6. Alnus rugosa (speckled alder)	S	10	OBL
7. Salix petiolaris (meadow willow)	S	10	FACW+
8. Abies balsamea (balsam fir)	T	50	FACW
9. Populus tremuloides (quaking aspen)	T	20	FAC
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 55%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B - Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-16	2	10R 3/4			Clay, 3mm peds

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

No significant amounts of rain for 2-3 weeks. Test pit located on a approximately 20% slope area where hydrology flows towards Crawford Creek. Problem area due to clay soils.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Filled	<input type="checkbox"/> Floodplain
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Seasonal	<input type="checkbox"/> Ditched
Investigation Date: <u>8-20-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Permanent	<input type="checkbox"/> Tiled
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP2W</u>	Transect No. <u>1</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Cirsium arvense (Canada thistle)	H	50	FACU
2. Calamagrostis canadensis (Canada bluejoint grass)	H	20	OBL
3. Rubus strigosus (American red raspberry)	H	20	FACW-
4. Solidago gigantea (giant goldenrod)	H	10	FACW
5. Salix petiolaris (meadow willow)	S	60	FACW+
6. Alnus rugosa (speckled alder)	S	40	OBL
7. Abies balsamea (balsam fir)	T	20	FACW
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 86%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B – Amnicon-Cuttre complex Natural Drainage Class: SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-8	2	10R 3/4	10R 6/2	10	Clay
8-16	3	7.5YR 4/4			Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 7 – Forested Swamp	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	T1Kr	

Remarks

Problem area due to clay soils.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-20-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP3U</u>	Transect No. <u>2</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Aster macrophyllus (large leaf aster)	H	75	UPL
2. Cornus canadensis (bunchberry)	H	20	FAC
3. Equisetum sylvaticum (woodland horsetail)	H	5	FACW
4. Picea mariana (black spruce)	T	50	FACW
5. Abies balsamea (balsam fir)	T	30	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 80%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 92F - Udorthents, ravines and escarpments Natural Drainage Class: N/A - not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-3	1				Organic topsoil
3-7	2	7.5YR 3/2			Clay
7-12	3	7.5YR 4/4			Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Hydrology drains down slope to Crawford Creek. Problem area due to clay soils. Sample point located near Crawford Creek floodplain.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	<u>Floodplain</u> Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent Tiled
Investigation Date: <u>8-20-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP4W</u>	Transect No. <u>2</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex sp. (sedge)	H	30	NI
2. Equisetum fluviatile (water horsetail)	H	20	FACW
3. Matteuccia struthiopteris (ostrich fern)	H	20	FACW
4. Anemone Canadensis (anemone)	H	10	OBL
5. Alnus rugosa (speckled alder)	S	30	OBL
6. Fraxinus nigra (black ash)	T	10	FACW+
7. Abies balsamea (balsam fir)	T	20	FACW
8. Picea mariana (black spruce)	T	10	FACW
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 86%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 8"

SOILS

Map Unit Name: 92F – Udorthents, ravines and escarpments Natural Drainage Class N/A – not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-3	1				Organic material, moss
3-6	2	7.5YR 2.5/1	7.5YR 4/4	15	Clay
6-12	3	5YR 3/4	5YR 4/6	20	Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 7 – Forested Swamp	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	T1Kr	

Remarks

Sample point located in Crawford Creek floodplain on slope to Crawford Creek. Hydrology drains down slope. Dry clay soil. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	<u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP5W</u>	Transect No. <u>3</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phalaris arundinacea (reed canary grass)	H	20	FACW+
2. Carex gracillima (graceful sedge)	H	15	FACU
3. Salix petiolaris (meadow willow) (emerging)	H	5	FACW+
4. Scirpus atrovirens (green bulrush)	H	10	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 75%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B – Amnicon-Cuttre complex Natural Drainage Class: SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-3	2	7.5YR 3/2	7.5YR 5/6	20	Red clay
3-16	3	5YR 4/4			Blocky red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma ≤ 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma ≤ 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2 - Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Hummocks in ditch. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP6U</u>			Transect No. <u>3</u>		

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pretense (timothy)	H	40	FACU
2. Trifolium pratense (red clover)	H	20	FACU+
3. Ranunculus acris (tall buttercup)	H	15	FACW-
4. Daucus carota (queen anne's lace)	H	15	FACU
5. Taraxacum officinale (common dandelion)	H	10	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 20%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B - Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil, roots
2-6	2	10YR 3/2			Crumbly clay
6-12	3	10YR 3/1			Blocky clay
12-18	4	5YR 4/4			Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input checked="" type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area with clay soils.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	<u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP7W</u>	Transect No.	<u>4</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phalaris arundinacea (reed canary grass)	H	30	FACW+
2. Salix petiolaris (meadow willow) (emerging)	H	5	FACW+
3. Carex gracillima (graceful sedge)	H	10	FACU
4. Scirpus atrovirens (green bulrush)	H	10	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 75%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-6	2	7.5YR 3/3	7.5YR 5/6	15	Clay, roots
6-18	3	5YR 4/4			Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2 - Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural field which was hayed this summer. Problem area due to clay soils. Hummocks present in ditch. Soil meets TF2 hydric soil indicator.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP8U</u>	Transect No. <u>4</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	60	FACU
2. Trifolium pratense (red clover)	H	20	FACU
3. Daucus carota (queen anne's lace)	H	5	NI
4. Phalaris arundinacea (reed canary grass)	H	5	FACW+
5. Ranunculus acris (tall buttercup)	H	5	FACW-
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 40%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-3	1				Topsoil
3-8	2	10YR 3/2	10YR 5/6	10	Clay
8-12	3	10YR 3/2	10YR 5/6	20	Clay
12-16	4	10YR 3/2			Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	<u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP9W</u>	Transect No. <u>5</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	60	FACU
2. Salix petiolaris (meadow willow) (emerging)	H	20	FACW+
3. Mentha arvensis (wild mint)	H	20	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 67%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-6	2	7.5YR 3/3	7.5YR 5/6	15	Clay, roots
6-18	3	5YR 4/4			Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural field which was hayed this summer. Hummocks present in ditch. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP10U</u>			Transect No.	<u>5</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	60	FACU
2. Trifolium pratense (red clover)	H	25	FACU
3. Ranunculus acris (tall buttercup)	H	10	FACW-
4. Taraxacum officinale (common dandelion)	H	5	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 25%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-7	2	10YR 3/2	10YR 5/6	10	Clay
7-12	3	10YR 3/2	10YR 5/6	20	Clay
12-18	4	10YR 3/3			Clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain <u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		Tiled
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP11W</u>	Transect No. <u>6</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex lacustris (lake sedge)	H	80	OBL
2. Poa pratensis (Kentucky blue grass)	H	10	FAC-
3. Scirpus atrovirens (green bulrush)	H	5	OBL
4. Salix petiolaris (meadow willow) (emerging)	H	5	FACW+
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 100%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil, roots
2-8	2	7.5YR 4/4	7.5YR 5/6	20	Clay
8-18	3	5YR 4/4	7.5YR 5/6	25	Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP12U</u>			Transect No.	<u>6</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Bromus inermis (smooth brome)	H	40	NI
2. Phleum pratense (timothy)	H	20	FACU
3. Fragaria virginiana (woodland strawberry)	H	20	FAC-
4. Lotus corniculatus (bird's-foot trefoil)	H	10	FAC-
5. Solidago canadensis (Canada goldenrod)	H	10	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 0%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-6	2	5YR 3/2			Crumbly clay
6-16	3	5YR 4/4	7.5YR 5/6	10	Blocky red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils. Soils meets TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain <u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP13W</u>	Transect No.	<u>7</u>		

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	45	FACU
2. Phleum pretense (timothy)	H	40	FACU
3. Salix petiolaris (meadow willow) (emerging)	H	10	FACW+
4. Mentha arvensis (wild mint)	H	5	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 50%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil, roots
2-9	2	7.5YR 4/4	7.5YR 5/6	25	Clay
9-18	3	5YR 4/4	7.5YR 5/6	25	Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural field which was hayed this summer. Hummocks present in ditch. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP14U</u>	Transect No. <u>7</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	40	FACU
2. Solidago canadensis (giant goldenrod)	H	30	FACU
3. Fragaria virginiana (woodland strawberry)	H	20	FAC-
4. Bromus inermis (smooth brome)	H	5	NI
5. Hieracium aurantiacum (orange hawkweed)	H	5	NI
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 20%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-7	2	10YR 3/2	10YR 5/6	10	Clay
7-12	3	10YR 3/2	10YR 5/6	15	Clay
12-18	4	10YR 3/3			Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>AENBRI0803.00/0804.00</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Filled	<input type="checkbox"/> Floodplain
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Seasonal	<input type="checkbox"/> Permanent
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Tiled	
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP15W</u>		Transect No. <u>8</u>		

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Calamagrostis canadensis (Canada bluejoint grass)	H	80	OBL
2. Carex lacustris (lake sedge)	H	10	OBL
3. Scirpus cyperinus (woolgrass)	H	5	OBL
4. Phalaris arundinacea (reed canary grass)	H	5	FACW+
5. Salix petiolaris (meadow willow) (emerging)	S	50	FACW+
6. Alnus incana (speckled alder)	S	50	OBL
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 100%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-7	2	10YR 3/4	10R 6/2	10	Clay
7-18	3	7.5YR 4/4			Clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 6- Shrub scrub	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	PSS1	

Remarks

Problem area due to clay soils. Sample point taken on eastern boundary. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Filled	<input type="checkbox"/> Floodplain
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Seasonal	<input type="checkbox"/> Permanent
Investigation Date: <u>8-25-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Tiled	
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP16W</u>	Transect No. <u>9</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (uptight sedge)	H	30	OBL
2. Fragaria virginiana (woodland strawberry)	H	20	FAC-
3. Scirpus atrovirens (green bulrush)	H	10	OBL
4. Salix petiolaris (meadow willow)	S	60	FACW+
5. Alnus rugosa (speckled alder)	S	40	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 100%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 347A- Bergland-Cuttre complex Natural Drainage Class Poorly drained- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	10R 3/4	10R 6/2	10	Clay
8-18	3	7.5YR 4/4			Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 6- shrub scrub	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	PSS1	

Remarks

Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP17U</u>	Transect No. <u>9</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	40	FACU
2. Ranunculus acris (tall buttercup)	H	20	FACW-
3. Fragaria virginiana (woodland strawberry)	H	20	FAC-
4. Taraxacum officinale (common dandelion)	H	10	FACU
5. Lotus corniculata (bird's-foot trefoil)	H	5	FAC-
6. Trifolium pratense (red clover)	H	5	FACU
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 17%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-7	2	5YR 3/2			Clay
7-18	3	5YR 4/4	7.5YR 5/6	15	Blocky red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	<u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP18W</u>			Transect No.	<u>10</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (uptight sedge)	H	40	OBL
2. Trifolium pratense (red clover)	H	20	FACU
3. Anemone canadensis (Canadian anemone)	H	20	FACW
4. Taraxacum officinale (common dandelion)	H	10	FACU
5. Salix petiolaris (meadow willow) (emerging)	S	20	FACW+
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 60%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-9	2	7.5YR 4/4	7.5YR 5/6	25	Clay
9-18	3	5YR 4/4	7.5YR 5/6	25	Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP19U</u>			Transect No.	<u>10</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Trifolium pratense (red clover)	H	60	FACU
2. Phleum pratense (timothy)	H	30	FACU
3. Carex gracillima (graceful sedge)	H	15	FACU
4. Ranunculus acris (tall buttercup)	H	5	FACW-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 25%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-6	2	10YR 3/2	10YR 5/6	10	Clay
6-11	3	10YR 3/2	10YR 5/6	15	Clay
11-18	4	10YR 3/3			Clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	<u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP20W</u>			Transect No. <u>11</u>		

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phalaris arundinacea (reed canary grass)	H	50	FACW+
2. Poa pratensis (Kentucky blue grass)	H	20	FAC-
3. Carex lacustris (lake sedge)	H	15	OBL
4. Salix petiolaris (meadow willow) (emerging)	H	10	FACW+
5. Chelone glabra (white turtlehead)	H	5	OBL
6. Heracleum maximum (cowparsnip)	H	5	FACW
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 100%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil, roots
2-6	2	10YR 3/1	10YR 5/8	20	Loam
6-8	3	10YR 3/2	10YR 5/8	20	Clay
8-18	4				Gravel fill

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma ≤ 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma ≤ 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Man-made ditch along Darrow Road. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP21U</u>			Transect No. <u>11</u>		

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	25	FACU
2. Phalaris arundinacea (reed canary grass)	H	25	FACW+
3. Trifolium pratense (red clover)	H	20	FACU
4. Lotus corniculata (bird's-foot trefoil)	H	20	FAC-
5. Taraxacum officinale (common dandelion)	H	10	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 20%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-6	2	10YR 3/3	10YR 5/6		Blocky clay
6-12	3	10YR 4/3	10YR 5/1		White mixing with clay
12-18	4	10YR 4/3			Blocky clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Sample point taken along Darrow Road between hay bales and ditch.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	<u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP22W</u>			Transect No.	<u>12</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (uptight sedge)	H	60	OBL
2. Salix petiolaris (meadow willow)	H	20	FACW+
3. Phalaris arundinacea (reed canary grass)	H	10	FACW+
4. Chelone glabra (white turtlehead)	H	5	OBL
5. Heracleum maximum (cowparsnip)	H	5	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 100%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-6	2	10YR 3/1	10YR 5/8	20	Loam
6-8	3	10YR 3/1	10YR 5/8	20	Clay
8-18	4				Gravel fill

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Man-made ditch along Darrow Road. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP23U</u>			Transect No.	<u>12</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Trifolium pratense (red clover)	H	80	FACU
2. Lotus corniculata (bird's-foot trefoil)	H	20	FAC-
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 0%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-6	2	10YR 3/3	10YR 5/6		Blocky clay
6-12	3	10YR 4/3	10YR 5/1		White mixing with clay
12-18	4	10YR 4/3			Blocky clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Man-made ditched agricultural hay field which was hayed this summer.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain <u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP24W</u>	Transect No.	<u>13</u>		

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	40	FACU
2. Phleum pratense (timothy)	H	30	FACU
3. Salix petiolaris (meadow willow) (emerging)	H	20	FACW
4. Scirpus atrovirens (green bulrush)	H	10	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 50%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-9	2	7.5YR 4/4	7.5YR 5/6	25	Clay
9-18	3	5YR 4/4	7.5YR 5/6	25	Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP25U</u>			Transect No.	<u>13</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Trifolium pratense (red clover)	H	40	FACU
2. Taraxacum officinale (common dandelion)	H	20	FACU
3. Carex gracillima (graceful sedge)	H	20	FACU
4. Phleum pratense (timothy)	H	20	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 0%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	10YR 3/2	10YR 5/6	15	Clay
8-12	3	10YR 3/2	10YR 5/6	20	Clay
12-18	4	10YR 3/3			Clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	<u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP26W</u>			Transect No.	<u>14</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (uptight sedge)	H	40	OBL
2. Scirpus atrovirens (green bulrush)	H	30	OBL
3. Phleum pratense (timothy)	H	20	FACU
4. Mentha arvensis (wild mint)	H	15	FACW
5. Salix nigra (black willow)	H	10	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 80%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	7.5YR 4/4	7.5YR 4/4	20	Clay
8-18	3	5YR 4/4	7.5YR 5/6	25	Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP27U</u>			Transect No.	<u>14</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	40	FACU
2. Carex gracillima (graceful sedge)	H	30	FACU
3. Trifolium pratense (red clover)	H	20	FACU
4. Medicago sativa (alfalfa)	H	15	FACU
5. Taraxacum officinale (common dandelion)	H	10	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 0%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-7	2	5YR 3/2			Clay
7-18	3	5YR 4/4	7.5YR 5/6	10	Blocky red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Filled	<input type="checkbox"/> Floodplain
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Seasonal	<input type="checkbox"/> Permanent
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Tiled	
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP28W</u>	Transect No. <u>15</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex lacustris (lake sedge)	H	30	OBL
2. Scirpus cyperinus (woolgrass)	H	30	OBL
3. Calamagrostis canadensis (bluejoint)	H	20	OBL
4. Phalaris arundinacea (reed canary grass)	H	20	FACW+
5. Salix petiolaris (meadow willow)	S	30	FACW+
6. Alnus incana (speckled alder)	S	20	OBL
7. Populus tremuloides (quaking aspen)	T	40	FAC
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 100%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	10R3/4	10R 6/2	10	Clay
8-18	3	7.5YR 4/4	7.5YR 5/6	10	Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site:	Nemadji River Wetland Mitigation Site	Yes	No	Is the Area (Circle):			
Applicant/Owner:	Enbridge Energy, Limited Partnership	Abnormal conditions?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator:	Lindsay H., Whitney H., Troy S.	Site disturbed (Atypical)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date:	8-26-2008	Problem area?	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
County	Douglas	State:	WI				
Wetland or Upland Sample Point (Circle) and ID No.	TP29U	Transect No.	15				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	25	FACU
2. Trifolium pratense (red clover)	H	25	FACU
3. Fragaria virginiana (woodland strawberry)	H	20	FAC-
4. Taraxacum officinale (common dandelion)	H	15	FACU
5. Anemone canadensis (Canadian anemone)	H	10	FACW
6. Ranunculus acris (tall buttercup)	H	5	FACW-
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 33%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None

Depth to Water in Pit: None

Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD - partially hydric

Soil Suborder: Bergland Whole unit hydric soil? Y N

Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	5YR 3/2			Clay
8-18	3	5YR 4/4	7.5YR 5/6	15	Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain <u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		Tiled
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP30W</u>	Transect No. <u>16</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (uptight sedge)	H	30	OBL
2. Scirpus atrovirens (green bulrush)	H	20	OBL
3. Salix petiolaris (meadow willow)	H	20	FACW+
4. Juncus effusus (common rush)	H	15	OBL
5. Phleum pratense (timothy)	H	10	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 80%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-9	2	7.5YR 4/4	7.5YR 5/6	25	Clay
9-18	3	5YR 4/4	7.5YR 5/6	25	Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP31U</u>			Transect No.	<u>16</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	30	FACU
2. Trifolium pratense (red clover)	H	30	FACU
3. Taraxacum officinale (common dandelion)	H	20	FACU
4. Ranunculus acris (tall buttercup)	H	10	FACW-
5. Fragaria virginiana (woodland strawberry)	H	10	FAC-
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 20%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	10YR 3/2	10YR 5/6	10	Clay
8-15	3	10YR 3/2	10YR 5/6	15	Clay
15-18	4	10YR 3/3			Clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain <u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP32W</u>	Transect No. <u>17</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	70	FACU
2. Anemone canadensis (Canadian anemone)	H	15	FACW
3. Ranunculus acris (tall buttercup)	H	5	FACW-
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 20%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-9	2	7.5YR 4/4	7.5YR 5/6	20	Clay
9-18	3	5YR 4/4	7.5YR 5/6	25	Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Ditch contains hummocks. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP33U</u>			Transect No.	<u>17</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Ranunculus acris (tall buttercup)	H	40	FACW-
2. Fragaria virginiana (woodland strawberry)	H	25	FAC-
3. Phleum pratense (timothy)	H	20	FACU
4. Trifolium pratense (red clover)	H	15	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 25%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-7	2	5YR 3/2			Clay
7-18	3	5YR 4/4	7.5YR 5/6	15	Blocky red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Upland between ditches. Ditched agricultural hay field which was hayed this summer. Drains via sheet flow into man-made ditches. Problem area due to clay soils.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP34W</u>	Transect No. <u>18</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (upright sedge)	H	30	OBL
2. Calamagrostis canadensis (bluejoint)	H	30	OBL
3. Fragaria virginiana (woodland strawberry)	H	15	FAC-
4. Rubus idaeus (American red raspberry)	H	15	FACU+
5. Scirpus atrovirens (green bulrush)	H	15	OBL
6. Doellingeria umbellata (parasol whitetop)	H	10	FACW
7. Iris germanica (flag iris)	H	5	FACW
8. Alnus incana (speckled alder)	S	70	OBL
9. Ulmus americana (American elm)	T	20	FACW-
10. Tamarack	T	10	FACW
11. Picea mariana (black spruce)	T	5	FACW
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 82%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 10"

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-5	2	7.5YR 6/1	7.5YR 6/6	25	Gley clay
5-9	3	7.5YR 4/3	7.5YR 6/6	30	Clay
9-18	4	5YR 4/4	5YR 5/6	25	Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input checked="" type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 7 - Forested	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	PFO1	

Remarks

Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Filled	<input type="checkbox"/> Floodplain
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Seasonal	<input type="checkbox"/> Permanent
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Tiled	
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP35W</u>	Transect No. <u>18</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (uptight sedge)	H	45	OBL
2. Calamagrostis canadensis (Canada bluejoint grass)	H	35	OBL
3. Doellingeria umbellata (parasol whitetop)	H	10	FACW
4. Rubus idaeus (American red raspberry)	H	10	FACU
5. Alnus incana (speckled alder)	S	60	OBL
6. Salix petiolaris (meadow willow)	S	40	FACW+
7. Populus tremuloides (quaking aspen)	T	20	FAC
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 86%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 5"

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-3	1				Topsoil
3-5	2	10YR 2/1			Blocky clay
5-8	3	10YR 2/1	10YR 5/6	15	Clay
8-18	4	7.5YR 4/4	7.5YR 5/8	30	Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input checked="" type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 6- Shrub scrub	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	PSS1	

Remarks

Problem area due to clay soils. Sample point taken between upland field and forested wetland.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP36U</u>	Transect No. <u>18</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Trifolium pratense (red clover)	H	35	FACU
2. Fragaria virginiana (woodland strawberry)	H	20	FAC-
3. Phleum pratense (timothy)	H	25	FACU
4. Phalaris arundinacea (reed canary grass)	H	10	FACW+
5. Anemone canadensis (Canadian anemone)	H	15	FACW
6. Taraxacum officinale (common dandelion)	H	15	FACU
7. Ranunculus acris (tall buttercup)	H	5	FACW-
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 43%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 11"

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
2-5	2	10YR 3/2			Black blocky clay
5-6	3	10YR 5/1	10YR 5/6	15	Gleyed clay
6-7	4	10YR 3/1	10YR 5/6	15	Black blocky clay
7-11	5	10YR 5/1	10YR 5/4	20	Gleyed clay
11-18	6	7.5YR 4/3	7.5YR 5/4	10	Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input checked="" type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Man-made ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow. Problem area due to clay soils. Appears as if this upland field was historically wet. Agricultural field surrounded by wetland.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	<u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP37W</u>			Transect No.	<u>19</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (uptight sedge)	H	40	OBL
2. Phleum pratense (timothy)	H	30	FACU
3. Taraxacum officinale (common dandelion)	H	10	FACU
4. Anemone canadensis (Canadian anemone)	H	10	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 50%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 11"

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
2-5	2	10YR 3/2			Blocky clay
5-7	3	10YR 5/1 & 10YR 3/1	10YR 5/6	15	Clay with gleying
7-12	4	10YR 5/1	10YR 5/4	20	Clay
12-18	5	7.5YR 4/3	7.5YR 5/4	10	Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input checked="" type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP38U</u>	Transect No. <u>19</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	30	FACU
2. Trifolium pratense (red clover)	H	30	FACU
3. Anemone canadensis (Canadian anemone)	H	20	FACW
4. Fragaria virginiana (woodland strawberry)	H	10	FAC-
5. Bellis perennis (common daisy)	H	5	FACU
6. Ranunculus acris (tall buttercup)	H	5	FACW-
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 25%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD - partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	5YR 3/2			Clay
8-18	3	5YR 4/4	7.5YR 5/6	15	Blocky red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input checked="" type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain <u>Ditched</u>
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Tiled
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP39W</u>	Transect No. <u>20</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex gracillima (graceful sedge)	H	40	FACU
2. Phleum pratense (timothy)	H	30	FACU
3. Salix petiolaris (meadow willow) (emerging)	H	20	FACW
4. Scirpus atrovirens (green bulrush)	H	10	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 50%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD – partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-9	2	7.5YR 4/4	7.5YR 5/6	25	Clay
9-18	3	5YR 4/4	7.5YR 5/6	25	Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Ditched agricultural hay field which was hayed this summer. Problem area due to clay soils. Soils meet TF2 hydric soil indicator.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site:	Nemadji River Wetland Mitigation Site	Yes	No	Is the Area (Circle):		
Applicant/Owner:	Enbridge Mitigation Site	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator:	Lindsay H., Whitney H., Troy S.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date:	8-26-2008	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
County	Douglas	State: WI				
Wetland or Upland Sample Point (Circle) and ID No.	TP40U	Transect No.		20		

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Trifolium pratense (red clover)	H	60	FACU
2. Carex gracillima (graceful sedge)	H	30	FACU
3. Taraxacum officinale (common dandelion)	H	10	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 0%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 10"

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	5YR 3/2			Clay
8-18	3	5YR 4/4	7.5YR 5/6	20	Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input checked="" type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Ditched agricultural hay field which was hayed this summer. Upland drains via sheet flow into man-made ditches. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Filled	<input type="checkbox"/> Floodplain
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Seasonal	<input type="checkbox"/> Ditched
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Permanent	<input type="checkbox"/> Tiled
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP41W</u>	Transect No. <u>21</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Calamagrostis canadensis (Canada bluejoint grass)	H	60	OBL
2. Carex stricta (upright sedge)	H	30	OBL
3. Rubus idaeus (American red raspberry)	H	10	FACU
4. Scirpus cyperinus (woolgrass)	H	10	OBL
5. Alnus incana (speckled alder)	S	100	OBL
6. Abies balsamea (balsam fir)	T	10	FACW
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 83%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 7"

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class: SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-9	2	7.5YR 4/4	7.5YR 5/6	15	Clay
9-18	3	5YR 4/4	7.5YR 5/6	20	Clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input checked="" type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 6- Shrub scrub	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	PSS1	

Remarks

Shrub scrub area to south of hay field.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-26-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP42U</u>	Transect No. <u>21</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Trifolium pratense (red clover)	H	60	FACU
2. Carex gracillima (graceful sedge)	H	20	FACU
3. Ranunculus acris (tall buttercup)	H	10	FACW-
4. Anemone canadensis (Canadian anemone)	H	5	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 50%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 10"

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	5YR 3/2			Clay
8-18	3	5YR 4/4	7.5YR 5/6	20	Clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Disturbed/problem area due to man-made ditched agricultural field with clay soils. Soils meet TF2 hydric soil indicator.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	<u>Floodplain</u> Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP43W</u>	Transect No. <u>22</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Acer saccharinum (silver maple)	T	50	FACW
2. Fraxinus nigra (black ash)	T	30	FACW+
3. Ulmus americana (American elm)	T	20	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 100%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 92F- Udorthents, ravines and escarpments Natural Drainage Class NA- not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-3	1	10YR 3/1			Clay
3-8	2	10YR 3/2	10YR 5/6	15	Clay
8-10	3	10YR 3/2	10YR 5/2	20	Clay
10-18	4	10YR 3/2	10YR 5/6	20	Clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 1- Seasonally Flooded Floodplain	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	PFO1J	

Remarks

Sample point located in Nemadji River forested floodplain. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP44U</u>	Transect No. <u>22</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	40	FACU
2. Trifolium pratense (red clover)	H	30	FACU
3. Cirsium arvense (Canada thistle)	H	15	FACU
4. Helianthus occidentalis (few-leaved sunflower)	H	15	FACU-
5. Solidago canadensis (Canada goldenrod)	H	30	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 0%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 92F- Udorthents, ravines and escarpments Natural Drainage Class NA- not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil, roots
2-8	2	7.5YR 3/4			Hard compacted clay
8-18	3	7.5YR 3/2			Hard compacted clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma ≤ 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma ≤ 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Horse pasture, grazed vegetation. Slope is too steep for water to saturate. Test point on slope draining to Nemadji River floodplain. Problem area due to clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	<u>Floodplain</u> Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP45W</u>	Transect No. <u>23</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Agrostis gigantea (red top)	H	30	NI
2. Carex lacustris (lake sedge)	H	25	OBL
3. Scirpus atrovirens (green bulrush)	H	20	OBL
4. Typha angustifolia (narrow-leaf cattail)	H	10	OBL
5. Doellingeria umbellata (parasol whitetop)	H	10	FACW
6. Prunella vulgaris (heal-all)	H	5	FAC
7. Fraxinus nigra (black ash)	T	30	FACW+
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 71%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 0"

SOILS

Map Unit Name: 92F- Udorthents, ravines and escarpments Natural Drainage Class NA- not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-18	2	5YR 4/4			Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 1- Seasonally Flooded Floodplain	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	PFO1J	

Remarks

Bottom of steep slope near drainage. Problem area due to clay soils. Area disturbed due to horses compacting clay soils.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP46U</u>	Transect No. <u>23</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	30	FACU
2. Poa pratensis (Kentucky blue grass)	H	20	FAC-
3. Trifolium pratense (red clover)	H	20	FACU
4. Plantago rugelii (American plantain)	H	15	FAC
5. Ambrosia artemisiifolia (ragweed)	H	10	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 20%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 92F- Udorthents, ravines and escarpments Natural Drainage Class NA- not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-1	1				Topsoil
1-18	2	5YR 4/4			Hard compacted red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Sample point located on steep slope draining to floodplain. Hydrology does not sit here. Hard compacted clay from horses.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	<u>Floodplain</u> Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP47W</u>	Transect No. <u>24</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Calamagrostis canadensis (Canada bluejoint grass)	H	60	OBL
2. Scirpus atrovirens (green bulrush)	H	10	OBL
3. Heracleum maximum (cowparsnip)	H	10	FACW
4. Helianthus occidentalis (sunflower)	H	10	FACU
5. Cornus sericea (redosier dogwood)	S	20	FACW
6. Ulmus americana (American elm)	T	40	FACW-
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 83%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: 2"

SOILS

Map Unit Name: 92F- Udorthents, ravines and escarpments Natural Drainage Class NA- not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-3	1	10YR 3/1			Clay
3-9	2	10YR 3/2	10YR 5/6	10	Clay
9-11	3	10YR 3/2	10YR 5/2	15	Clay
11-18	4	10YR 3/2	10YR 5/6	15	Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 1- Seasonally Flooded Floodplain	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	PFO1J	

Remarks

Sample point taken in Nemadji River Floodplain.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP48U</u>			Transect No.	<u>24</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Cirsium arvense (Canada thistle)	H	60	FACU
2. Anemone canadensis (Canadian anemone)	H	30	FACW
3. Phalaris arundinacea (reed canary grass)	H	15	FACW+
4. Heracleum maximum (cowparsnip)	H	15	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 75%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 92F- Udorthents, ravines and escarpments Natural Drainage Class NA- not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	7.5YR 3/4			Hard compacted clay
8-18	3	7.5YR 3/2			Hard compacted clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

On slope to Nemadji River floodplain.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Filled	<input type="checkbox"/> Floodplain
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Seasonal	<input type="checkbox"/> Permanent
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Ditched	<input type="checkbox"/> Tiled
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP49W</u>	Transect No. <u>25</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	40	FACU
2. Phalaris arundinacea (reed canary grass)	H	20	FACW+
3. Trifolium pratense (red clover)	H	20	FACU
4. Moss spp.	H	20	NI
5. Carex gracillima (graceful sedge)	H	10	FACU
6. Salix petiolaris (meadow willow) (emerging)	H	5	FACW+
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 50%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (In)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-6	2	10YR 4/1	10YR 5/6	25	Gleyed clay
6-12	3	10YR 2/1	10YR 5/6	15	Blocky clay
12-18	4	5YR 4/4	5YR 5/8	10	Blocky clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input checked="" type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Sample point located on what appears to be an old horse track/ring.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP50U</u>			Transect No.	<u>25</u>	

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	70	FACU
2. Taraxacum officinale (common dandelion)	H	10	FACU
3. Trifolium pratense (red clover)	H	10	FACU
4. Ranunculus acris (tall buttercup)	H	10	FACW-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 25%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 262B- Amnicon-Cuttre complex Natural Drainage Class SPD- partially hydric
 Soil Suborder: Bergland Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-8	2	10YR 2/1	10YR 5/6	20	Clay
8-18	3	10YR 3/2	10YR 5/6	20	Clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|--|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma ≤ 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma ≤ 2 | <input checked="" type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

Upland area in center of old horse track/ring.

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):	
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Filled Floodplain Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Seasonal Permanent Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>		
County: <u>Douglas</u>	State: <u>WI</u>			
Wetland or Upland Sample Point (Circle) and ID No. <u>TP51W</u>	Transect No. <u>26</u>			

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Carex stricta (uptight sedge)	H	30	OBL
2. Ambrosia artemisiifolia (ragweed)	H	30	FACU
3. Phleum pratense (timothy)	H	20	FACU
4. Phalaris arundinacea (reed canary grass)	H	10	FACW+
5. Scirpus atrovirens (green bulrush)	H	5	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 60%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 274D- Miskoaki clay loam Natural Drainage Class Well drained- not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-3	1				Topsoil
3-12	2	7.5YR 3/3	5YR 5/8	30	Clay
12-16	3	7.5YR 3/2	5YR 5/8	30	Clay
16-18	4	7.5YR 3/4	7.5YR 4/6	20	Red clay

**DATA FORM
ROUTINE ONSITE DETERMINATION METHOD**



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this sampling site within a wetland?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wetland hydrology present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland Circular 39 Basin Type Classification:	Type 2- Inland Fresh Meadow	
Hydric soils present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NWI or WWI Basin Type Classification	E2Kfr	

Remarks

Drainage to Nemadji River Floodplain. Hard, compacted soils due to horses. Soils meet TF2 hydric soil indicator.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Project/Site: <u>Nemadji River Wetland Mitigation Site</u>	Yes	No	Is the Area (Circle):		
Applicant/Owner: <u>Enbridge Energy, Limited Partnership</u>	Abnormal conditions? <input type="checkbox"/>	<input checked="" type="checkbox"/>	Filled	Floodplain	Ditched
Field Investigator: <u>Lindsay H., Whitney H., Troy S.</u>	Site disturbed (Atypical)? <input checked="" type="checkbox"/>	<input type="checkbox"/>	Seasonal	Permanent	Tiled
Investigation Date: <u>8-27-2008</u>	Problem area? <input checked="" type="checkbox"/>	<input type="checkbox"/>			
County: <u>Douglas</u>	State: <u>WI</u>				
Wetland or Upland Sample Point (Circle) and ID No. <u>TP52U</u>	Transect No. <u>26</u>				

VEGETATION

Dominant Plant Species	Stratum	%	Indicator
1. Phleum pratense (timothy)	H	35	FACU
2. Trifolium pratense (red clover)	H	25	FACU
3. Taraxacum officinale (common dandelion)	H	20	FACU
4. Poa pratensis (Kentucky blue grass)	H	20	FAC-
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Percent of dominant species that are OBL, FACW and/or FAC = 0%

HYDROLOGY

- Stream, Lake or Well Data
- Precipitation Data
- Aerial Photographs
- Other (Explain in remarks)
- No recorded data used

Primary Wetland Hydrology Indicators

- Inundated
- Saturated in upper 12"
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- (If no primary indicator, 2 or more required)
- Oxidized Root Channels in upper 12"
 - Water Stained Leaves
 - Local Soil Survey Data
 - FAC Neutral Vegetation Test
 - Multiple Trunks
 - Buttressing
 - Other (Explain in remarks)

Field Observations

Depth of Surface Water: None
 Depth to Water in Pit: None
 Depth to Saturated Soil: None

SOILS

Map Unit Name: 274D- Miskoaki clay loam Natural Drainage Class: Well drained- not hydric
 Soil Suborder: _____ Whole unit hydric soil? Y N
 Field Observations Confirmed Mapped Type? Y N

Soil Profile Description					
Depth (in)	Horizon Name	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle %	Soil Texture and Comments
0-2	1				Topsoil
2-18	2	5YR 4/3			Red clay

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD



Hydric Soil Indicators

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol | <input type="checkbox"/> Chroma \leq 3 in Entisol | <input type="checkbox"/> Listed on Local Hydric Soils List |
| <input type="checkbox"/> Histic Epipedon | <input type="checkbox"/> Mottled with Chroma \leq 2 | <input type="checkbox"/> Listed on National Hydric Soils List |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> Chroma of 1 without Mottles | <input type="checkbox"/> Spodic Horizon at 12" |
| <input type="checkbox"/> Aquic/Peraquic Moisture Regime | <input type="checkbox"/> Iron/Manganese Concretions | <input type="checkbox"/> Aquatic Invertebrate Remains |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Dark Organic Vertical Streaking in Sandy Soils | <input type="checkbox"/> Inclusionary Hydric Soil |
| <input type="checkbox"/> Gleying | <input type="checkbox"/> High Organic Content at Surface Layer in Sandy Soils | <input type="checkbox"/> Other (Explain in remarks) |

WETLAND DETERMINATION

	Yes	No		Yes	No
Hydrophytic vegetation present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this sampling site within a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland hydrology present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Wetland Circular 39 Basin Type Classification:		
Hydric soils present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NWI or WWI Basin Type Classification		

Remarks

On slope to drainage ditch. Too steep for water to saturate. Very hard, dry compacted red clay.

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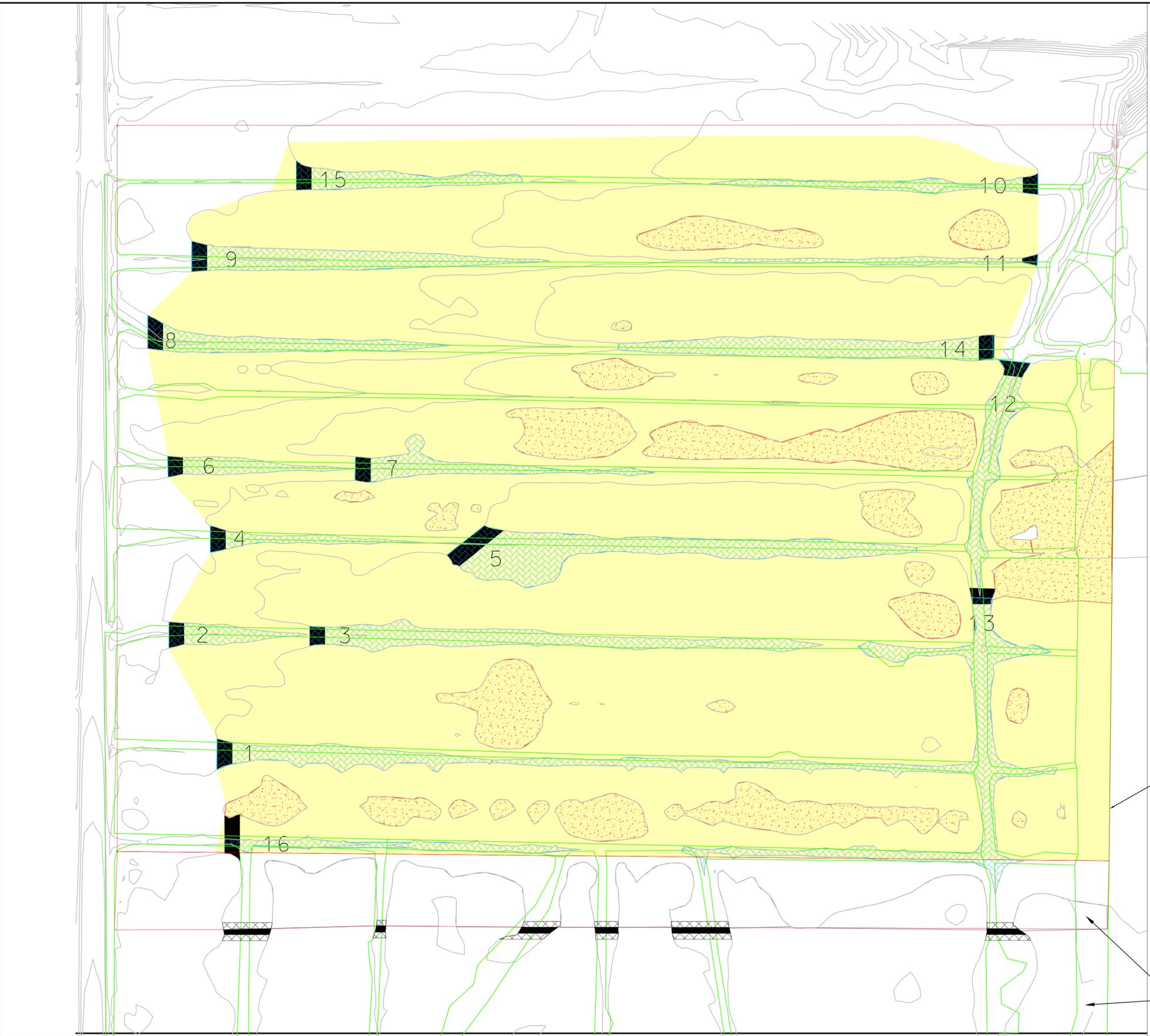
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Appendix B

Project Plan Sheets

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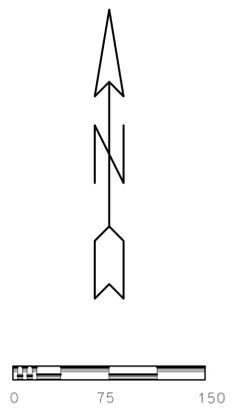


CRAWFORD CREEK	
TOTAL AREA	29.4 AC
TOTAL EXISTING WETLAND	3.5 AC
TOTAL PROPOSED WETLAND	23.0 AC
WATER DEPTH 0 TO 1 FT	3.0 AC
WATER DEPTH -1 TO 0 FT	20.0 AC
UPLAND	6.4 AC

- WATER DEPTH 0 TO 1 FEET (3.0 ACRES)
- WATER DEPTH -1 TO 0 FEET (20.0 ACRES)
- WATER DEPTH -2 TO -1 FEET (2.9 ACRES)
- EXISTING WETLAND BOUNDARY
WETLAND ENHANCEMENT = 3.5 ACRES
WETLAND RESTORATION = 20.8 ACRES (0 TO -1 DEPTH)
- PROPOSED DITCH PLUG
- EXISTING DITCH PLUG

PROJECT BOUNDARY (TYP.)

EXISTING STEP WETLAND MITIGATION SITE



NOT FOR CONSTRUCTION

EXHIBIT A: PROPOSED HYDROLOGY
ENBRIDGE ENERGY CRAWFORD CREEK WETLAND MITIGATION SITE PLAN
DOUGLAS COUNTY, WISCONSIN

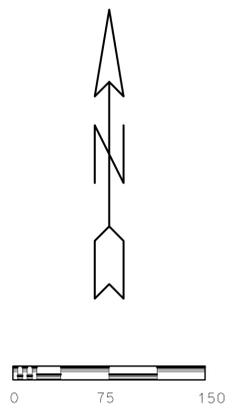
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DARROW ROAD

-  WATER DEPTH 0 TO 1 FEET (3.0 ACRES)
-  WATER DEPTH -1 TO 0 FEET (20.0 ACRES)
-  WATER DEPTH -2 TO -1 FEET (2.9 ACRES)
-  APPROXIMATE LOCATION OF SOIL STOCKPILES TO BE REMOVED
-  EXISTING WETLAND BOUNDARY
WETLAND ENHANCEMENT = 3.5 ACRES
WETLAND RESTORATION = 20.8 ACRES (0 TO -1 DEPTH)
-  PROPOSED DITCH PLUG
-  EXISTING DITCH PLUG

PROJECT BOUNDARY (TYP.)

EXISTING STEP WETLAND MITIGATION SITE



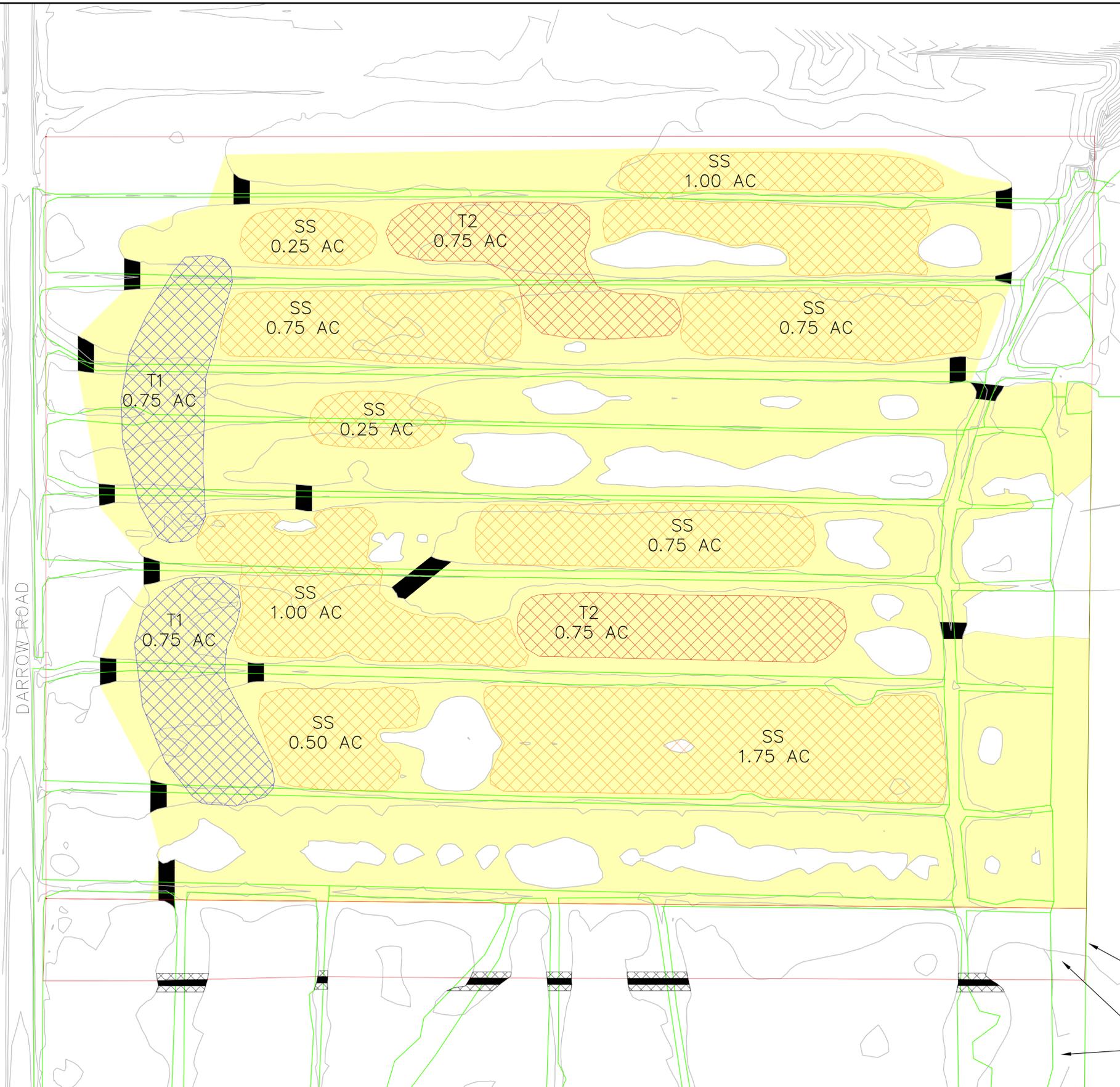
NOT FOR CONSTRUCTION

EXHIBIT B: PRELIMINARY GRADING PLAN
ENBRIDGE ENERGY CRAWFORD CREEK WETLAND MITIGATION SITE PLAN
DOUGLAS COUNTY, WISCONSIN

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DARROW ROAD

PLANTING CLUSTERS			
ZONE	TYPE	AREA	ESTIMATED # OF TREES/SCHRUBS
SS		7.00 AC	2940
	MEADOW WILLOW (140/AC)		980
	RED OSIER DOGWOOD (140/AC)		980
	PUSSY WILLOW (140/AC)		980
T1		1.50 AC	2100
	BLACK SPRUCE (400/AC)		600
	BALSAM FIR (600/AC)		900
	RED MAPLE (400/AC)		600
T2		1.50 AC	2100
	YELLOW BIRCH (400/AC)		600
	RED MAPLE (400 AC)		600
	TAMARACK (600/AC)		900



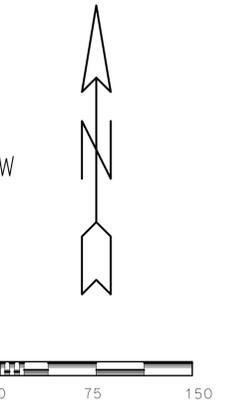
- FRESH WET MEADOW 13.00 ACRES
- T1 FORESTED WETLAND 1.50 ACRES
- T2 FORESTED WETLAND 1.50 ACRES
- SS SHRUB-CARR WETLAND 7.00 ACRES
- TOTAL WETLANDS 23.00 ACRES
- EXISTING WETLAND BOUNDARY
- PROPOSED DITCH PLUG
- EXISTING DITCH PLUG

NOTE: NATIVE WET MEADOW SEED MIX TO BE BROADCAST IN ALL WETLAND (23.00 ACRES TOTAL)

DISTURBED AREAS ON DITCH PLUGS ARE TO BE SEEDED WITH NATIVE WET MEADOW MIX AND COVERED WITH STRAW MULCH (11,000 SF TOTAL)

PROJECT BOUNDARY (TYP.)

EXISTING STEP WETLAND MITIGATION SITE



NOT FOR CONSTRUCTION

EXHIBIT C: PROPOSED PLANTING PLAN
ENBRIDGE ENERGY CRAWFORD CREEK WETLAND MITIGATION SITE PLAN
DOUGLAS COUNTY, WISCONSIN

Appendix C

C-1: Superior RAM Functional Assessment

C-2: Superior RAM Performance Standards

GENERAL INFORMATION

WETLAND ID NO.	Storm Basin (subwatershed)	Reed Map Type(s) & Size (acres)	Location					Climate	Wetland Size approx. acres
			1/4	1/4	Sec	Town	Range	norm/wet/dry	
Wetlands in Fields	Nemadji River	N/A			23	48N	14W	Normal	N/A
Evaluator(s)	Date(s) of Visit	Wetland Type(s)	Photo File No.s			Other Assoc. Maps/Files/Sheets			
L. Hogfeldt	8/1/2008	PEM				Aerial Photograph			
	2/1/2009	Type 2				WWI Map			
						Douglas County Zoning			
						USGS Topographic Map			

SUMMARY

FUNCTIONS (and Related Values)		Functional Index Score	Functional Index Rating (High, Medium, Low)	Comments
1. Special Features Identified?				Yes, T & E Plants
2. Plant Community Integrity				
Plant Comm. 1	100%	5.0	Medium	
Plant Comm. 2	0%			
Plant Comm. 3	0%			
Plant Comm. 4	0%			
Average Weighted Score/Rating		5.0	Medium	
3. Hydrologic Integrity		1.8	Low	Haying, ditches, no impervious
4. Wildlife Habitat Integrity/Quality		3.0	Low	Ditches
5. Flood & Stormwater Attenuation		1.7	Low	Low development
6. Water Quality Protection		1.0	Low	Low development
7. Aesthetics/Rec./Edu./Cultural		1.0	Low	Privately owned

II. OVERALL PLANT COMMUNITY INTEGRITY

	ID Community Types using Key A	% of Wetland Area	Community Quality (Key B)
Community Type	Wet Meadow	100%	Medium
Dominants	<i>Ranunculus acris</i> (Tall buttercup), <i>Trifolium pratense</i> (Red clover), <i>Fragaria virginiana</i> (Woodland strawberry), <i>Salix petiolaris</i> (Meadow willow), <i>Carex gracillima</i> (Graceful sedge)		
Non-Dominants	<i>Scirpus atrovirens</i> (Green bulrush), <i>Mentha arvensis</i> (Wild mint), <i>Carex lacustris</i> (Lake sedge), <i>Solidago canadensis</i> (Canada goldenrod), <i>Carex stricta</i> (Uptight sedge)		
Invasive/Exotic	<i>Phalaris arundinacea</i> (Reed canary grass)		
Community Type			
Dominants			
Non-Dominants			
Invasive/Exotic			
Community Type			
Dominants			
Non-Dominants			
Invasive/Exotic			
Community Type			
Dominants			
Non-Dominants			
Invasive/Exotic			

City of Superior Routine Assessment Method for Evaluating Wetland Functions (6/3/02)

Invasive/Exotic			
WETLAND ID:			
QUES. NO.	FUNCTIONAL INDEX SCORE (L=1.0; M=5.0; H=9.0)	FUNCTIONAL INDEX RATING (L=1.0-3.0; M=3.1-6.9; H=7.0-9.0)	COMMENTS
I. SPECIAL FEATURES			
1			No
A			
1)			No, not within the City of Superior
2)			No
B			No
C			
1)			Yes
2)			No
D			
1)			Yes
2)			No
E			
1)			No
2)			No
II. OVERALL PLANT COMMUNITY INTEGRITY			
Comm. 1	5.0	Medium	
Comm. 2			
Comm. 3			
Comm. 4			
Avg. Score	5.0	Medium	Invasives 20-50%
III. HYDROLOGIC INTEGRITY EVALUATION			
4	1.0	Low	
5	3.5	Medium	Haying, low impervious
6	1.0	Low	All man-made ditches
Avg. Score	1.8	Low	Index Score =(4+5+6)/3
IV. WILDLIFE HABITAT INTEGRITY / QUALITY			
7	5.0	Medium	
8	1.8	Low	
9	1.0	Low	
10	3.1	Medium	Haying, man-made ditches
11	2.0	Low	
12	7.0	High	
13	1.0	Low	Narrow ditches
14	3.1	Medium	Upland between ditches
Avg. Score	3.0	Low	Index Score=(7+8+(9+10+11+12+13+14))/6
V. FLOOD & STORMWATER ATTENUATION EVALUATION			
15	3.1	Medium	Ditching
16	3.1	Medium	
17	1.0	Low	Haying, no development
18	1.0	Low	
19	1.0	Low	
20	1.0	Low	
Avg. Score	1.7	Low	Index score= (15+16+17+18+19+20)/6
VI. PROTECTION OF WATER QUALITY			
21	1.0	Low	Haying, no development
22	1.0	Low	
23	1.0	Low	

City of Superior Routine Assessment Method for Evaluating Wetland Functions (6/3/02)

24	1.0	Low	Man-made ditches
25	1.0	Low	
26	1.0	Low	
Avg. Score	1.0	Low	Index score= (21+22+23+24+25+26)/6
V. AESTHETICS/ RECREATION/ EDUCATION/ CULTURAL/ SCIENCE			
27	1.0	Low	Privately owned
28	1.0	Low	No access allowed
29	1.0	Low	
Avg. Score	1.0	p	

NOTES:

Y / N	Does the wetland have the portatial for hydrologic or vegetative restoration without negatively affecting surrounding properties? If yes to Special Features No. 1.B., describe conditions.
-------	---

Identify any noteworthy wildlife species observed or in evidence in the wetland or on adjacent lands:
(refer to species listed in Special Features No. 1. E. 2)

Additional Notes/Sketch

Limiting Conditions:

Note: Refer to routine assessment (10 Pages, dated 06/03/02) for complete text and rating criteria.

Appendix C-2. Superior RAM Performance Standards for Crawford Creek Mitigation Site

Wetland ID	Habitat Type(s), WWI Classification	Wetland Acreage	Special Features	Overall Plant Community integrity		Hydrologic Integrity		Wildlife Habitat Integrity		Flood and Stormwater Attenuation		Protection of Water Quality		Aesthetics/ Recreation/ Education/ Cultural/ Science		Comments
S4-30-23 (Reference)*	S3, T3	16.0	Y	M	4.2	M	6.0	M	5.3	M	4.7	M	5.8	L	1.1	Potential for hydrologic restoration, ditches along road
Mitigation Site (Existing Condition)**	E2K, upl	12.4	Y	M	5.0	L	1.8	L	3.0	L	1.7	L	1.0	L	1.0	T&E plants present, potential for hydrologic restoration
Mitigation Site (Target Values)	E2K, S3K, TK	31.9	Y	H	≥7.0	M	≥5.0	M	≥6.0	M	≥3.1	M	≥5.0	L	≥1.0	Anticipate T&E plants

* Reference wetland in Nemadji River watershed, evaluated for City of Superior Special Area Management Plan (SAMP)

** Functional assessment worksheets available in Appendix C-1 of the 2014 CSP

Appendix D

Seed Mix and Seeding Rates

STATE SEED MIXES

Standard seed mixtures used by Mn/DOT, BWSR, and some divisions of the DNR have been revised and consolidated into one list of State Seed Mixes. Standards for the mixes have also been combined, with both BWSR and Mn/DOT requiring that mixes be sold as pure live seed (PLS), Source Identified (Yellow Tag) when available, and specific labeling requirements.

Standards for local origin seed will vary depending on program requirements. Native Vegetation Establishment and Enhancement guidelines have been developed for BWSR funded programs and can be found at: http://www.bwsr.state.mn.us/native_vegetation/index.html

Note: Cover crops are included as a component of State Seed Mixes with the exception of some wetland mixes where cover species are not necessary. For State Seed Mixes, oats and winter wheat should be selected based on the time of year that the mix is being used. Oats should be included in mixes if a mix is used between October 15th and August 1st. Winter wheat should be used for seeding between August 1st and October 15th. The seeding rate is the same for oats and winter wheat.

List of State Seed Mixes

21-111 Oats Cover Crop

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/sq ft
Oats	<i>Avena sativa</i>	112.08	100.00	100.00%	44.54
	Totals:	112.08	100.00	100.00%	44.54
Purpose:	Temporary cover crop for spring and summer plantings				
Planting Area:	Statewide				

21-112 Winter Wheat Cover Crop

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/sq ft
Winter Wheat	<i>Triticum aestivum</i>	112.09	100.00	100.00%	26.08
	Totals:	112.09	100.00	100.00%	26.08
Purpose:	Temporary cover crop for fall plantings				
Planting Area:	Statewide				

21-113 Soil Building Cover Crop

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/sq ft
Field Pea	<i>Pisum sativum</i>	56.04	50.00	45.46%	3.44
	Total Forbs	56.04	50.00	45.46%	3.44
Oats	<i>Avena sativa</i>	67.25	60.00	54.54%	26.72
	Total Cover Crop	67.25	60.00	54.54%	26.72
	Totals:	123.29	110.00	100.00%	30.16
Purpose:	Temporary cover crop with soil building function.				
Planting Area:	Statewide				

34-371

Wet Meadow Northeast

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/sq ft
fringed brome	<i>Bromus ciliatus</i>	2.24	2.00	16.04%	8.10
bluejoint	<i>Calamagrostis canadensis</i>	0.11	0.10	0.78%	10.00
Virginia wild rye	<i>Elymus virginicus</i>	1.68	1.50	11.99%	2.31
tall manna grass	<i>Glyceria grandis</i>	0.28	0.25	1.96%	6.30
fowl bluegrass	<i>Poa palustris</i>	0.73	0.65	5.19%	31.00
	Total Grasses	5.04	4.50	35.96%	57.71
tussock sedge	<i>Carex stricta</i>	0.04	0.04	0.35%	0.85
pointed broom sedge	<i>Carex scoparia</i>	0.06	0.05	0.39%	1.50
dark green bulrush	<i>Scirpus atrovirens</i>	0.22	0.20	1.56%	33.00
woolgrass	<i>Scirpus cyperinus</i>	0.07	0.06	0.51%	40.00
	Total Sedges and Rushes	0.39	0.35	2.81%	75.35
Canada anemone	<i>Anemone canadensis</i>	0.11	0.10	0.82%	0.30
marsh milkweed	<i>Asclepias incarnata</i>	0.27	0.24	1.95%	0.43
flat-topped aster	<i>Doellingeria umbellata</i>	0.11	0.10	0.81%	2.50
common boneset	<i>Eupatorium perfoliatum</i>	0.10	0.09	0.68%	5.00
grass-leaved goldenrod	<i>Euthamia graminifolia</i>	0.04	0.04	0.31%	5.00
spotted Joe pye weed	<i>Eutrochium maculatum</i>	0.16	0.14	1.15%	5.00
blue monkey flower	<i>Mimulus ringens</i>	0.03	0.03	0.24%	25.00
giant goldenrod	<i>Solidago gigantea</i>	0.03	0.03	0.20%	2.30
eastern panicled aster	<i>Symphotrichum lanceolatum</i>	0.03	0.03	0.28%	2.00
	Total Forbs	0.90	0.80	6.44%	47.53
Oats or winter wheat (see note at beginning of list for recommended dates)		7.68	6.85	54.79%	3.05
	Total Cover Crop	7.68	6.85	54.79%	3.05
	Totals:	14.01	12.50	100.00%	183.64
Purpose:	Wet meadow / Sedge meadow reconstruction for wetland mitigation or ecological restoration.				
Planting Area:	Laurentian Mixed Forest Province. Mn/DOT Districts 1, 2(east) and 3A.				



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Appendix G
Landowner List

**Sandpiper Pipeline and Line 3 Replacement Projects
Property Owners Crossed by the Project and Alternatives**

Milepost	Tract Number	Owner Name	Address	City	State	Zip Code
600.83	WI-DO-002.000	Jerome P. Timmer	68 E COUNTY ROAD C	SUPERIOR	WI	54880
600.93	WI-DO-002.200	JEROME P & ANNA F TIMMER	68 E COUNTY ROAD C	SUPERIOR	WI	54880
601.07	WI-DO-003.000	JOSEPH E & MARY M GOHLIKE	12585 OTCHIPWE AVE N	STILLWATER	MN	55082
601.45	WI-DO-004.000	State of Wisconsin Department of Natural Resources	PO BOX 7921	MADISON	WI	53707
601.69	WI-DO-005.000	Mitchell A. Bauer	2915 18-3/4 ST	RICE LAKE	WI	54868
601.82	WI-DO-005.210	Mark J. Radzak	5395 W PIXLEY DR	MINONG	WI	54859
601.84	WI-DO-006.000	Bradley D. Burling	2589 S 5 1/2 ST	CUMBERLAND	WI	54829
601.84	WI-DO-007.000	Bradley D. Burling	2589 S 5 1/2 ST	CUMBERLAND	WI	54829
602.09	WI-DO-008.000	Tri-State Holdings, LLC	119 N 25TH ST E	SUPERIOR	WI	54880
602.48	WI-DO-009.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVE	NEW YORK	NY	10028
602.61	WI-DO-009.200	Cowett Wisconsin, a New York partnership	1040 FIFTH AVE	NEW YORK	NY	10028
602.62	WI-DO-010.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
602.71	WI-DO-011.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
602.81	WI-DO-012.000	George Smilanich	3019 3RD AVE W	HIBBING	MN	55746
602.91	WI-DO-013.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
602.96	WI-DO-014.000	Tri-State Holdings, LLC	119 N 25TH ST E	SUPERIOR	WI	54880
603.04	WI-DO-016.000	Enbridge Energy, LP	1100 3400 LOUISIANA ST	HOUSTON	TX	77002
603.04	WI-DO-015.000	Tri-State Holdings, LLC	119 N 25TH ST E	SUPERIOR	WI	54880
603.10	WI-DO-017.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
603.26	WI-DO-018.000	Lynn Taipale	1406 109TH AVE W	DULUTH	MN	55808
603.32	WI-DO-019.000	Lynn Taipale	1406 109TH AVE W	DULUTH	MN	55808
603.41	WI-DO-020.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
603.80	WI-DO-021.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
603.94	WI-DO-022.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
604.19	WI-DO-023.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028

**Sandpiper Pipeline and Line 3 Replacement Projects
Property Owners Crossed by the Project and Alternatives**

604.20	WI-DO-025.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
604.21	WI-DO-024.000	Cowett Wisconsin, a New York partnership	1040 FIFTH AVENUE	NEW YORK	NY	10028
604.60	WI-DO-026.000	Gary J. Carr	2095 E BROOKLYN ST	SUPERIOR	WI	54880
604.79	WI-DO-028.000	Rubies34,LLC	W7659 STATE RD 35	RIVER FALLS	WI	54022
604.88	WI-DO-029.000	Terry L. Schumacher	2970 80TH AVE	WILSON	WI	54027
605.19	WI-DO-030.000	Rubies34,LLC	W7659 STATE RD 35	HAGER CITY	WI	54014
605.34	WI-DO-030.210	Thomas Dolney	9643 COLUMBUS AVE S	BLOOMINGTON	MN	55420
605.35	WI-DO-031.000	Christian F. Litchke	4870 IRONDALE RD	SUPERIOR	WI	54880
605.36	WI-DO-032.000	Julie Litchke	4870 IRONDALE RD	SUPERIOR	WI	54880
605.72	WI-DO-033.000	Julie Litchke	4870 IRONDALE RD	SUPERIOR	WI	54880
605.78	WI-DO-034.000	Julie Litchke	4870 IRONDALE RD	SUPERIOR	WI	54880
606.08	WI-DO-034.210	Daniel G. Pendergast	3835 S CTY RD W	SUPERIOR	WI	54880
606.10	WI-DO-034.500	Michael Merlin Severson	3898 S IRONDALE RD	SUPERIOR	WI	54880
606.19	WI-DO-034.505	Charles J. Kotera Jr.	2255 E KIMMES RD	SUPERIOR	WI	54880
606.34	WI-DO-034.510	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
606.36	WI-DO-034.515	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
606.48	WI-DO-034.520	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
606.59	WI-DO-034.525	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
606.65	WI-DO-034.530	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
606.70	WI-DO-034.535	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
606.78	WI-DO-034.540	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
606.86	WI-DO-041.000	Douglas County Forest Department	1313 BELKNAP ST	SUPERIOR	WI	54880
607.15	WI-DO-041.500	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
607.26	WI-DO-041.500.310	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
607.30	WI-DO-041.500.320	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
607.32	WI-DO-041.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
607.35	WI-DO-041.502	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
607.39	WI-DO-041.504	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
607.47	WI-DO-041.506	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
607.72	WI-DO-041.200	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
607.87	WI-DO-041.508	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880

**Sandpiper Pipeline and Line 3 Replacement Projects
Property Owners Crossed by the Project and Alternatives**

608.22	WI-DO-041.508.910FC	Northern Power Company	TBD	TBD	TBD	TBD
608.36	WI-DO-041.510	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
608.78	WI-DO-041.512	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
609.28	WI-DO-041.516	Midwest Communications Inc.	3081 S POKEGAMA RD	SUPERIOR	WI	54880
609.36	WI-DO-041.518	Shimon Shaked	TBD	TBD	TBD	TBD
609.45	WI-DO-041.518.200	Shimon Shaked	TBD	TBD	TBD	TBD
609.46	WI-DO-041.520	David A. Goldberg	TBD	TBD	TBD	TBD
609.46	WI-DO-041.520.200	David A. Goldberg	TBD	TBD	TBD	TBD
609.61	WI-DO-041.522	Thomas A. Harris	TBD	TBD	TBD	TBD
609.61	WI-DO-041.522.200	Patricia K. Harris	TBD	TBD	TBD	TBD
609.71	WI-DO-041.522.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
609.77	WI-DO-041.524	Mary A. Thomson	TBD	TBD	TBD	TBD
609.95	WI-DO-041.526	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
610.08	WI-DO-041.528	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
610.12	WI-DO-041.530	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
610.21	WI-DO-041.532	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
610.22	WI-DO-041.532.200	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
610.29	WI-DO-041.534	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
610.30	WI-DO-041.534.200	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
610.35	WI-DO-041.536	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
610.59	WI-DO-041.536.900FC	Northern Power Company	TBD	TBD	TBD	TBD
610.65	WI-DO-041.538	Duluth Landfill Superior, LLC	2626 CENTRAL AVE	SUPERIOR	WI	54880
610.70	WI-DO-041.538.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
610.72	WI-DO-041.540	Duluth Landfill Superior, LLC	2626 CENTRAL AVE	SUPERIOR	WI	54880
610.77	WI-DO-041.540.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
610.83	WI-DO-041.542	Duluth Landfill Superior, LLC	2626 CENTRAL AVE	SUPERIOR	WI	54880
610.92	WI-DO-041.544	Demolition Landfill Saari Properties, LLC	2626 CENTRAL AVE	SUPERIOR	WI	54880
610.93	WI-DO-041.542.310	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
611.06	WI-DO-055.200	Demolition Landfill Saari Properties, LLC	2626 CENTRAL AVE	SUPERIOR	WI	54880
611.19	WI-DO-057.000	Mary Podgorak	W8805 LITTLE SAND RD	MINONG	WI	54859
611.21	WI-DO-056.000	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
611.48	WI-DO-058.300	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
611.48	WI-DO-057.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
611.50	WI-DO-058.000	William A. Cich	3816 E 70TH ST	SUPERIOR	WI	54880
611.55	WI-DO-059.000	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
611.57	WI-DO-059.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
611.59	WI-DO-060.000	William A. Cich	3816 E 70TH ST	SUPERIOR	WI	54880
611.62	WI-DO-059.310	GREAT NORTHERN RAILROAD	TBD	TBD	TBD	TBD
611.62	WI-DO-060.220	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880

**Sandpiper Pipeline and Line 3 Replacement Projects
Property Owners Crossed by the Project and Alternatives**

611.64	WI-DO-061.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
611.64	WI-DO-061.000	Richard Dedominces	1814 N 69TH ST	SUPERIOR	WI	54880
611.66	WI-DO-062.000	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
611.67	WI-DO-061.200	Richard Dedominces	1814 N 69TH ST	SUPERIOR	WI	54880
611.67	WI-DO-063.200	Jimmy O. Hegg	1804 N 69TH ST	SUPERIOR	WI	54880
611.67	WI-DO-063.000	Jimmy O. Hegg	1804 N 69TH ST	SUPERIOR	WI	54880
611.69	WI-DO-063.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
611.70	WI-DO-064.300	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
611.71	WI-DO-064.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
611.71	WI-DO-064.000	Christopher A. Shatto	6902 TOWER AVE	SUPERIOR	WI	54880
611.73	WI-DO-065.000	Christopher A. Shatto	6902 TOWER AVE	SUPERIOR	WI	54880
611.78	WI-DO-066.000	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
611.78	WI-DO-066.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
611.81	WI-DO-067.000RR	Soo Line Railroad Company	501 1525 MARQUETTE AVE S	MINNEAPOLIS	MN	55402
611.81	WI-DO-068.000	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
611.82	WI-DO-068.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
611.84	WI-DO-066.200	Boguslaw W. Wnuk	6824 OGDEN AVE	SUPERIOR	WI	54880
611.90	WI-DO-069.000	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
611.96	WI-DO-070.000	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
612.01	WI-DO-071.000	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
612.06	WI-DO-071.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.07	WI-DO-072.000	Udeen Trucking, Inc.	6521 TOWER AVE	SUPERIOR	WI	54880
612.10	WI-DO-073.000	Joseph W. Podgorak	1407 N 67TH ST	SUPERIOR	WI	54880
612.10	WI-DO-073.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.11	WI-DO-074.000	Fredolph A. and Janice Tunell, Life Estate	6700 HAMMOND AVE	SUPERIOR	WI	54880
612.11	WI-DO-075.200	Village of Superior	PO BOX 3065	SUPERIOR	WI	54880
612.12	WI-DO-075.000	Joseph W. Podgorak	1407 N 67TH ST	SUPERIOR	WI	54880
612.16	WI-DO-074.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.31	WI-DO-075.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.35	WI-DO-076.200	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.39	WI-DO-076.200.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.40	WI-DO-079.230	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.41	WI-DO-076.001RD	JEREMY D ENGELKING	7618 OGDEN AVE	SUPERIOR	WI	54880
612.42	WI-DO-079.504	Alan L. Rode	1626 NEVADA AVE S	ST. LOUIS PARK	MN	55426
612.42	WI-DO-079.320.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.43	WI-DO-079.210	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.46	WI-DO-079.210.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.47	WI-DO-079.200	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.50	WI-DO-079.200.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.51	WI-DO-079.000	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.53	WI-DO-080.000	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.55	WI-DO-078.000	Enbridge Energy, LP	1100 3300 LOUISIANA	SUPERIOR	WI	54880

**Sandpiper Pipeline and Line 3 Replacement Projects
Property Owners Crossed by the Project and Alternatives**

612.56	WI-DO-081.000	Russell P. Johnson	4841 S IRONDALE RD	SUPERIOR	WI	54880
612.58	WI-DO-082.000	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.59	WI-DO-083.000	Enbridge Energy, LP	1100 3300 LOUISIANA	SUPERIOR	WI	54880
612.63	WI-DO-085.000	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.64	WI-DO-084.000	Enbridge Energy, LP	1100 3300 LOUISIANA	SUPERIOR	WI	54880
612.67	WI-DO-085.210	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.68	WI-DO-086.000	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.69	WI-DO-087.000	Enbridge Energy, LP	1100 3300 LOUISIANA	SUPERIOR	WI	54880
612.73	WI-DO-089.200	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.73	WI-DO-088.000	Enbridge Energy, LP	1100 3300 LOUISIANA	SUPERIOR	WI	54880
612.75	WI-DO-089.000	Tri-State Holdings, LLC	119 N 25TH ST E	SUPERIOR	WI	54880
612.76	WI-DO-090.200	Scott Campbell	802 CENTRAL AVE	SUPERIOR	WI	54880
612.76	WI-DO-090.000	Scott Campbell	802 CENTRAL AVE	SUPERIOR	WI	54880
612.76	WI-DO-090.230	Kenneth King	816 CENTRAL AVE	SUPERIOR	WI	54880
612.77	WI-DO-090.220	The Trust Agreement of Jerald and Jean Stewart	3730 E 8TH ST	SUPERIOR	WI	54880
612.77	WI-DO-090.210	Scott Campbell	802 CENTRAL AVE	SUPERIOR	WI	54880
612.78	WI-DO-090.300	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.79	WI-DO-090.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.79	WI-DO-091.000	Enbridge Energy, LP	1100 3300 LOUISIANA	SUPERIOR	WI	54880
612.81	WI-DO-092.000	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.84	WI-DO-093.000	Peter J. Fredman	717 CENTRAL AVE	SUPERIOR	WI	54880
612.86	WI-DO-094.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
612.89	WI-DO-094.200	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
612.95	WI-DO-097.210	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
613.03	WI-DO-100.260	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
613.09	WI-DO-100.500	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
613.10	WI-DO-100.510	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
613.18	WI-DO-106.200	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
613.40	WI-DO-106.000	J. Kimmes Construction, Inc.	2626 CENTRAL AVE	SUPERIOR	WI	54880
613.45	WI-DO-107.000	Tri-State Holdings, LLC	119 N 25TH ST E	SUPERIOR	WI	54880
613.46	WI-DO-108.220	Calumet Superior, LLC	2780 STE 200 WATERFRONT PKY E	INDIANAPOLIS	IN	46214
613.51	WI-DO-108.210	Claire Cunningham	501 1525 MARQUETTE AVE S	MINNEAPOLIS	MN	55402
613.72	WI-DO-109.210.010	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
613.72	WI-DO-109.210	Jim Carter	1100 3300 LOUISIANA	SUPERIOR	WI	54880
613.75	WI-DO-109.206	Jim Carter	1100 3300 LOUISIANA	SUPERIOR	WI	54880

**Sandpiper Pipeline and Line 3 Replacement Projects
Property Owners Crossed by the Project and Alternatives**

613.76	WI-DO-109.210.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
613.76	WI-DO-109.224	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
613.76	WI-DO-109.208	Douglas County	1313 BELKNAP ST	SUPERIOR	WI	54880
613.76	WI-DO-109.204	Jim Carter	1316 N 14TH ST	SUPERIOR	WI	54880
613.78	WI-DO-109.202.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
613.78	WI-DO-109.202	Jim Carter	1316 N 14TH ST	SUPERIOR	WI	54880
613.79	WI-DO-109.232	Calumet Superior, LLC	2780 STE 200 WATERFRONT PKY E	INDIANAPOLIS	IN	46214
613.84	WI-DO-109.200	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
613.93	WI-DO-110.000	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
614.00	WI-DO-111.000	Calumet Superior, LLC	2780 STE 200 WATERFRONT PKY E	INDIANAPOLIS	IN	46214
614.04	WI-DO-110.001	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
614.09	WI-DO-112.000	City of Superior	1316 N 14TH ST	SUPERIOR	WI	54880
614.30	WI-DO-113.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	SUPERIOR	WI	54880
614.47	WI-DO-115.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.51	WI-DO-116.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.55	WI-DO-117.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.61	WI-DO-118.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.67	WI-DO-119.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.74	WI-DO-120.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.80	WI-DO-121.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.86	WI-DO-122.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.94	WI-DO-123.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002
614.99	WI-DO-124.000	Lakehead Pipeline Co., LTD	1100 3400 LOUISIANA	HOUSTON	TX	77002



Sandpiper Pipeline and Line 3 Replacement Projects

**Wisconsin Department of Natural Resources
Environmental Impact Report**

May 2014

Table of Contents

SUMMARY 1

1.0 PROJECT PURPOSE AND NEED 4

 1.1 System 4

 1.1.1 United States Crude Oil Market 4

 1.1.2 Proposed System in Wisconsin 6

 1.2 Sandpiper Pipeline 6

 1.3 Line 3 Replacement 7

2.0 AUTHORITIES AND APPROVALS 7

 2.1 Chapter 30 Permit 7

 2.2 Wetland Water Quality Certification 7

 2.3 Stormwater Permit 7

 2.4 Air Permit 8

 2.5 Incidental Take 8

 2.6 Wisconsin Environmental Policy Act (WEPA) 8

 2.7 Other Agencies 8

 2.7.1 Federal 8

 2.7.2 Local 8

 2.8 Required Permits and Approvals 8

3.0 PROPOSED PROJECT DESCRIPTION 9

 3.1 System 9

 3.1.1 Sandpiper 9

 3.1.2 Line 3 10

 3.1.3 Enbridge History 12

 3.2 Sandpiper and Line 3 Pipelines 15

 3.2.1 Route 15

 3.2.2 Landowners 17

 3.2.3 Land Requirements 18

 3.2.4 Materials 23

 3.2.5 Construction Procedures 23

 3.2.6 Project Schedule 41

 3.2.7 Operation, Integrity, and Emergency Response 41

4.0 ALTERNATIVES 46

 4.1 Comparison of Route Alternatives 46

 4.1.1 No-Action Alternative 46

 4.1.2 System Alternatives 47

4.1.3	Project Combination Alternative - One Pipeline Scenario	48
4.1.4	Alternative Energy Sources, Transport Modes, and Energy Conservation	49
4.1.5	Route Alternatives – Sandpiper Pipeline and Line 3 Replacement Projects	52
5.0	EXISTING ENVIRONMENT	64
5.1	Air Quality	64
5.2	Soils	66
5.2.1	Identification of Soil Conditions	66
5.3	Geology and Groundwater	67
5.3.1	Geology and Physiography	67
5.3.2	Groundwater	67
5.4	Surface Waters and Wetlands	68
5.4.1	Major Basins and Watersheds	68
5.4.2	Wetlands	72
5.5	Vegetation, Wildlife, and Fisheries	73
5.5.1	Vegetation	73
5.5.2	Wildlife	74
5.5.3	Fisheries	76
5.5.4	Threatened and Endangered Species	78
5.6	Land Use and Public Lands	79
5.7	Socioeconomic Resources	79
5.7.1	Existing Socioeconomic Conditions	79
5.8	Cultural Resources	81
5.8.1	Environmental Review of Historic Sites	81
6.0	ENVIRONMENTAL EFFECTS	82
6.1	Air Quality	82
6.1.1	Applicable Air Quality Rules	83
6.1.2	General Construction and Operation Impacts and Mitigation	83
6.2	Soils	84
6.2.1	Soil Characteristics and Assessments	84
6.2.2	General Construction and Operation Impacts and Mitigation	86
6.3	Geology and Groundwater	89
6.3.1	Mineral Resources	89
6.3.2	Paleontology	89
6.3.3	Public Water Supply Wells	89
6.3.4	Private Water Supply Wells	90
6.3.5	Federal and State Designated Aquifers	90

6.3.6	Contaminated Groundwater.....	90
6.3.7	General Construction and Operation Impacts and Mitigation.....	90
6.4	Surface Waters and Wetlands.....	91
6.4.1	Surface Waters.....	91
6.4.2	Wetlands.....	95
6.5	Vegetation, Wildlife, and Fisheries.....	99
6.5.1	Vegetation.....	99
6.5.2	Wildlife.....	102
6.5.3	Fisheries.....	104
6.5.4	Threatened and Endangered Species.....	106
6.6	Land Use and Public Lands.....	110
6.6.1	Forest Land.....	114
6.6.2	Agricultural Land.....	115
6.6.3	Wetlands.....	115
6.6.4	Open Land.....	115
6.6.5	Shrubland.....	115
6.6.6	Developed Land.....	115
6.6.7	Special Land Uses.....	115
6.7	Socioeconomics.....	116
6.7.1	General Construction and Operation Impacts and Mitigation.....	116
6.8	Cultural Resources.....	118
6.8.1	Environmental Review of Impacts on Historic Sites.....	118
6.8.2	Previously Recorded Archaeological and Historic Sites.....	118
6.8.3	Previously Conducted Investigations.....	119
6.8.4	Phase I Survey Approach.....	119
6.8.5	Cultural Resource Impacts and Mitigation.....	120
7.0	CUMULATIVE IMPACTS AND CONCLUSIONS.....	120
7.1	Conclusions.....	122
7.1.1	Alternatives Considered.....	123
7.1.2	Soils.....	123
7.1.3	Groundwater.....	124
7.1.4	Surface Water.....	124
7.1.5	Wetlands.....	125
7.1.6	Vegetation.....	125
7.1.7	Wildlife.....	125
7.1.8	Fisheries.....	126

7.1.9	Special Status Species	127
7.1.10	Land Use and Public Lands	127
7.1.11	Socioeconomics	128
7.1.12	Cultural Resources	129
7.1.13	Air Quality and Noise	129
7.1.14	Cumulative Effects	129
8.0	REFERENCES	130

List of Tables

Table 2.8-1	Agency Permits and Approvals in Wisconsin.....	9
Table 3.2.3-1	Typical Dimensions of Additional Temporary Workspaces.....	22
Table 3.2.3-2	Proposed Access Roads.....	22
Table 3.2.5-1	Planned Depth of Cover for Pipelines.....	26
Table 3.2.5-2	Standard Upland Seed Mix	31
Table 3.2.5-3	Native Sedge/Wet Meadow Mixture (W2)	39
Table 3.2.5-4	Native Wet Prairie Mixture (W3).....	40
Table 4.1.4-1	Total Daily Rail Requirements.....	50
Table 4.1.4-2	Total Daily Truck Requirements.....	51
Table 4.1.5-1	Environmental Features Comparison – Route Alternatives A1 and A2.....	55
Table 4.1.5-2	Environmental Features Comparison – Route Alternatives B1 and B2.....	59
Table 4.1.5-3	Environmental Features Comparison – Route Alternatives C1 and C2.....	60
Table 4.1.5-4	Comparison of Features Along the Project Route Options	61
Table 5.1-1	National Ambient Air Quality Standards (NAAQS) 40 CFR 50 and WI Administrative Code NR 404.04	64
Table 5.4.1-1	Watersheds Boundaries Crossed by the Projects	69
Table 5.4.1-2	Watersheds, Geopolitical, and Ecosystem Boundaries Crossed by the Projects	69
Table 5.4.1-3	Comparison of Pre-Settlement vs. Baseline Environmental Conditions for the Projects within the Beartrap-Nemadji Watershed.....	70
Table 5.4.1-4	Comparison of Pre-Settlement vs. Baseline Environmental Conditions for the Projects within the St. Louis Watershed	70
Table 5.5.2-1	Species of Greatest Conservation Need Associated with the Pokegama-Nemadji Wetlands COA	76
Table 5.5.3-1	Native Fish Species in the Pokegama River and Other Tributaries of the St. Louis River Estuary	77
Table 5.5.4-1	Status of Federally Listed Species and Designated Critical Habitat	78
Table 5.5.4-2	Plant Species Targeted for Field Surveys in the Project Area	78
Table 5.5.4-3	Wildlife Species Targeted for Habitat Assessments in the Project Area	79
Table 5.7.1-1	Existing Socioeconomic Conditions in the Project Area	79
Table 5.7.2-1	Demographic Conditions in the Project Area	81
Table 6.1-1	Ambient Air Quality Concentrations	82
Table 6.2.1-1	Soil Characteristics Comparison of Project Route Options	85
Table 6.2.1-2	Soil Characteristics Crossed.....	85
Table 6.2.1-3	Topsoil Depths and Slope Class in the Project Area.....	86
Table 6.4.1-1	Waterbody Crossing Comparison Along the Route Options	92

Table 6.4.1-2	Waterbody Crossings	93
Table 6.4.2-1	Wetland Impacts.....	96
Table 6.4.2-2	Wetland Impact Comparison of Project Route Options.....	97
Table 6.5.1-1	NHI Occurrences of Natural Communities Within 1 Mile of the Project.....	99
Table 6.5.1-2	NHI Occurrences of Plant Species Within 1 Mile of the Project.....	100
Table 6.5.2-1	NHI Occurrences of Wildlife Species Within 1 or 2 Miles of the Project.....	103
Table 6.5.3-1	NHI Occurrences of Fish Species Within 1 or 2 Miles of the Project	105
Table 6.5.4-1	Rare Plant Species Observed During 2013 Botanical Field Surveys Within the Project Area	109
Table 6.6-1	Land Use Classifications Affected by Construction and Operation of the Project ...	111
Table 6.6-2	Land Use Comparison of the Project Route Options	113
Table 6.6.1-1	Tracts Enrolled in the Managed Forest or Forest Crop Law Program	114
Table 6.8.3-1	Reports documenting previously conducted Phase I reconnaissance surveys within the Project Area	119
Table 7-1	Current, Proposed, and Future Projects in the General Project Area	122

List of Figures

Figure 1.1-1	Petroleum Administration for Defense Districts	5
Figure 3.1-1	Project Overview Map	11
Figure 3.1-2	Existing Enbridge Pipeline Corridors	14
Figure 3.2-1	Wisconsin Route Overview Map	16
Figure 3.2-2	Typical Existing Right-of-Way Configuration	19
Figure 3.2-3	Typical Greenfield Right-of-Way Configuration.....	20
Figure 3.2-4	Wisconsin Typical Sandpiper and Line 3 Replacement Co-Construction Workspace	21
Figure 3.2-5	Typical Pipeline Construction Sequence.....	25
Figure 4.1-1	Overview of Route Alternatives.....	53
Figure 4.1-2	Route Alternative A1 and A2.....	57
Figure 4.1-3	Route Alternative B1 and B2	58
Figure 4.1-4	Route Alternative C1 and C2	62
Figure 4.1-5	Route Options.....	63

List of Appendices

Appendix A	Environmental Protection Plan
Appendix B	Agricultural Protection Plan
Appendix C	Unanticipated Discoveries Plan

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 -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 ₂ O	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 Basin¹ 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 disproportionately 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.

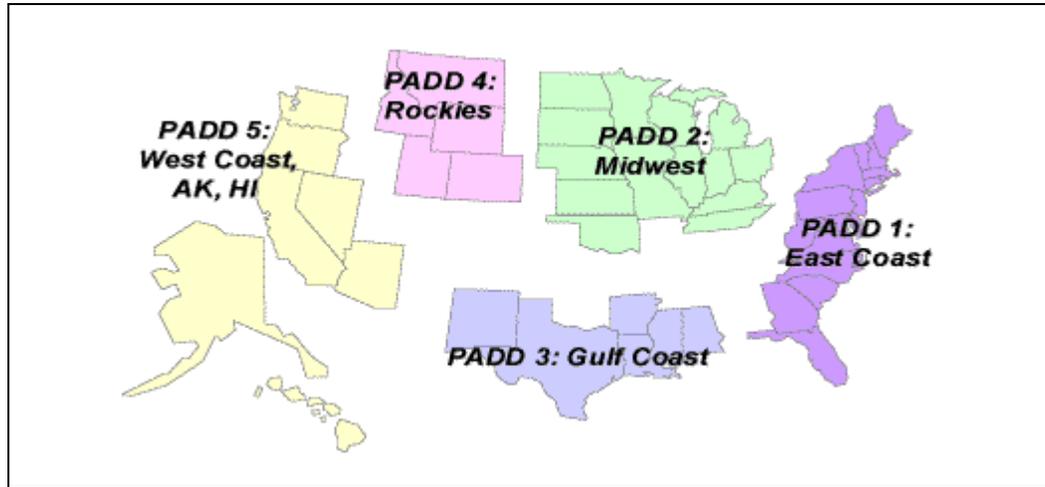
1.1.1 United States Crude Oil Market

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.

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 Basin⁷ 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 Basin⁸ 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;

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 Basin⁹ 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 service¹⁰ at Clearbrook 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.

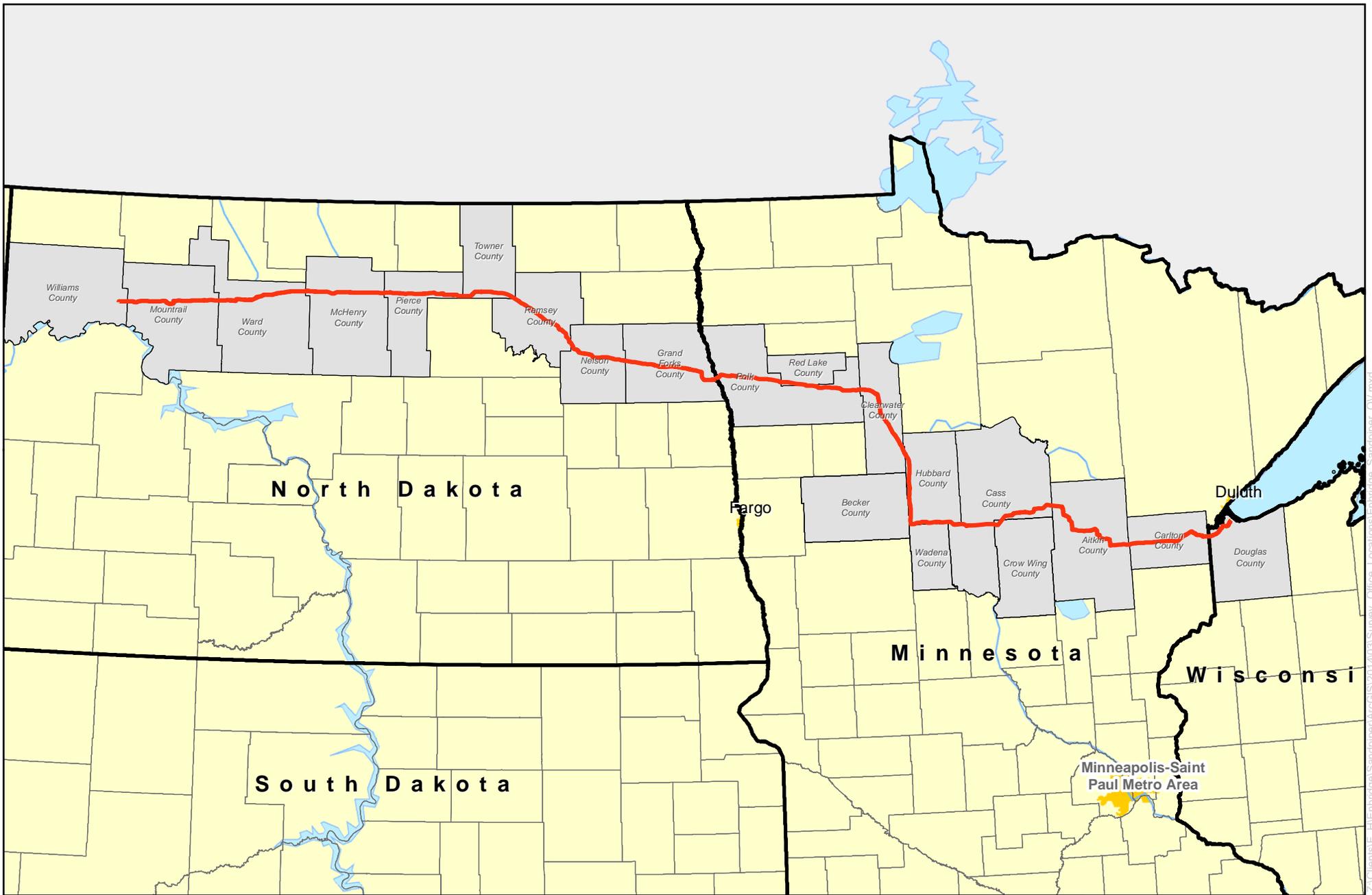
While ongoing integrity inspections, testing and maintenance achieves required safety standards¹¹, replacing this segment of Line 3 is a cost-effective option to meet the current capacity requirements of Enbridge's shippers. Moreover, the Project benefits the public by reducing ongoing impacts on landowners, 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.

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



Project Name
Sandpiper Pipeline Project
 Project Description



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.

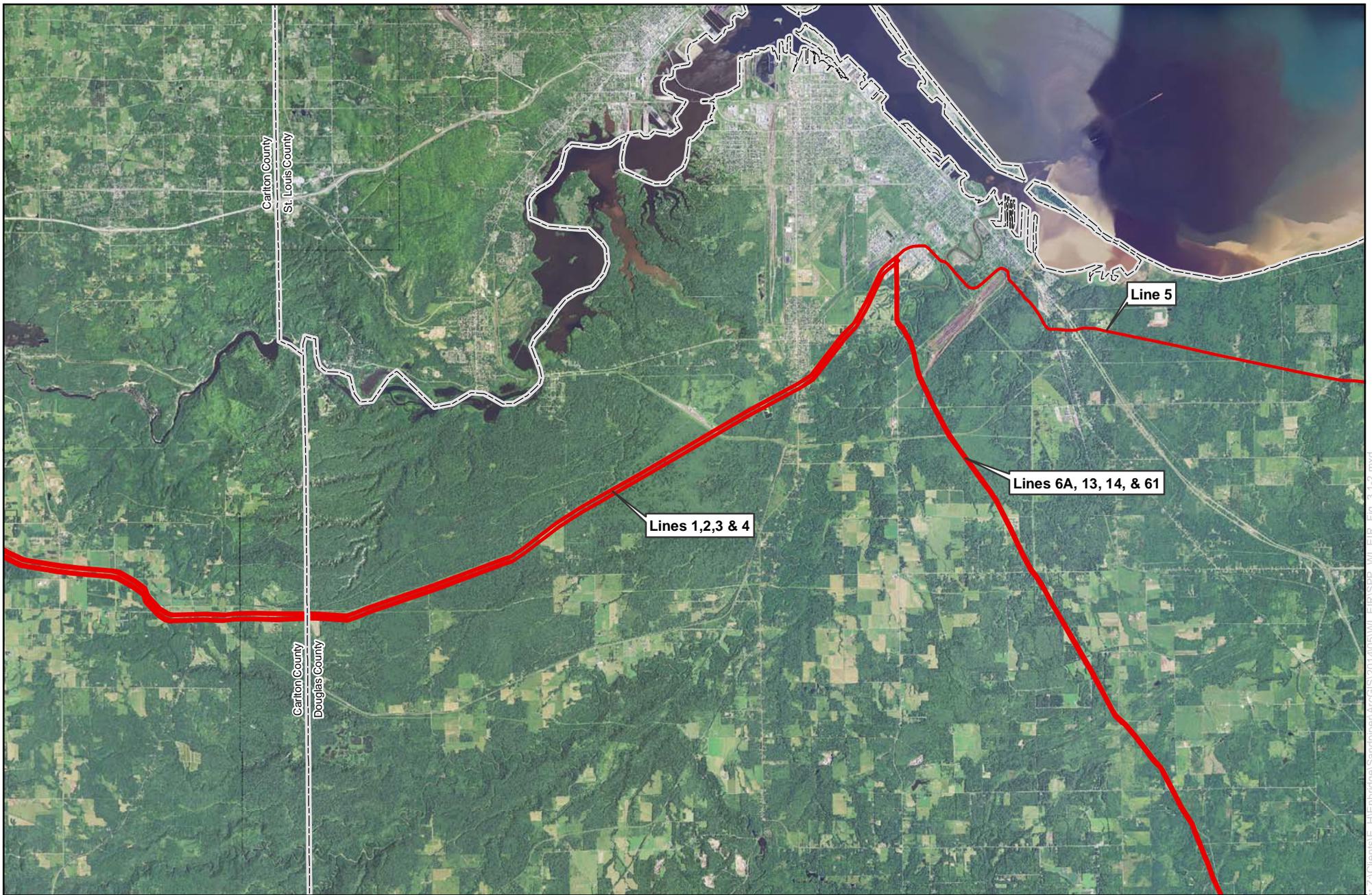
- Line 1 is an 18-inch-diameter crude oil pipeline installed in 1950. The installation of the pipeline occurred prior to the implementation of the Clean Water Act. No state wetland or waterbody permitting program at the federal or state level was in place at the time of installation. Enbridge completed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



0 1 2 Miles
1:150,000



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

— Existing Pipeline Corridors
 - - - County Boundary



Source: z:\Clients\IE_HIE\enbridge\Sandpiper\ArcGIS\201406\WLEIR\SP2_WLEIR_Fig_3.1-2.mxd Date: (02/17/2014)

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

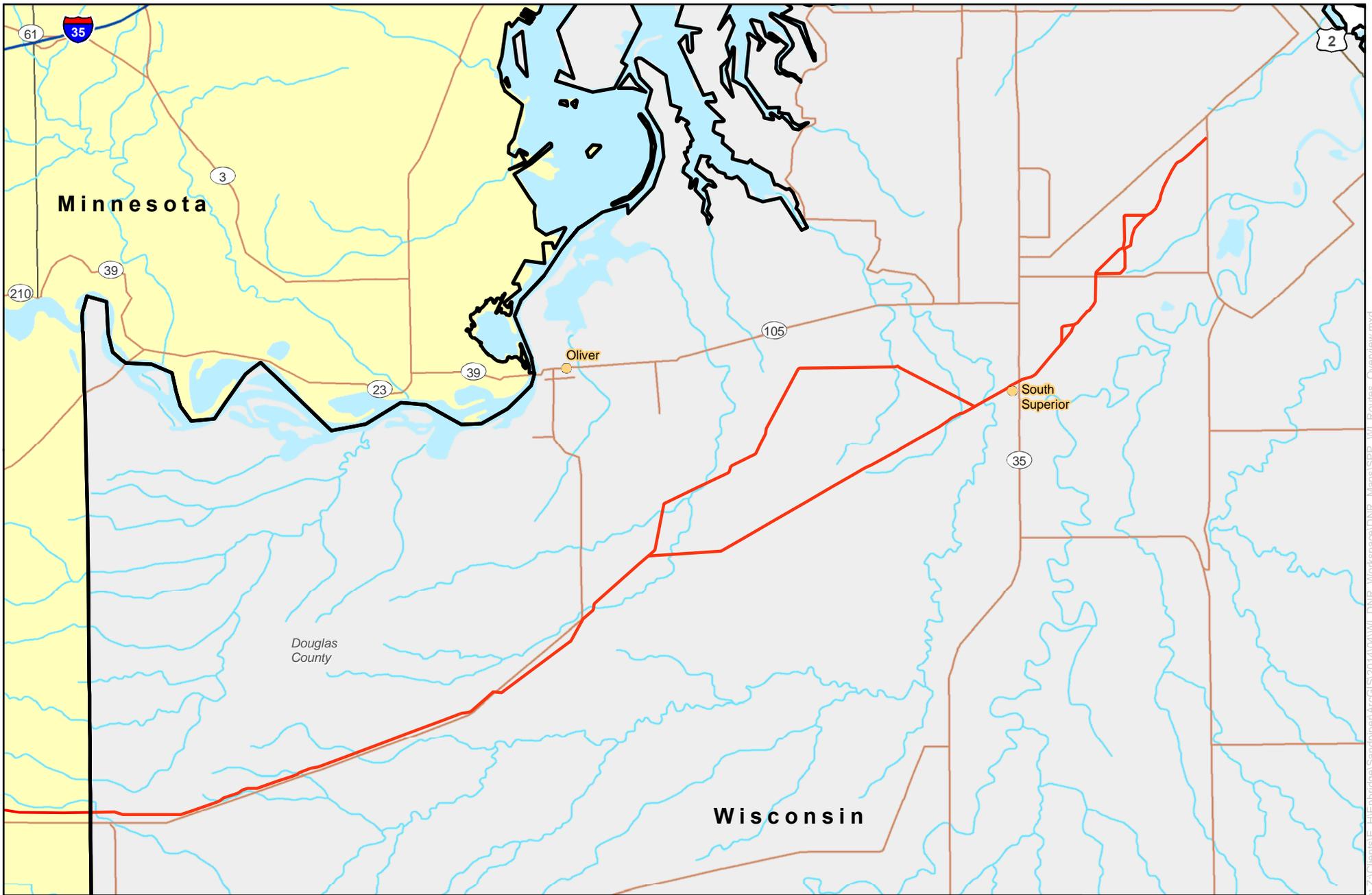
3.2.1 Route

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



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

— Route Overview Map



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

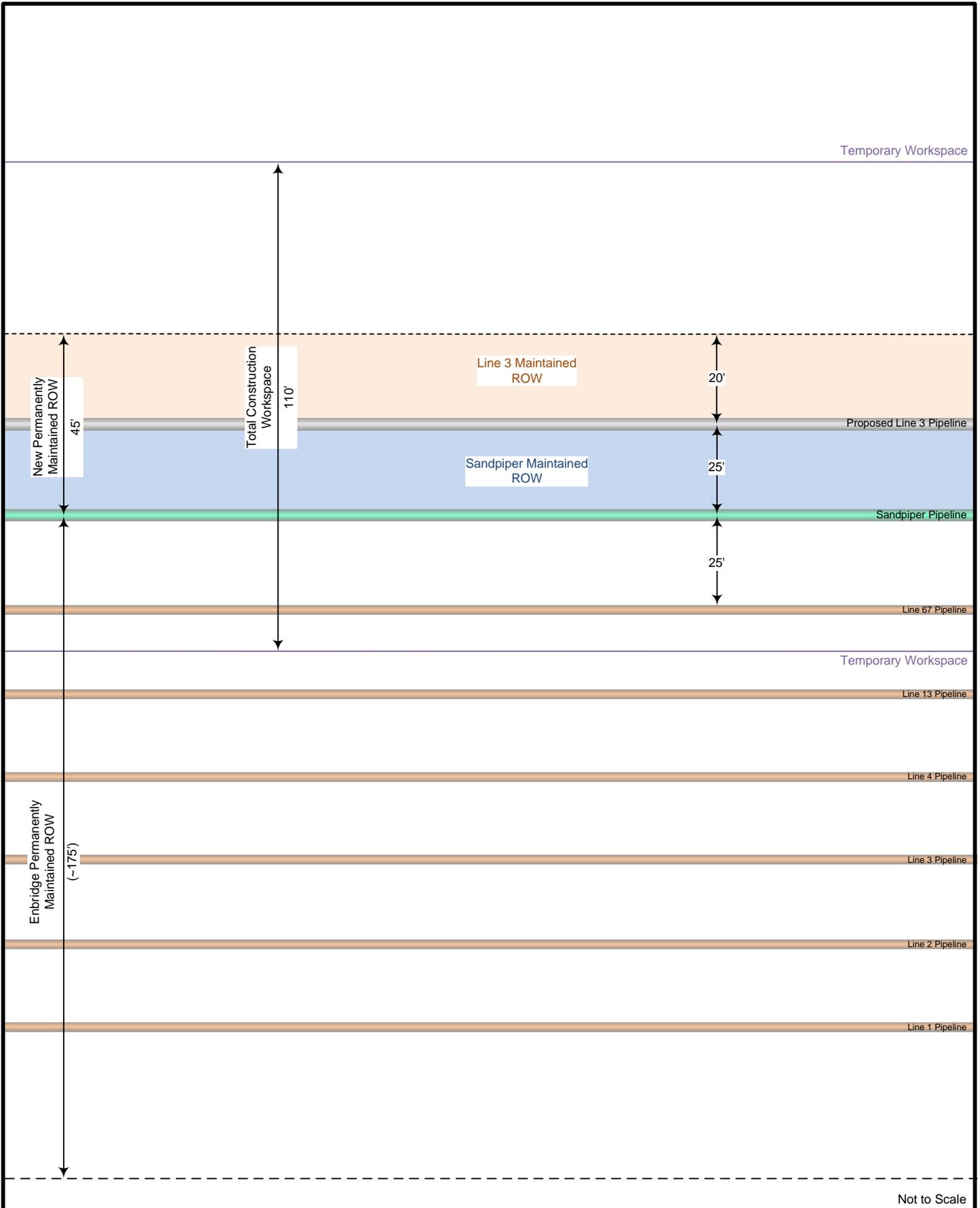
3.2.3.1 Construction Right-of-Way

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).



Temporary Workspace

Proposed Line 3 Pipeline

Sandpiper Pipeline

Line 67 Pipeline

Temporary Workspace

Line 13 Pipeline

Line 4 Pipeline

Line 3 Pipeline

Line 2 Pipeline

Line 1 Pipeline

Not to Scale

New Permanently Maintained ROW
45'

Total Construction Workspace
110'

Line 3 Maintained ROW

Sandpiper Maintained ROW

20'

25'

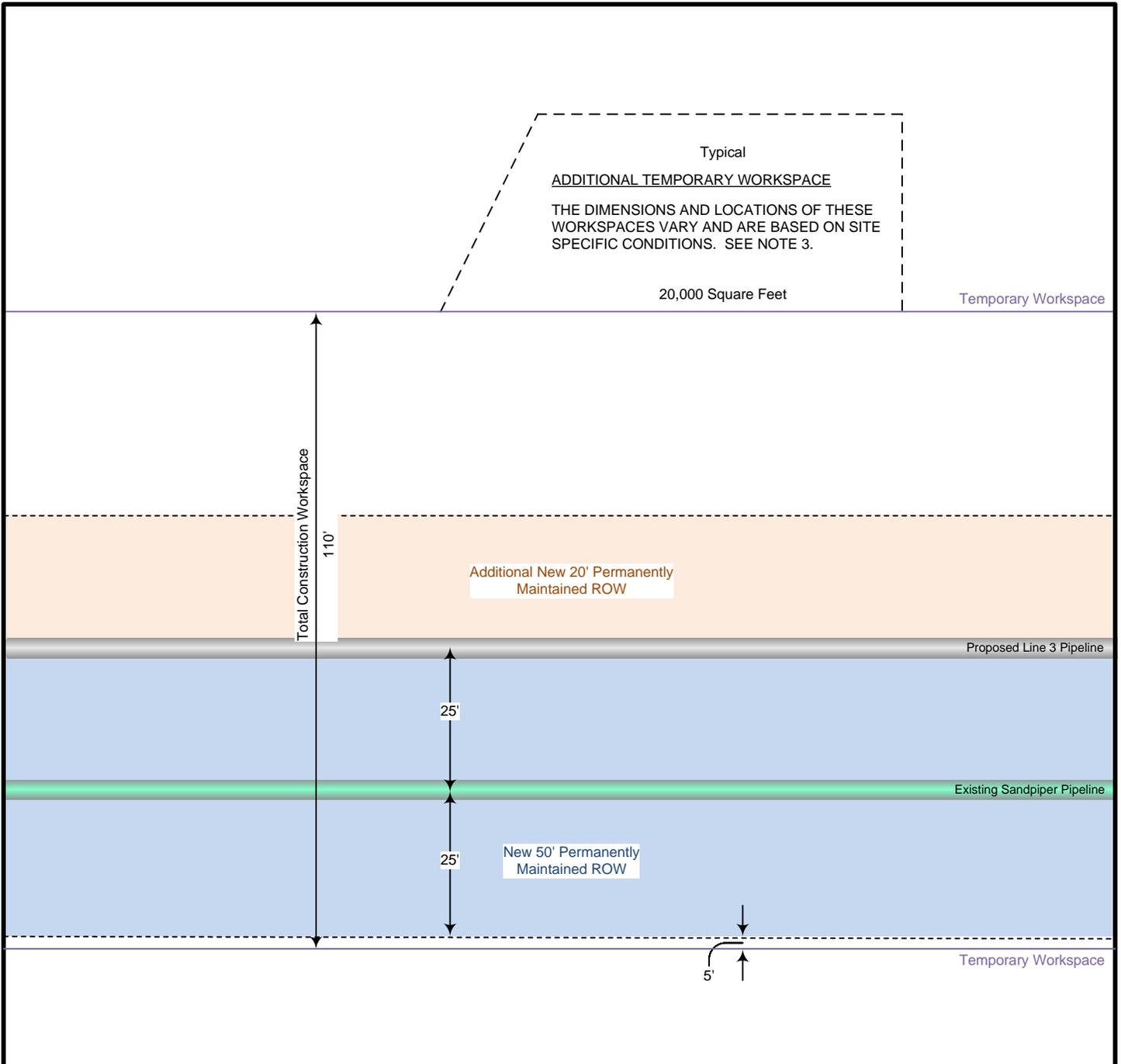
25'

Enbridge Permanently Maintained ROW
(~175')

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:

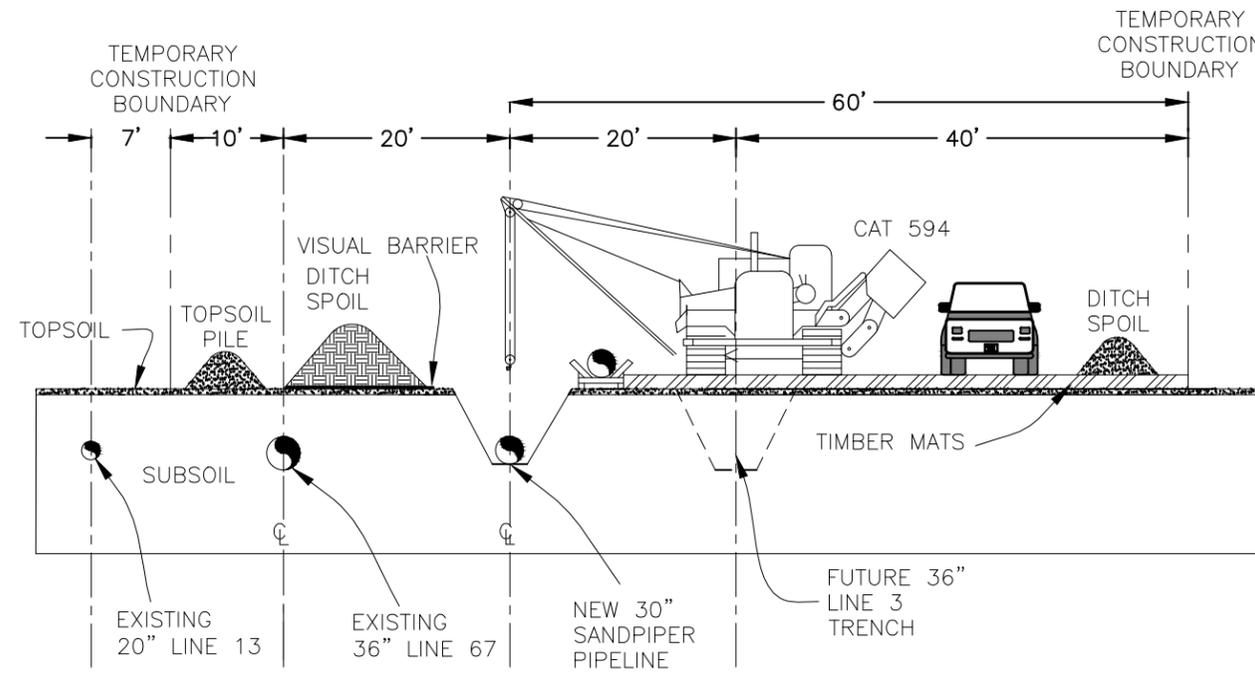
1. ENBRIDGE WILL TYPICALLY UTILIZE A 110-FOOT-WIDE CONSTRUCTION WORKSPACE TO INSTALL THE PIPELINES AND WILL HAVE A 25-FOOT OFFSET FROM EXISTING PIPELINE.
2. OF THE 110-FOOT-WIDE CONSTRUCTION FOOTPRINT, THE SANDPIPER PIPELINE WILL HAVE A NEW 50-FOOT-WIDE PERMANENTLY MAINTAINED RIGHT-OF-WAY AND THE LINE 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

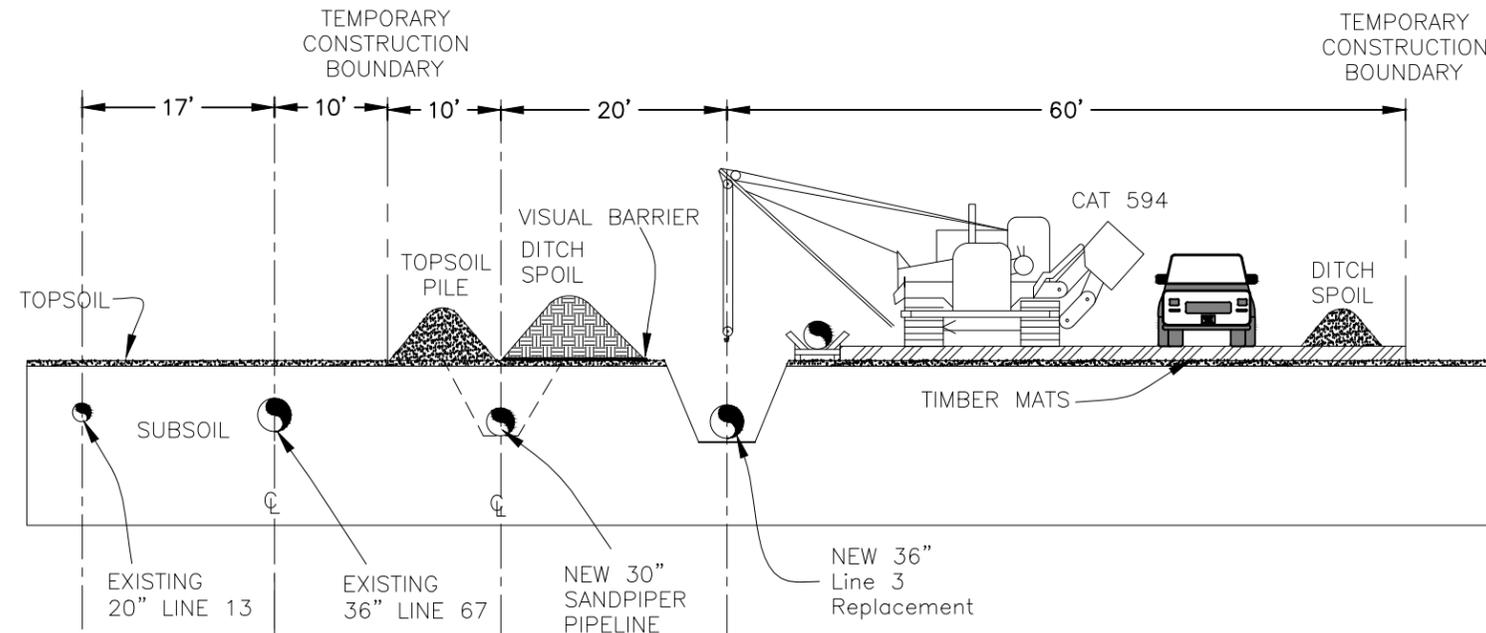


Figure 3.2-3
Line 3 Replacement and Sandpiper Pipeline Projects
Typical Greenfield Right-of-Way Configuration
(Wisconsin Only)

1ST PIPE (SANDPIPER)



2ND PIPE (LINE 3)



PRELIMINARY

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.

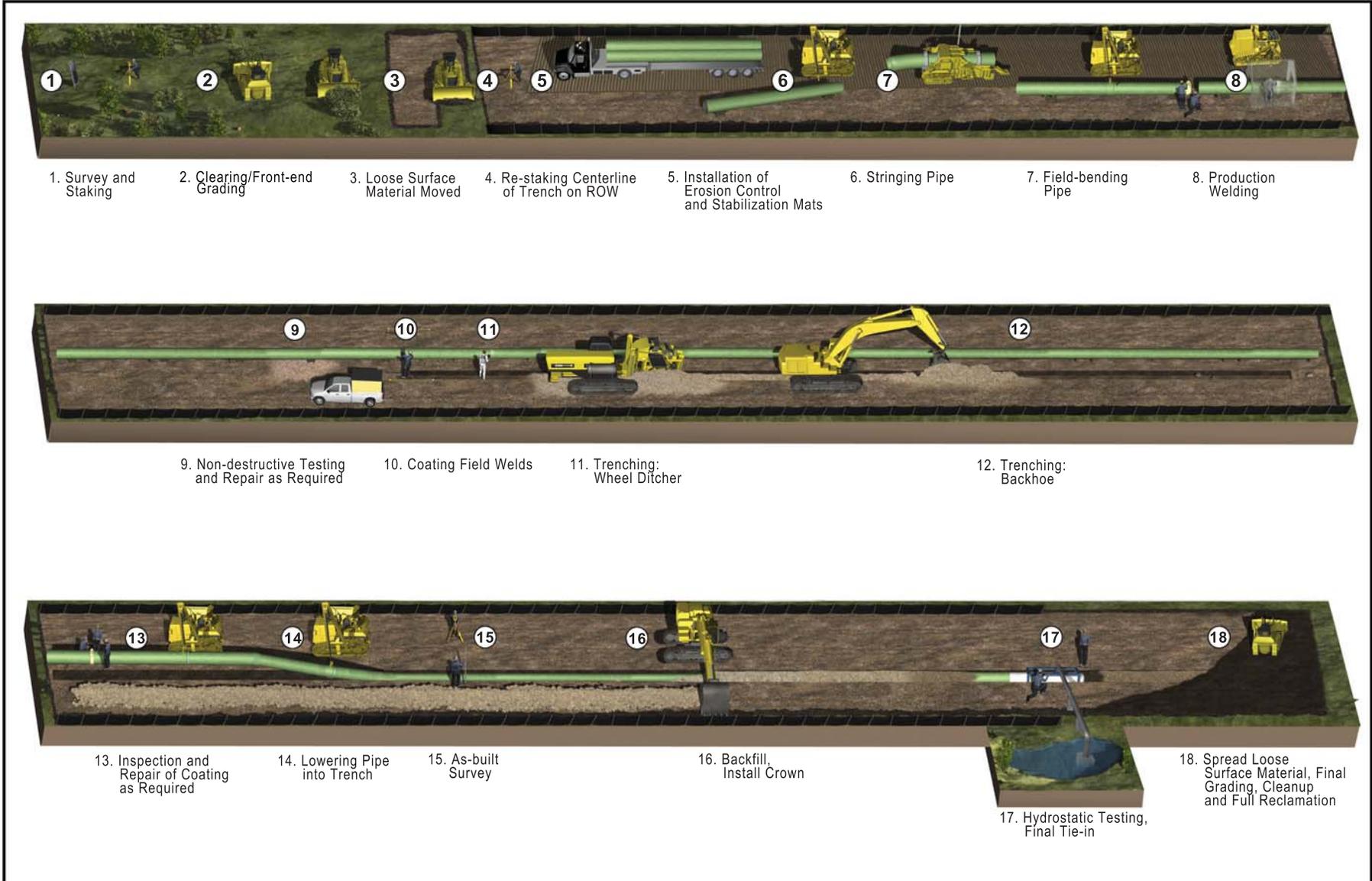
Non-merchantable timber and slash will be disposed of by mowing, chipping, grinding, and/or hauling to an approved off-site disposal facility or used in stabilizing erodible slopes or construction entrances. In non-agricultural, non-wetland areas, chips may be uniformly broadcast (at less than 1 inch 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 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 rock 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 (<i>Lolium perenne</i>)	2	17%
Canada Wild-rye (<i>Elymus canadensis</i>)	4	33%
Switchgrass (<i>Panicum virgatum</i>) (unimproved native variety)	4	33%
Timothy (<i>Phleum pratense</i>)	2	17%
Subtotal	12	100%
Associated Companion Crop Mix		
Oats (<i>Avena sativa</i>) for summer seeding; or Winter Wheat (<i>Triticum aestivum</i>) for seeding in late fall (dormant) or spring	16	80%
Annual Ryegrass (<i>Lolium italicum</i>) or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	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.

SANDPIPER PIPELINE AND
LINE 3 REPLACEMENT PROJECTS
WISCONSIN ENVIRONMENTAL IMPACT REPORT

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

SANDPIPER PIPELINE AND
LINE 3 REPLACEMENT PROJECTS
WISCONSIN ENVIRONMENTAL IMPACT REPORT

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

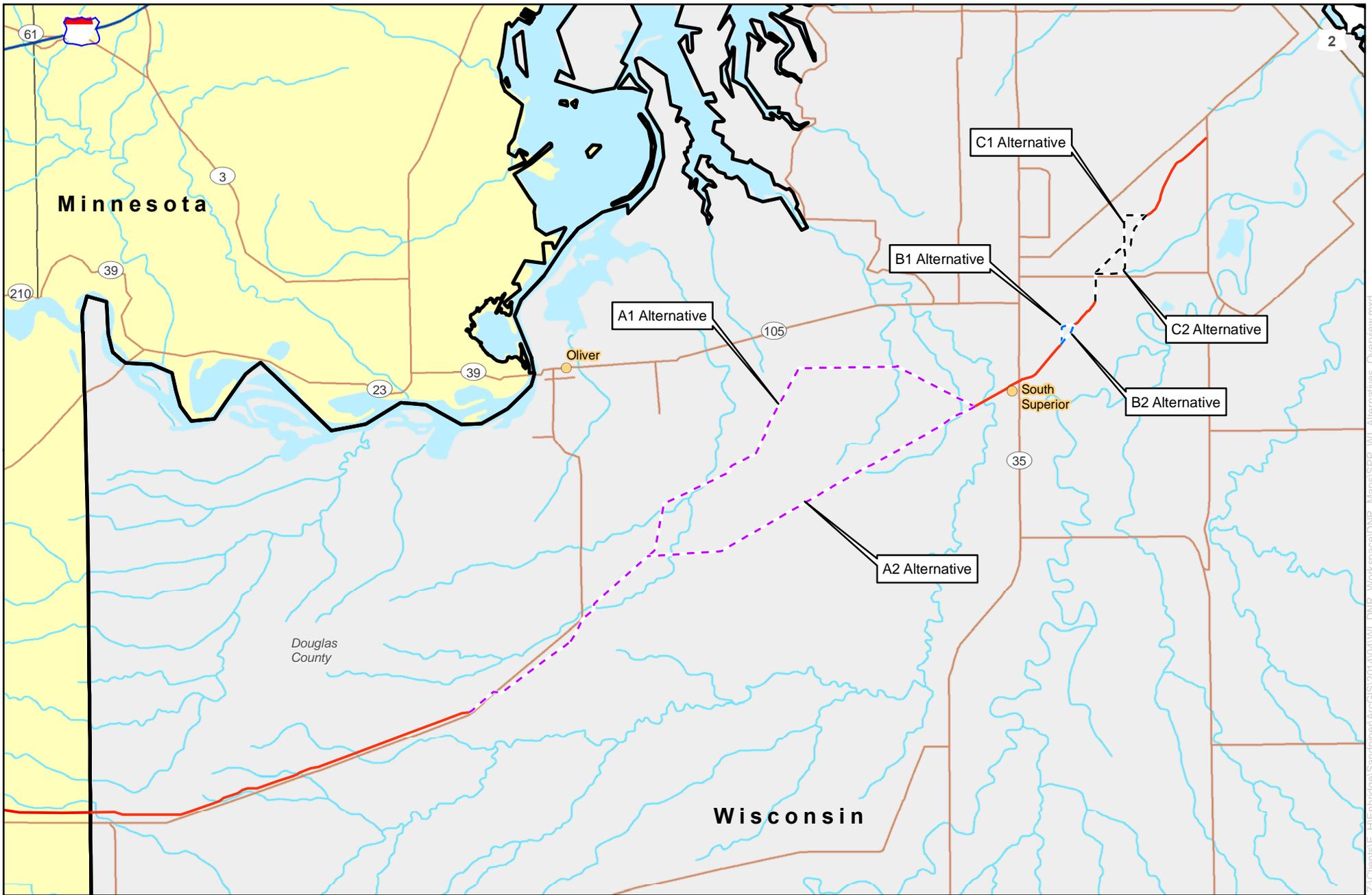


Figure 4.1-1
Sandpiper Pipeline and Line 3 Replacement Projects
 Overview of Alternatives

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

0 0.5 1
 Miles
 1 inch = 1.3 miles



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.

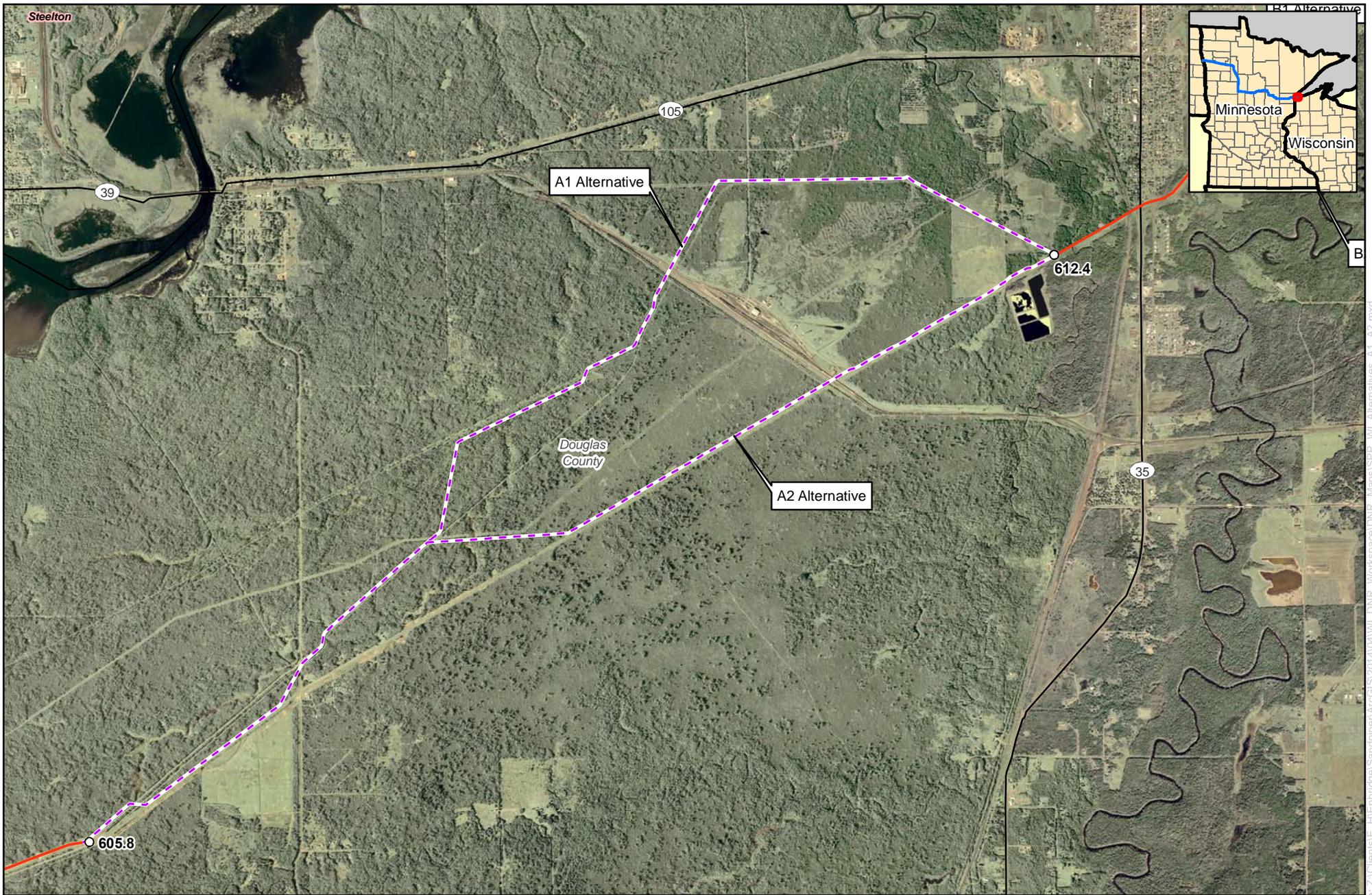
TABLE 4.1.5-1			
Environmental Features Comparison –Route Alternatives A1 and A2			
Environmental Features	Unit	Route Alternative A1	Route Alternative A2
Length	miles	6.5	5.8
Collocated with Enbridge Existing Right-of-Way	miles	0.0	2.8
Greenfield Route ^a	miles	0.6	0.2
Wetland Crossing Length ^{b, c}	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
<p>^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.</p> <p>^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.</p> <p>^c Crossing length of proposed pipeline centerline across wetlands.</p> <p>^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.</p> <p>^e Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.</p> <p>^f NLCD2006 Classification System (Fry et al., 2011)</p> <p>^g Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin’s Great Lakes, Pub. ## ER-002-00.</p> <p>^h Identified by the DNR and Great Lakes Indian Fish and Wildlife Commission.</p>			

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

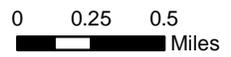


Figure 4.1-2
Sandpiper Pipeline and Line 3 Replacement Projects
 Route Alternatives A1 and A2





○ Milepost

— Proposed Project Route

- - - B1/B2 Route Alternative

0 0.05 0.1 Miles

Figure 4.1-3
Sandpiper Pipeline and Line 3 Replacement Projects
 Route Alternatives B1 and B2



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
<p>^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.</p> <p>^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.</p> <p>^c Crossing length of proposed pipeline centerline across wetlands.</p> <p>^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.</p> <p>^e Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.</p> <p>^f NLCD2006 Classification System (Fry et al., 2011).</p> <p>^g Identified by the March 2000 Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes, Pub. ## ER-002-00.</p> <p>^h Identified by the DNR and Great Lakes Indian Fish and Wildlife Commission.</p>			

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.

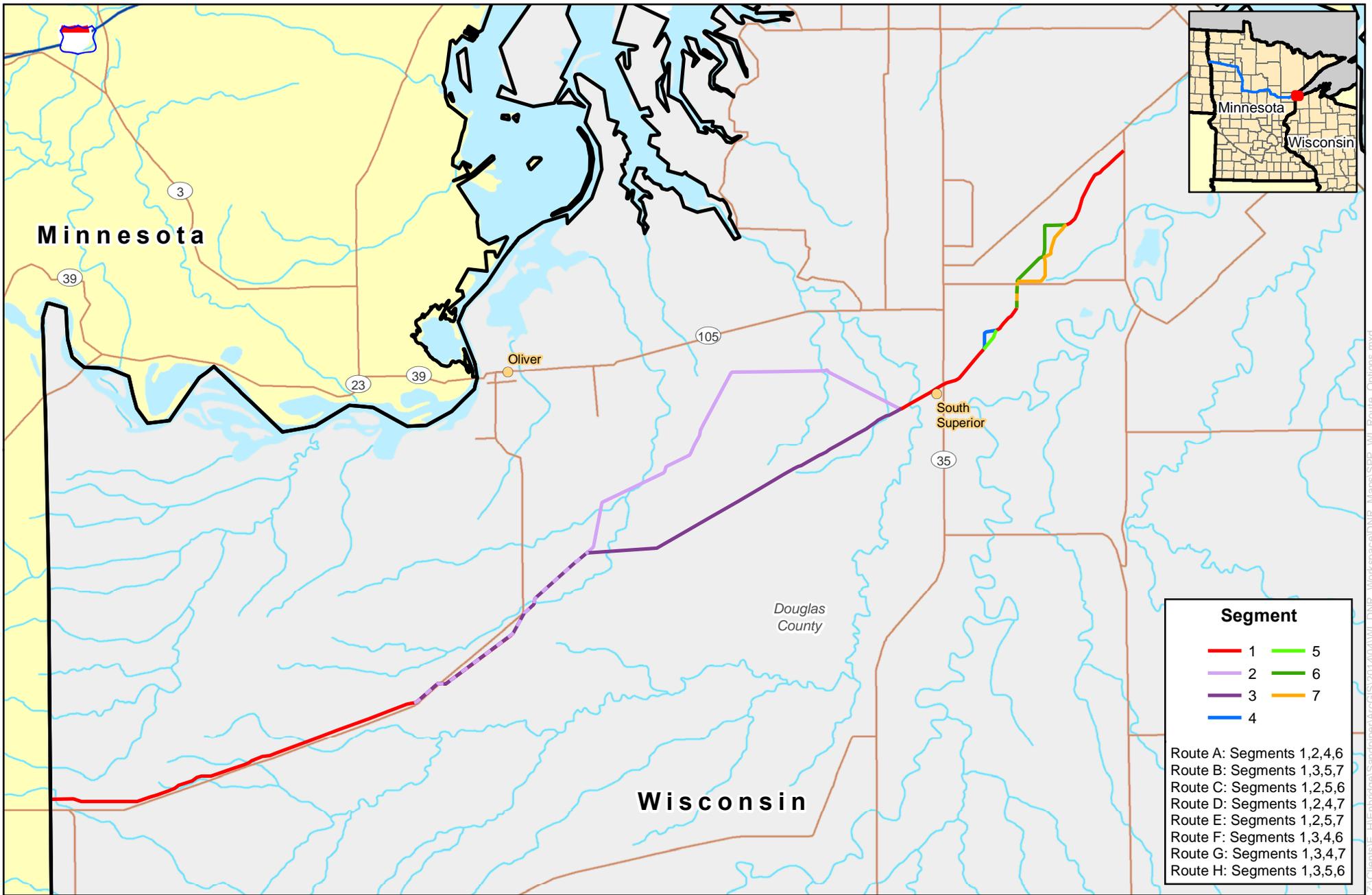
TABLE 4.1.5-4									
Comparison of Features Along the Project Route Options									
Features	Unit	Route Option A	Route Option B	Route Option C	Route Option D	Route Option E	Route Option F	Route Option G	Route Option H
Length	Miles	14.1	13.3	14.0	14.1	14.1	13.4	13.4	13.3
Adjacent to Existing Rights-of-Way	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.								



Figure 4.1-4
Sandpiper Pipeline and Line 3 Replacement Projects
 Route Alternatives C1 and C2



Source: Z:\Clients\EL\Henningsen\Sandpiper\GIS\2014\04\W\DNRC_Workspace\DNRC_Maps\SPP2_W\Alternatives_C1_C2.mxd Date: (5/2/2014)



0 0.5 1
Miles
1 inch = 1.3 miles



Figure 4.1-5
Sandpiper Pipeline and Line 3 Replacement Projects
Route Options A, B, C, D, E, F, G, and H



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 (NO₂), ozone, particulate matter less than 10 microns (PM₁₀), particulate matter less than 2.5 microns (PM_{2.5}), and sulfur dioxide (SO₂), 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.

Pollutant	Averaging Period	Primary Standard [1]		Secondary Standard [2]		Note
		ppmv	µg/m ³	ppmv	µg/m ³	
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]
NO ₂	1-hour	0.1	188			[7]
	annual	0.053	100	0.053	100	[8]
O ₃	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]
PM ₁₀	24-hour		150		150	[13]
	annual					[14]
PM _{2.5}	24-hour		65		65	[15]
			35		35	[16]
			35		35	[17]
	annual		15		15	[18]
			15		15	[19]
			12		15	[20]
SO ₂	1-hour	0.075	196	0.5	1,300	[21]
	3-hour					[22], [23]
	24-hour		0.14			[24], [25]
	annual		0.03			[26], [27]
<u>Notes:</u>						
[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/m ³	ppmv	µg/m ³	
						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/m ³	ppmv	µg/m ³	
		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/m ³ , 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/m ³ , 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 Keweenaw feldspathic quartzose sandstone overlying Keweenaw 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 Protection (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 Keweenaw 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 WETLANDS¹²

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

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}					
Land Use	Pre-settlement		Wisland Land Use or WWI acreage (thousands)	Baseline	
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS		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	
<i>Wisland Emergent Wetland</i>			38.3		
<i>Wisland Forested Wetland</i>			23.7		

^a Pre-settlement land cover distribution determined using the Wisconsin Native Vegetation Map.
^b Land Use determined using Wisland digital data set, Wisconsin Department of Natural Resources, Madison.
^c Wisland acreage was modified to substitute WWI acreage for Wisland forested and emergent wetland acreage estimates. WWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS. Wisland 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 Wisland. The difference is likely due to the inclusion of wetlands with a PSS component into the forested wetland category. The difference between Wisland 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}					
Land Use	Pre-settlement		Wisland Land Use or WWI acreage (thousands)	Baseline	
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS		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}					
Land Use	Pre-settlement			Baseline	
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS	Wisland Land Use or WWI acreage (thousands)	Relative Percentage for Watershed	Percentage Change
Subtotal	44.8	100.0	45.3	100.0	
<i>Wisland Emergent Wetland</i>			12.6		
<i>Wisland Forested Wetland</i>			2.0		

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

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

^c Wisland acreage was modified to substitute WWI acreage for Wisland forested and emergent wetland acreage estimates. WWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS. Wisland 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 Wisland. The difference is likely due to the inclusion of wetlands with a PSS component into the forested wetland category. The difference between Wisland 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.

Common Name	Scientific Name	Ecological Landscape Association Score ^a
MAMMALS		
gray wolf	<i>Canis lupus</i>	3
northern flying squirrel	<i>Glaucomys sabrinus</i>	3
silver-haired bat	<i>Lasionycteris noctivagans</i>	2
eastern red bat	<i>Lasiurus borealis</i>	2
hoary bat	<i>Lasiurus cinereus</i>	2
American marten	<i>Martes americana</i>	2
woodland jumping mouse	<i>Napaeozapus insignis</i>	3
water shrew	<i>Sorex palustris</i>	3
BIRDS		
veery	<i>Catharus fuscescens</i>	3
olive-sided flycatcher	<i>Contopus cooperi</i>	2
least flycatcher	<i>Empidonax minimus</i>	3
rusty blackbird	<i>Euphagus carolinus</i>	2
black-backed woodpecker	<i>Picoides arcticus</i>	2
Canada warbler	<i>Wilsonia canadensis</i>	3
AMPHIBIANS		
four-toed salamander	<i>Hemidactylium scutatum</i>	3
INVERTEBRATES		
bay underwing moth	<i>Catocala badia coelebs</i>	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	<i>Acipenser fulvescens</i>	common			Y	Y	Y	Y				
rockbass	<i>Ambloplites rupestris</i>	common		Y	Y	Y	Y	Y	Y	Y	Y	Y
longnose sucker	<i>Catostomus catostomus</i>	present			Y	Y			Y			
white sucker	<i>Catostomus commersoni</i>	common			Y	Y	Y	Y	Y	Y	Y	Y
lake chub	<i>Couesius plumbeus</i>	trace	Y	Y	Y	Y						
northern pike	<i>Esox lucius</i>	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
muskellunge	<i>Esox masquinongy</i>	present	Y		Y	Y	Y	Y	Y	Y	Y	Y
johnny darter	<i>Etheostoma nigrum</i>	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
black bullhead	<i>Ictalurus melas</i>	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
yellow bullhead	<i>Ictalurus natalis</i>	trace		Y	Y	Y	Y	Y	Y	Y	Y	Y
brown bullhead	<i>Ictalurus nebulosus</i>	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
channel catfish	<i>Ictalurus punctatus</i>	common	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
pumpkinseed	<i>Lepomis gibbosus</i>	trace		Y	Y	Y	Y	Y	Y	Y	Y	Y
bluegill	<i>Lepomis macrochirus</i>	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
burbot	<i>Lota lota</i>	present			Y	Y	Y	Y	Y			Y
smallmouth bass	<i>Micropterus dolomieu</i>	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
largemouth bass	<i>Micropterus salmoides</i>	trace		Y	Y	Y	Y	Y	Y	Y	Y	Y
silver redhorse	<i>Moxostoma anisurum</i>	common			Y	Y	Y	Y	Y	Y	Y	Y
shorthead redhorse	<i>Moxostoma macrolepidotum</i>	common			Y	Y	Y	Y	Y	Y	Y	Y
golden shiner	<i>Notemigonus crysoleucas</i>	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
emerald shiner	<i>Notropis atherinoides</i>	common		Y	Y	Y	Y	Y	Y	Y	Y	Y
common shiner	<i>Notropis cornutus</i>	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
spottail shiner	<i>Notropis hudsonius</i>	common		Y	Y	Y	Y	Y	Y	Y	Y	Y
mimic shiner	<i>Notropis volucellus</i>	present			Y	Y	Y	Y	Y	Y	Y	Y
tadpole madtom	<i>Noturus gyrinus</i>	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
yellow perch	<i>Perca flavescens</i>	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
log perch	<i>Percina caprodes</i>	common	Y		Y	Y	Y	Y	Y	Y	Y	Y
trout perch	<i>Percopsis omiscomaycus</i>	common		Y	Y	Y	Y	Y	Y	Y	Y	Y
fathead minnow	<i>Pimephales promelas</i>	present		Y	Y	Y	Y	Y	Y	Y	Y	Y
black crappie	<i>Poxomis nigromaculatus</i>	common	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
walleye	<i>Stizostedion vitreum</i>	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 (<i>Charadrius melodus</i>)	Endangered Critical Habitat	Sandy beaches, bare alluvial and dredge spoil islands
Kirtland's warbler (<i>Dendroica kirtlandii</i>)	Endangered	Young jack pine stands (5-25 years old)
Canada lynx (<i>Lynx canadensis</i>)	Threatened	Northern forest
Northern long-eared bat (<i>Myotis septentrionalis</i>)	Proposed	Cavities or crevices of both live and dead trees.
Fassett's locoweed (<i>Oxytropis campestris</i> var. <i>chartacea</i>)	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	<i>Petasites sagittatus</i>	threatened
floating marsh-marigold	<i>Caltha natans</i>	endangered
marsh grass-of-Parnassus	<i>Parnassia palustris</i>	threatened
clustered bur reed	<i>Sparganium glomeratum</i>	threatened
seaside crowfoot	<i>Ranunculus cymbalaria</i>	threatened
slender spike-rush	<i>Eleocharis nitida</i>	endangered
small yellow water crowfoot	<i>Ranunculus gmelinii</i>	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	<i>Salix planifolia</i>	threatened

TABLE 5.5.4-3		
Wildlife Species Targeted for Habitat Assessments in the Project Area		
Common Name	Scientific Name	State Status
upland sandpiper	<i>Bartramia longicauda</i>	threatened
wood turtle	<i>Glyptemys insculpta</i>	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									
State/County	Race as a Percentage of Total Population ^a							Persons of Hispanic or Latino Origin, percent (2012) ^a	Persons Below Poverty, percent (2007-2011) ^b
	White	Black or African American	Asian	American Indian and Alaska Native	Native Hawaiian and Other Pacific Islander	Persons Reporting Other Race/2 or More Races	Total		
WISCONSIN	88.2	6.5	2.5	1.1	0.0	1.7	100	6.2	12.0
Douglas	93.2	1.2	0.9	2.0	0.0	2.8	100	1.2	12.9

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

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

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

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 4 th max	0.050 ppm	2010-2012	9 miles north
PM _{2.5}	24-hour	B	3 year average of 98 th %	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	No data available				
	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 37 th 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: CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHG emissions are estimated as carbon dioxide equivalents (CO₂-eq). CO₂-eq emissions are calculated by determining the GHG's global warming potential (GWP) of the gases relative to CO₂ 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 PM₁₀, PM_{2.5}, NO₂, CO, ozone, SO₂ 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.

SANDPIPER PIPELINE AND
LINE 3 REPLACEMENT PROJECTS
WISCONSIN ENVIRONMENTAL IMPACT REPORT

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%)							
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%)							
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%)							
Shallow Bedrock	0.0 (0%)							
<p>^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.</p> <p>^b Includes land listed by the NRCS as potential prime farmland if a limiting factor is mitigated (e.g., artificial drainage).</p> <p>^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.</p>								

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.

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.

SANDPIPER PIPELINE AND
LINE 3 REPLACEMENT PROJECTS
WISCONSIN ENVIRONMENTAL IMPACT REPORT

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}
<i>St. Louis River Watershed (HUC 8)</i>								
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
<i>Beartrap-Nemadji Watershed (HUC 8)</i>								
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 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
<p>^a Crossing length of pipeline centerline across wetlands.</p> <p>^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.</p> <p>^c Permanent conversion impacts include the area within the new permanent easement where the pipeline corridor will be maintained by periodic clearing activities.</p>									

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 balsampoplar (*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 (<i>Aster modestus</i>)		X	X	X						
slim-stem small reed grass (<i>Calamagrostis stricta</i>)		X	X	X				X	X	X
Fernald's sedge (<i>Carex merritt-fernaldii</i>)										X
smooth black sedge (<i>Carex nigra</i>)										X
flat-stemmed spike- rush (<i>Eleocharis compressa</i>)										X
mamillate spike-rush (<i>Eleocharis mamillata</i>)		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 (<i>Equisetum palustre</i>)										X
large-leaved avens (<i>Geum macrophyllum</i> var. <i>macrophyllum</i>)			X							
Vasey's rush (<i>Juncus vaseyi</i>)	X	X	X	X	X	X	X	X	X	X
large-flowered ground- cherry (<i>Leucophysalis</i> <i>grandiflora</i>)				X	X	X	X	X	X	X
THREATENED										
marsh grass-of- Parnassus (<i>Parnassia</i> <i>palustris</i>)		X	X							
arrow-leaved sweet- coltsfoot (<i>Petasites</i> <i>sagittatus</i>)	X	X	X	X	X	X	X	X	X	X
seaside crowfoot (<i>Ranunculus</i> <i>cymbalaria</i>)		X	X	X	X	X	X	X	X	X
tea-leaved willow (<i>Salix planifolia</i>)	X	X	X	X	X	X	X	X	X	
clustered bur reed (<i>Sparganium</i> <i>glomeratum</i>)	X	X	X	X	X		X	X	X	X
ENDANGERED										
floating marsh-marigold (<i>Caltha natans</i>)		X	X							
slender spike-rush (<i>Eleocharis nitida</i>)		X	X	X	X	X	X	X	X	X
small yellow water crowfoot (<i>Ranunculus</i> <i>gmelinii</i>)	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 reseeded 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 (<i>Ammodramus leconteii</i>) ^a	X	X	X							
a flat-headed mayfly (<i>Maccaffertium pulchellum</i>) ^b		X	X	X	X	X	X			
Connecticut warbler (<i>Oporornis agilis</i>) ^a	X	X	X							
forcipate emerald dragonfly (<i>Somatochlora forcipata</i>) ^b		X								
a small square-gilled mayfly (<i>Sparbarus maculates</i>) ^b		X	X	X	X	X	X			
THREATENED										
upland sandpiper (<i>Bartramia longicauda</i>) ^a	X	X	X							
wood turtle (<i>Glyptemys insculpta</i>) ^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 (<i>Acipenser fulvescens</i>) ^b		X	X							
American eel (<i>Anguilla rostrata</i>) ^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

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 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.

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] (<i>Juncus vaseyi</i>)		X	X					X	X	X
THREATENED										
marsh grass-of- Parnassus [7] (<i>Parnassia palustris</i>)			X							
sweet coltsfoot [154] (<i>Petasites sagittatus</i>)		X	X							
seaside crowfoot [9] (<i>Ranunculus cymbalaria</i>)										X
tea-leaved willow [251] (<i>Salix planifolia</i>)	X	X	X					X	X	X
clustered bur reed [3] (<i>Sparganium glomeratum</i>)	X	X								
ENDANGERED										
neat spike-rush [18] (<i>Eleocharis nitida</i>)		X	X					X		X
small yellow water crowfoot [2] (<i>Ranunculus gmelinii</i>)			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 605.8 – 612.4		MP 613.4 – 613.7		MP 613.7 – 614.0		MP 614.0 – 615.1		MP 615.1 – 616.1	
	MP 602.0 – 605.8	Route Alternative A1	Route Alternative A2	MP 612.4 – 613.4	Route Alternative B1	Route Alternative B2	MP 613.7 – 614.0	Route Alternative C1	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		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	
% 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).										

SANDPIPER PIPELINE AND
LINE 3 REPLACEMENT PROJECTS
WISCONSIN ENVIRONMENTAL IMPACT REPORT

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 be provided a cutting notification at least 30 days prior to clearing activities on the tracts identified below.

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.

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* (Dudzick 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.

SANDPIPER PIPELINE AND
LINE 3 REPLACEMENT PROJECTS
WISCONSIN ENVIRONMENTAL IMPACT REPORT

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 1 st quarter 2014 and completed in 4 th 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 2 nd quarter 2012 to construction complete in 2 nd 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 4 th quarter 2013 to Project in-service in 1 st 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 2 nd 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 3 rd quarter 2013 construction complete 4 th 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	4 th 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 1 st quarter 2014 to in-service in 2 nd 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 1 st quarter 2014 to in-service in 2 nd 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 1 st 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-diameter, 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 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 reseeded 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

TABLE OF CONTENTS

INTRODUCTION 1

1.0 GENERAL MITIGATION MEASURES 3

 1.1 IDENTIFICATION OF AVOIDANCE AREAS 3

 1.2 CONSTRUCTION LINE LIST AND PERMITS 3

 1.3 WET WEATHER SHUTDOWN 3

 1.4 RIGHT-OF-WAY ACCESS 3

 1.5 RIGHT-OF-WAY REQUIREMENTS 4

 1.6 CONTROLLING SPREAD OF UNDESIRABLE SPECIES 4

 1.6.1 Prevention and Control Measures 5

 1.7 POTHOLING/HYDROVAC SLURRY 6

 1.8 UPLAND CLEARING 6

 1.8.1 Disposal of Non-Merchantable Timber 6

 1.8.2 Disposal of Merchantable Timber 6

 1.8.3 Upland Grading and Stump Removal 6

 1.9 TEMPORARY EROSION AND SEDIMENT CONTROLS 6

 1.9.1 Temporary Stabilization 7

 1.9.2 Erosion Control Blanket 7

 1.9.3 Mulch 7

 1.9.4 Cat Tracking 8

 1.9.5 Temporary Slope Breakers 8

 1.10 UPLAND TOPSOIL SEGREGATION 9

 1.11 UPLAND TRENCHING 10

 1.11.1 Timing 10

 1.12 FOAM PILLOW INSTALLATION 10

 1.13 TRENCH BREAKERS 10

 1.14 DRAIN TILE INLET PROTECTION AND TILE REPAIRS 11

 1.15 UPLAND BACKFILLING 11

 1.16 CLEANUP AND ROUGH/FINAL GRADING 11

 1.16.1 Timing 11

 1.17 PERMANENT EROSION AND SEDIMENT CONTROLS 12

 1.18 SOIL COMPACTION TREATMENT 12

1.19	STONE REMOVAL.....	12
1.20	REPAIR OF DAMAGED CONSERVATION PRACTICES.....	12
1.21	LAND LEVELING FOLLOWING CONSTRUCTION.....	13
2.0	STREAM AND RIVER CROSSING GENERAL REQUIREMENTS.....	14
2.1	TIME WINDOW FOR CONSTRUCTION.....	14
2.2	CLEARING AND GRADING.....	14
2.2.1	Impaired Waters.....	15
2.3	ADDITIONAL TEMPORARY WORKSPACE.....	15
2.4	BRIDGES.....	15
2.4.1	Types of Bridges.....	15
2.4.2	Bridge Design and Maintenance.....	16
2.5	STREAM AND RIVER CROSSING CONSTRUCTION METHODS.....	16
2.5.1	Wet Trench Method.....	16
2.5.2	Dam and Pump Method.....	17
2.5.3	Flume Method.....	18
2.5.4	Directional Drill and/or Guided Bore Method.....	19
2.6	PERMANENT RESTORATION.....	20
2.6.1	Vegetative Bank Restoration.....	20
2.6.2	Supplemental Bank Stabilization.....	20
2.6.3	Bridge Removal.....	21
2.6.4	Swales.....	21
3.0	WETLAND CROSSING GENERAL REQUIREMENTS.....	22
3.1	WETLAND ACCESS.....	22
3.2	CLEARING.....	22
3.3	ADDITIONAL TEMPORARY WORKSPACE IN WETLANDS.....	22
3.4	GRADING IN A WETLAND.....	23
3.5	RIGHT-OF-WAY STABILIZATION.....	23
3.6	TRENCHING.....	23
3.6.1	Topsoil Segregation.....	23
3.6.2	Trench Breakers.....	24
3.7	PIPELINE INSTALLATION.....	24
3.7.1	Push/Pull Method.....	24
3.7.2	Temporary Erosion and Sediment Controls.....	24
3.7.3	Concrete Coating.....	24
3.8	BACKFILLING.....	24
3.9	ROUGH GRADING, CLEANUP, AND TEMPORARY RESTORATION.....	25
3.9.1	Timing.....	25
3.9.2	Temporary Stabilization.....	25
4.0	HIGHWAY, ROAD and RAIL CROSSINGS.....	26
4.1	ADDITIONAL WORKSPACE.....	26
4.2	MAINTENANCE.....	26

4.3	TEMPORARY EROSION AND SEDIMENT CONTROLS.....	26
5.0	CONSTRUCTION DEWATERING.....	27
5.1	TRENCH DEWATERING.....	27
5.1.1	Flow Measurement and Water Sampling.....	28
5.1.2	Regulatory Notification and Reporting.....	28
5.2	HYDROSTATIC TEST DISCHARGES.....	28
5.2.1	Refueling.....	28
5.2.2	Siting of Test Manifolds.....	28
5.2.3	Water Sampling.....	28
5.2.4	Best Management Practices.....	28
5.2.5	Flow Measurement.....	29
6.0	WATER APPROPRIATION.....	30
6.1	GENERAL.....	30
6.2	WATER SOURCES.....	30
6.3	FLOW MEASUREMENT.....	30
6.4	WATER SAMPLING.....	30
6.5	REGULATORY NOTIFICATION AND REPORTING.....	30
7.0	REVEGETATION & MONITORING.....	31
7.1	PROJECT SEED SPECIFICATIONS.....	31
7.2	TEMPORARY REVEGETATION.....	31
7.3	TIMING FOR TEMPORARY VEGETATION.....	32
7.4	MULCH.....	32
7.5	PERMANENT REVEGETATION.....	32
7.6	UPLAND CONSTRUCTION AREAS.....	33
7.7	PERMANENT SEEDING OF WETLAND AREAS.....	33
7.7.1	Unsaturated Wetland Areas.....	33
7.7.2	Saturated/Standing Water Wetlands.....	33
7.7.3	Forested Wetland Restoration.....	33
7.8	PERMANENT SEEDING OF WATERBODY BANKS.....	33
7.9	SPECIALIZED SEED MIXES.....	33
7.10	CONSERVATION RESERVE PROGRAM (CRP) PROPERTIES.....	34
7.11	SEED BED PREPARATION AND SEEDING PROCEDURES.....	34
7.12	SEEDING METHODS.....	34
7.12.1	Drill Seeding.....	34
7.12.2	Broadcast Seeding.....	34
7.12.3	Hydroseeding.....	34
7.13	SOIL AMENDMENTS.....	35
7.14	SEEDING PERIODS.....	35
7.15	TIMING OF FINAL SEEDING.....	35
7.16	EROSION & SEDIMENT CONTROL.....	35

7.17 DORMANT SEEDING.....35

7.18 MONITORING36

8.0 WINTER CONSTRUCTION.....37

9.0 WASTE MANAGEMENT38

9.1 HAZARDOUS WASTES38

9.2 ABRASIVE BLAST DEBRIS38

10.0 SPILL PREVENTION, CONTAINMENT, AND CONTROL MEASURES39

10.1 PLANNING AND PREVENTION39

10.2 ROLES AND RESPONSIBILITIES.....39

10.2.1 Spill Coordinator.....39

10.2.2 Environmental Inspector.....39

10.2.3 Authorized Personnel40

10.2.4 Construction Superintendent40

10.2.5 Construction Personnel40

10.3 TRAINING.....40

10.4 EQUIPMENT40

10.5 SUPERVISION AND INSPECTION41

10.6 STORAGE AND HANDLING OF FUELS/HAZARDOUS LIQUIDS41

10.6.1 Fuel Storage - General41

10.6.2 Refueling.....41

10.6.3 Refueling, Maintenance, and Fuel Storage Near Wetlands and Waterbodies.....41

10.6.4 Overnight parking42

10.6.5 Concrete Washout Handling.....42

10.7 INITIAL SPILL MANAGEMENT.....42

10.7.1 Immediate Response.....42

10.7.2 Mobilization43

10.8 SPILL NOTIFICATION RESPONSIBILITIES.....43

10.8.1 Notification Volumes.....43

10.8.2 Spill Report Form43

10.8.3 Agency Notification.....43

10.9 SPILL CONTAINMENT AND CLEANUP44

10.9.1 Spill Control - Upland Areas44

10.10 SPILL CONTROL - WETLANDS AND WATERBODIES44

10.11 STORAGE AND DISPOSAL OF CONTAMINATED MATERIALS45

11.0 DRILLING FLUID RESPONSE, CONTAINMENT, AND NOTIFICATION PROCEDURES46

11.1 ON-SITE OBSERVATION DURING CONSTRUCTION46

11.2 CONTAINMENT, RESPONSE, AND CLEAN-UP EQUIPMENT46

11.3 RESPONSE.....47

11.3.1 Upland Locations.....47

11.3.2 Wetland and Waterbody Locations.....47

11.4 NOTIFICATION AND RESUMPTION OF SUSPENDED HDD OPERATIONS...48

11.5 CLEAN-UP48

11.6 RESTORATION AND POST-CONSTRUCTION MONITORING49

FIGURES¹

Figure 1	Typical Topsoil Segregation – Modified Ditch Plus Spoil Side
Figure 2	Typical Topsoil Segregation – Full Right-of-Way
Figure 3	Typical Topsoil Segregation – Trench Line Only
Figure 4	Typical Temporary or Permanent Berms – Perspective View
Figure 5	Typical Temporary or Permanent Berms – Elevation View
Figure 6	Typical Silt Fence Installation
Figure 7	Typical Straw Bale Installation
Figure 8	Typical Erosion Control Blanket Installation
Figure 9	Typical Staple Pattern for Erosion Control Fabric
Figure 10	Typical Bio-log Installation
Figure 11	Typical Cat Tracking
Figure 12	Typical Trench Breakers – Perspective View
Figure 13	Typical Trench Breakers – Plan and Profile Views
Figure 14	Permanent Slope Breakers – Perspective View
Figure 15	Typical Waterbody Crossing – Wet Trench Method
Figure 16	Typical Waterbody Crossing – Dam and Pump Method
Figure 17	Typical Waterbody Crossing – Flume Method
Figure 18	Typical Waterbody Crossing – Directional Drill Method
Figure 19	Typical Span Type Bridge With and Without Support (Timber Mat Bridge)
Figure 20	Typical Rock and Flume Bridge
Figure 21	Typical Dewatering Measures
Figure 22A	Typical Straw Bale Dewatering Structure
Figure 22B	Typical Straw Bale Dewatering Structure
Figure 22C	Typical Straw Bale Dewatering Structure
Figure 23	Typical Final Stream Bank Stabilization – Rip Rap & Erosion Control
Figure 24	Typical Wetland Crossing
Figure 25	Typical Improved Road Crossing-Directional Bore
Figure 26	Typical Stream Bank Stabilization Bio-log
Figure 27	Typical Root Wad
Figure 28	Typical Natural Material Revetment

APPENDICES

Appendix A	Noxious and Invasive Weed Species
Appendix B	Equipment Cleaning Log
Appendix C	Seed Mixes
Appendix D	Enbridge Environment Hydrostatic Test Discharge Authorization & Documentation
Appendix E	Emergency Response Contractors/Disposal and Treatment Facilities
Appendix F	Spill Report Form
Appendix G	Spill Reporting-Agency Contacts

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.

<u>Slope (%)</u>	<u>Approximate Spacing (ft)</u>
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:

<u>Slope (%)</u>	<u>Approximate Spacing (ft)</u>
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:

$$(95\% \text{ germination} \times 80\% \text{ purity})/100 = 76\% \text{ PLS}$$
$$10 \text{ pounds PLS per acre} / .76\% \text{ PLS} = 13.2 \text{ pounds per acre actual seeding rate}$$

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 subject to approval by Enbridge.

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 double 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 double 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 topsoiling 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 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:

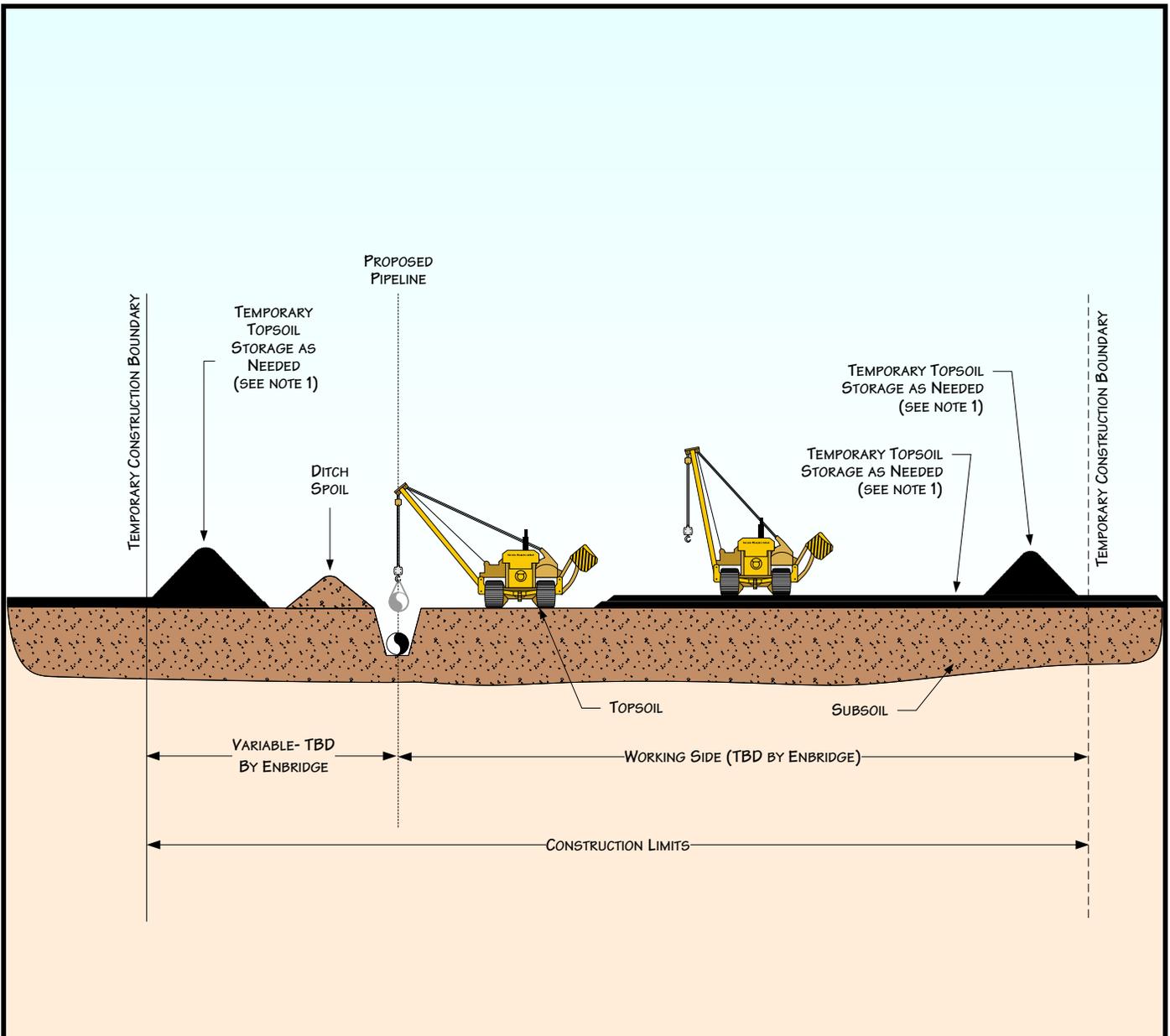
- Drilling fluid will be cleaned up by hand using hand shovels, buckets and soft-bristled brooms as possible without causing extensive ancillary damage to existing vegetation. Clean water washes may also be employed if deemed beneficial and feasible.
- Containment structures will be pumped out and the 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:

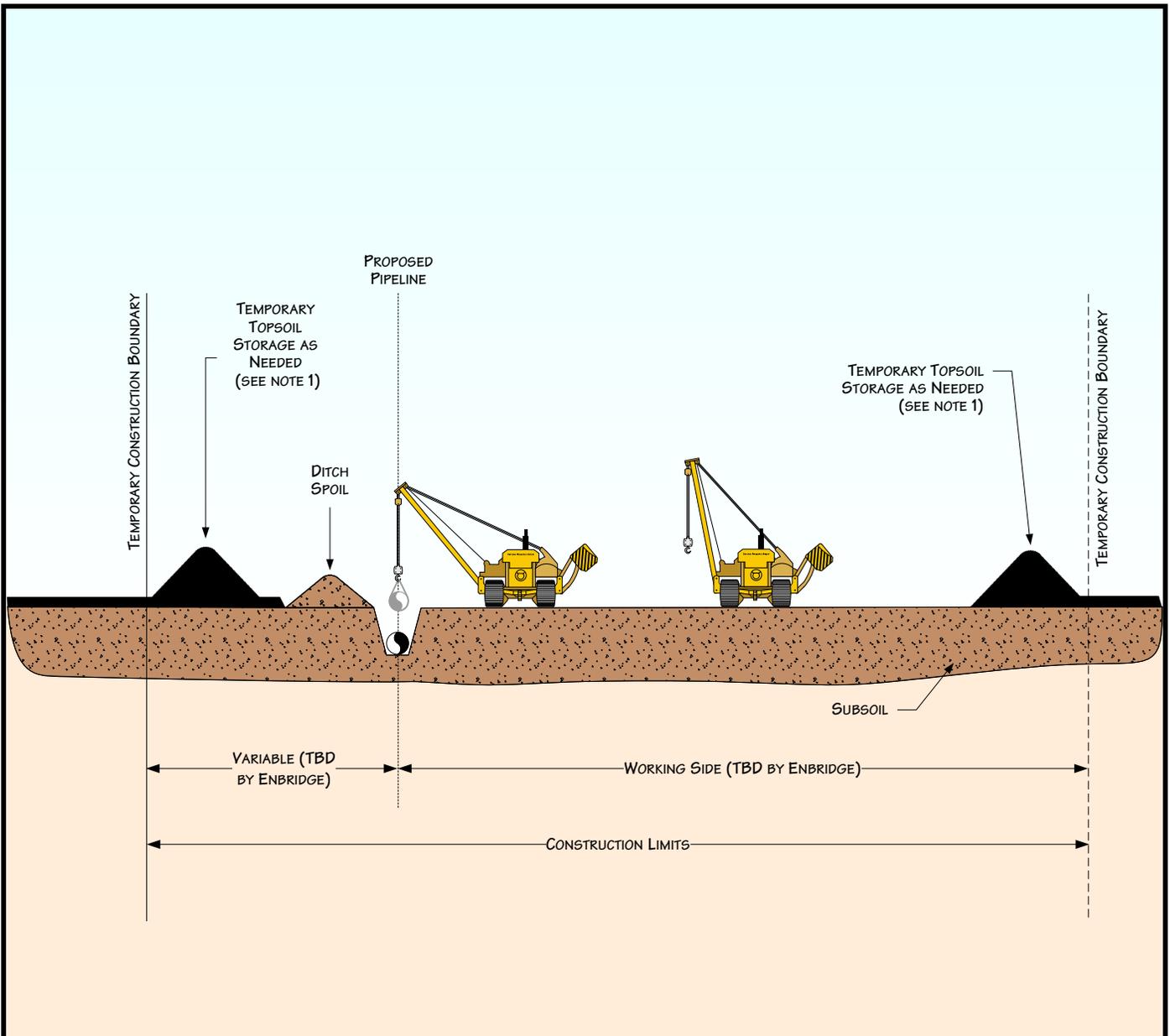
- 1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATIONS APPROVED BY THE COMPANY.

Environmental Protection Plan



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	
<small>K:\CLIENT_PROJECTS\ID-FIEEL\2011-019\FIG 1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD</small>	



PROFILE

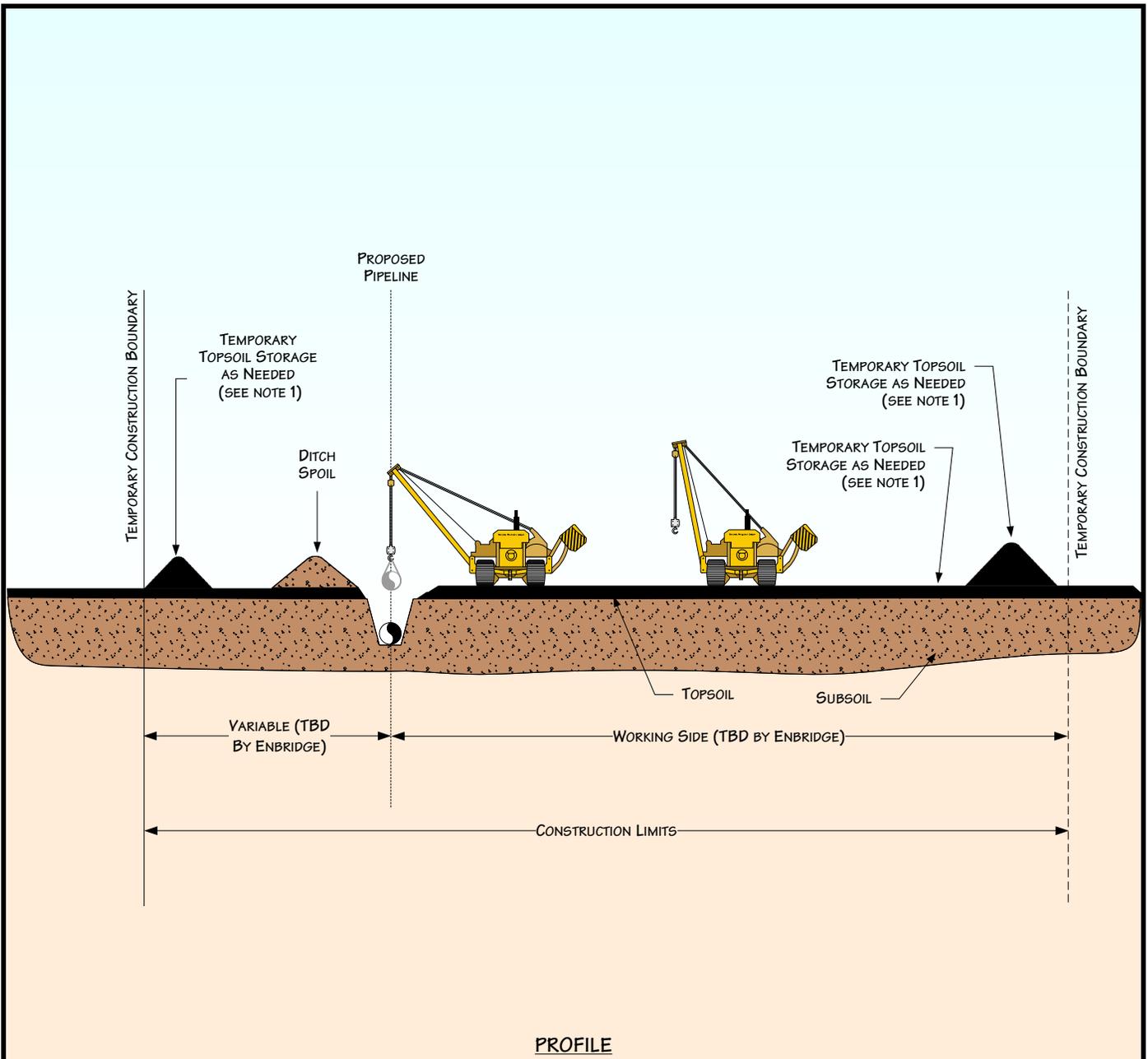
NOTES:

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\ID-FIEEL\2011-019\FIG 1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD	



PROFILE

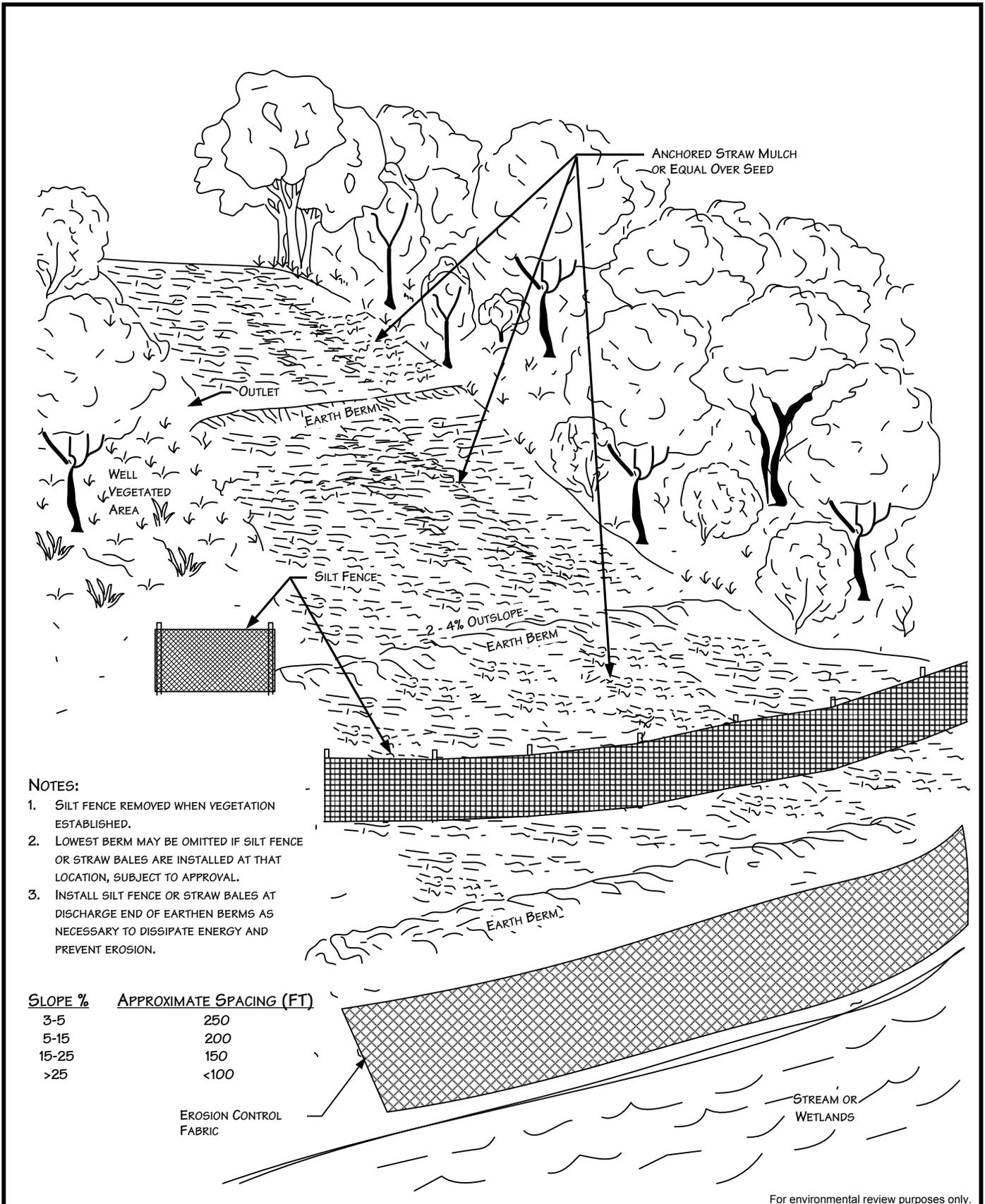
NOTES:

1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATIONS APPROVED BY THE COMPANY.



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

DATE: 7/9/2001	
REVISED: 3/11/2011	
SCALE: NTS	
DRAWN BY: JPBOENTJE	
<small> K:\CLIENT_PROJECTS\ID-FIEEL\2011-019\FIG 1-3_TYPICAL_TOPSOIL_SEGREGATION.VSD </small>	



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.

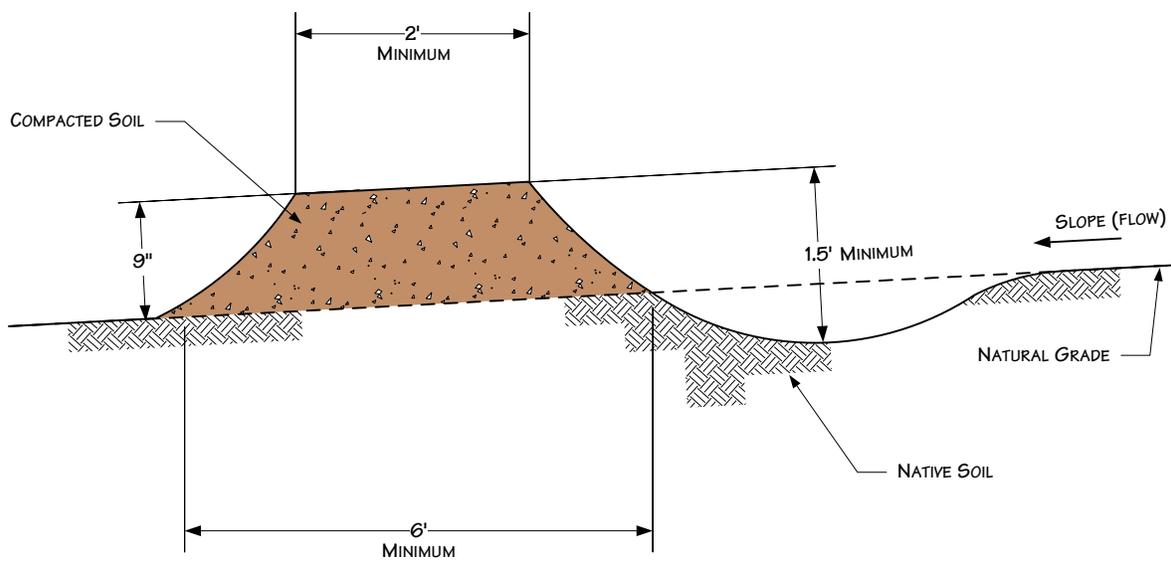
SLOPE %	APPROXIMATE SPACING (FT)
3-5	250
5-15	200
15-25	150
>25	<100

For environmental review purposes only.



Figure 4
Environmental Mitigation Plan
 Typical Temporary or Permanent Berms
 Perspective View

DATE: 11/14/2000	
REVISED: 3/11/2011	
SCALE: NTS	
DRAWN BY: KMKENDALL	
<small>K:\ CLIENT PROJECTS\ID-PEEL\2011-019\ FIG_4_BERMS_PERSPECTIVE_VIEW.VSD</small>	



NOTES

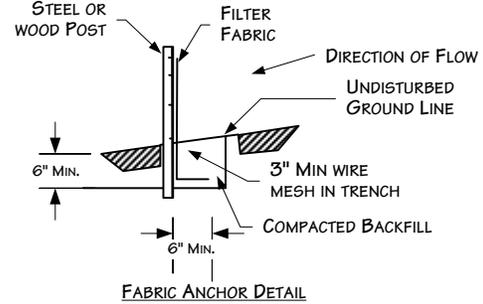
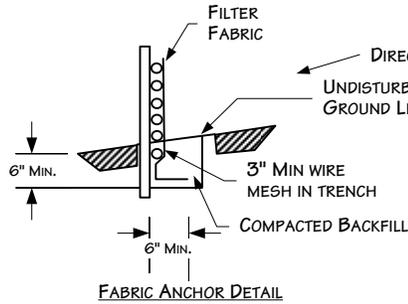
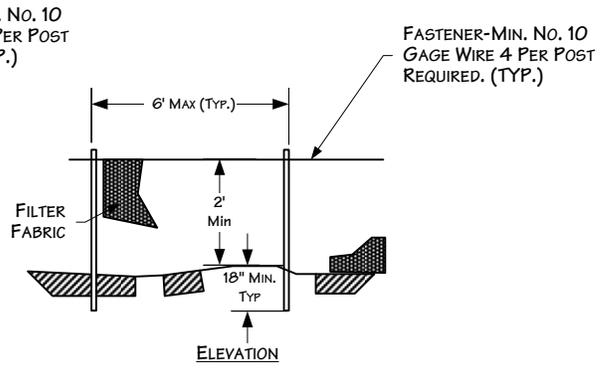
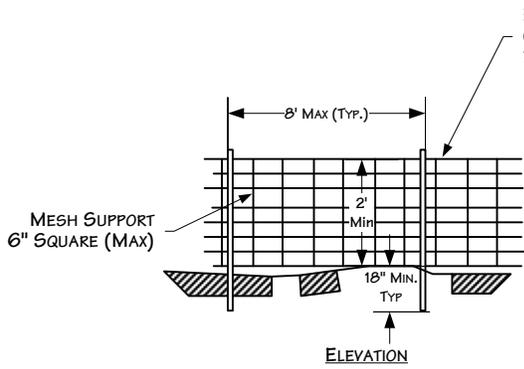
1. BERMS SHALL BE CONSTRUCTED WITH 2 TO 4 PERCENT OUTSLOPE.
2. BERMS SHALL BE OUTLETED TO WELL VEGETATED STABLE AREAS, SILT FENCES, STRAW BALES OR ROCK APRONS.
3. BERMS SHALL BE SPACED AS DESCRIBED IN CONSTRUCTION SPECIFICATIONS.
4. ADDITIONAL INFORMATION INCLUDED ON OTHER DRAWINGS.

For environmental review purposes only.



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	
<small>K:\ CLIENT PROJECTS\ID-PEEL\2011-019\ FIG_5_BERMS_ELEVATION_VIEW.VSD</small>	

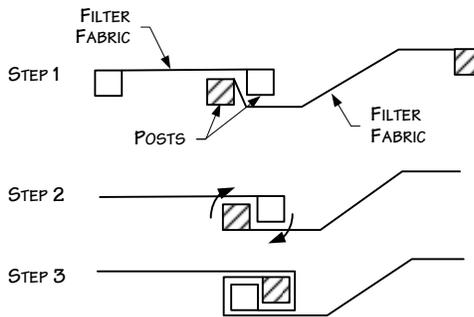


SILT FENCE WITH WIRE SUPPORT PLAN

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.

For environmental review purposes only.



Figure 6
Environmental Protection Plan
Typical Silt Fence Installation

DATE: 5/25/2001

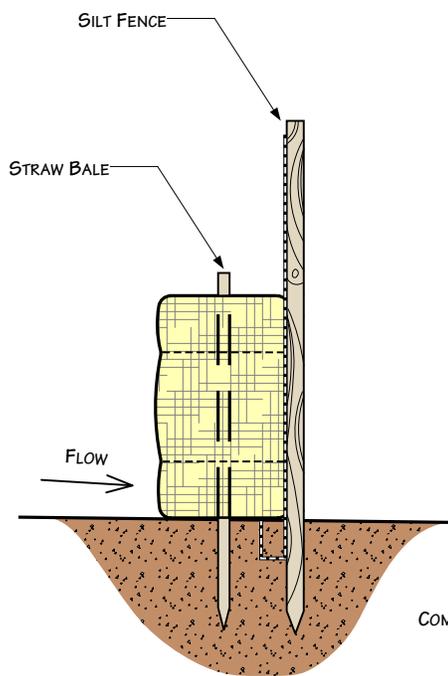
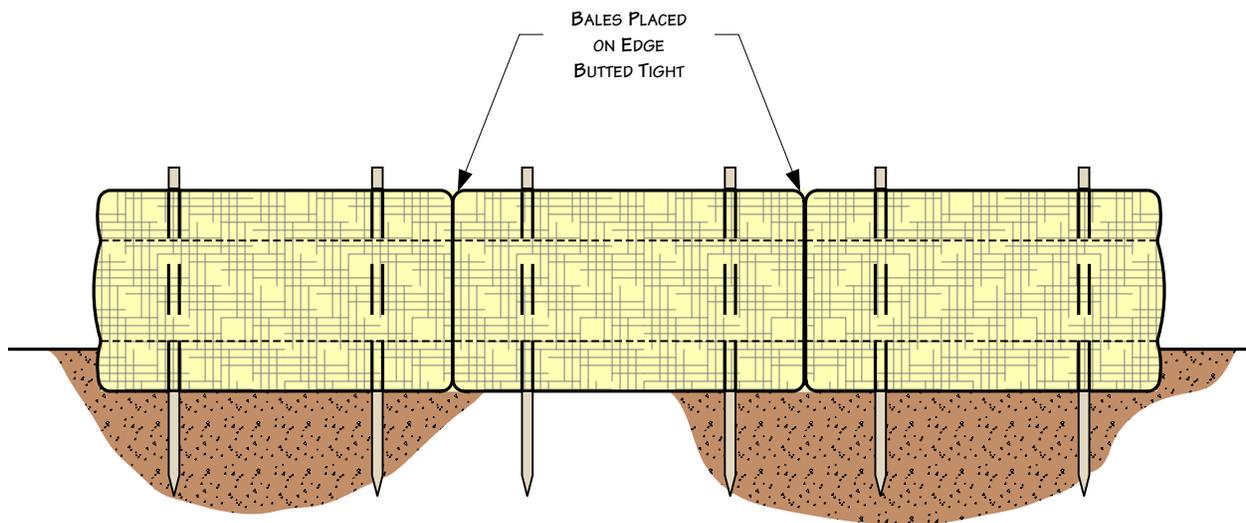
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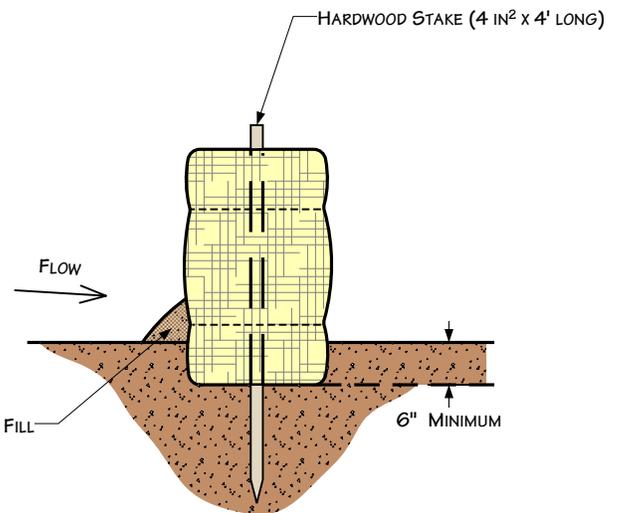
DRAWN BY: KMKENDALL

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STRAW BALES & SILT FENCE



STRAW BALES ONLY

For environmental review purposes only.



Figure 7
Environmental Protection Plan
 Typical Straw Bale Installation

DATE: 5/25/01

REVISED: 3/11/11

SCALE: Not to Scale

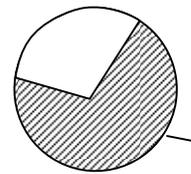
DRAWN BY: KMKENDALL

K:_CLIENT PROJECTS\D-FEEL\2011-019\FIG_7_STRAW_BALE_INSTALL.VSD

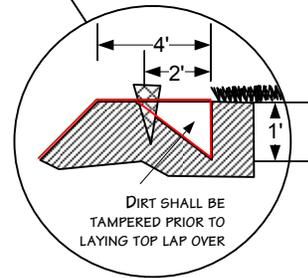
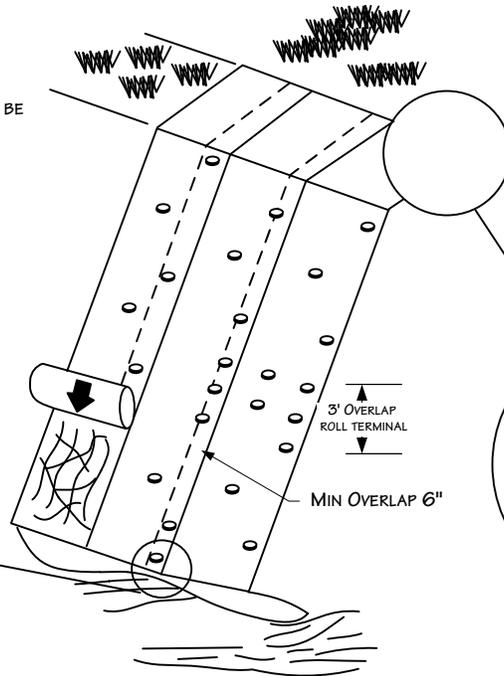


FILL SLOPE SECTION
 EROSION CONTROL BLANKETS SHOULD BE
 INSTALLED VERTICALLY DOWNSLOPE.

NOTE: SLOPE SURFACE SHALL BE
 SMOOTH AND FREE OF ROCKS,
 LUMPS OF DIRT, GRASS AND STICKS.
 MAT SHALL BE PLACED FLAT ON SURFACE
 TO ENSURE PROPER SOIL CONTACT.

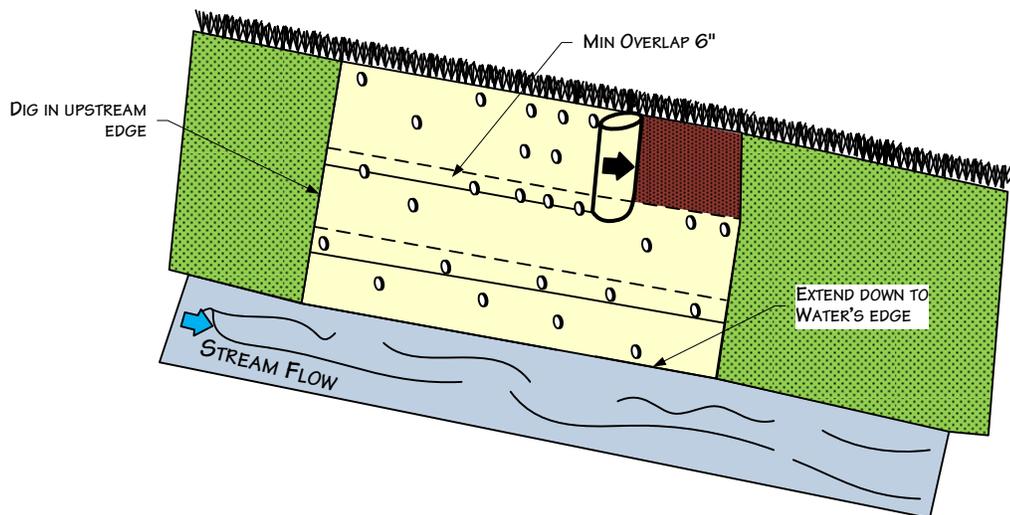


TOE
 MAINTAIN SLOPE ANGLE



BERM
 TRENCH INTO BERM AND
 PROGRESS DOWNSLOPE

STREAM CHANNEL
 EROSION CONTROL BLANKETS SHOULD BE
 INSTALLED HORIZONTALLY WITH STREAM FLOW.



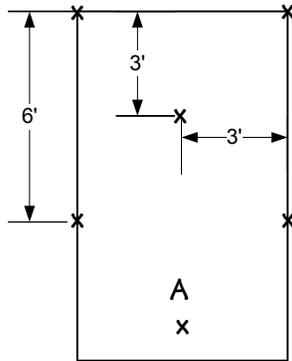
For environmental review purposes only.



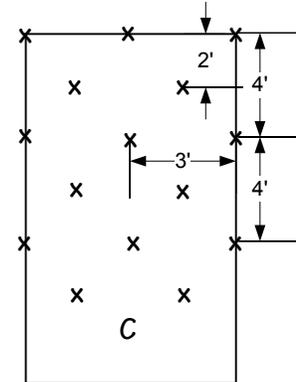
Figure 8
 Environmental Protection Plan
 Typical Erosion Control Blanket Installation

DATE: 5/25/2001
 REVISED: 3/23/2011
 SCALE: NTS
 DRAWN BY: KMKENDALL
 K:\CLIENT PROJECTS\ID-FIEEL\2011-019\FIG 8 EROSION_CONTROL_BLANKET_INS TALL.VSD

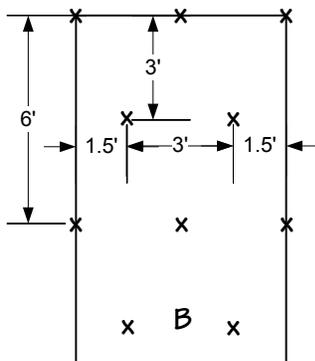
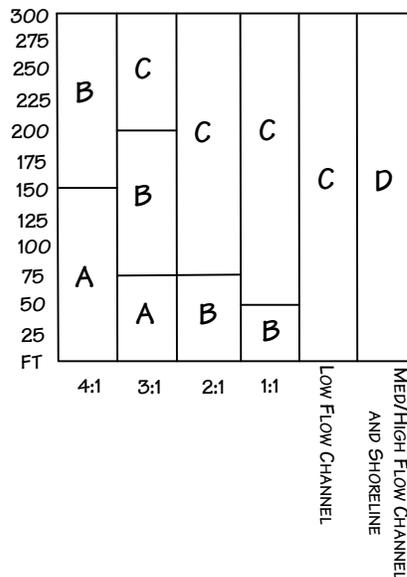




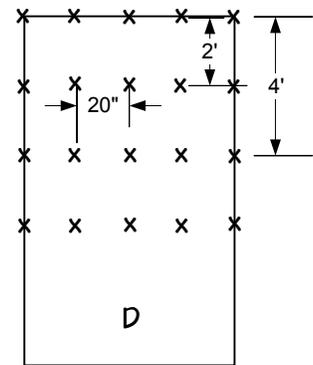
1 STAPLE PER SQ. YD



2 STAPLES PER SQ. YD



1 1/2 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.

For environmental review purposes only.



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

DATE: 5/25/2001

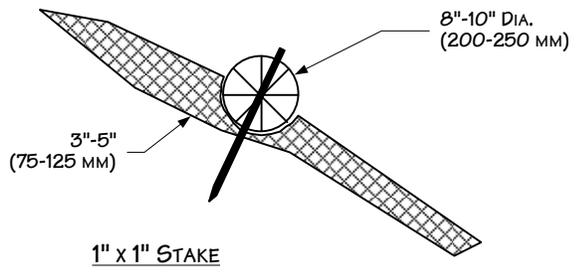
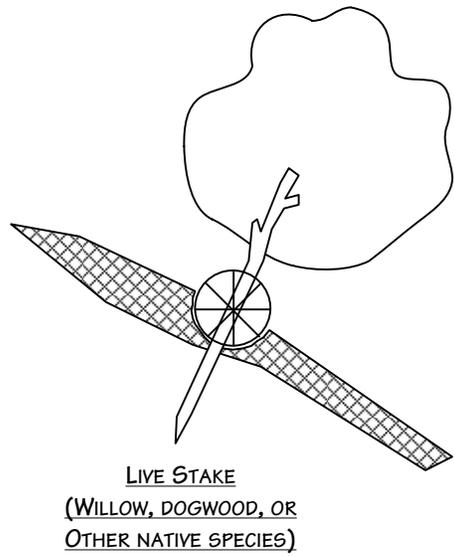
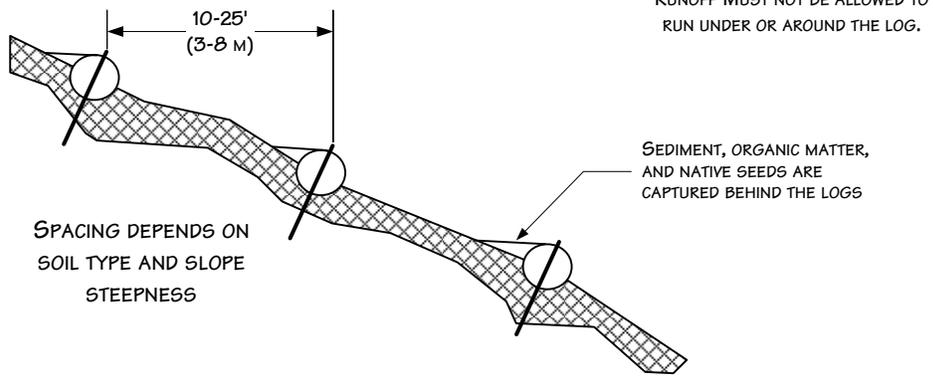
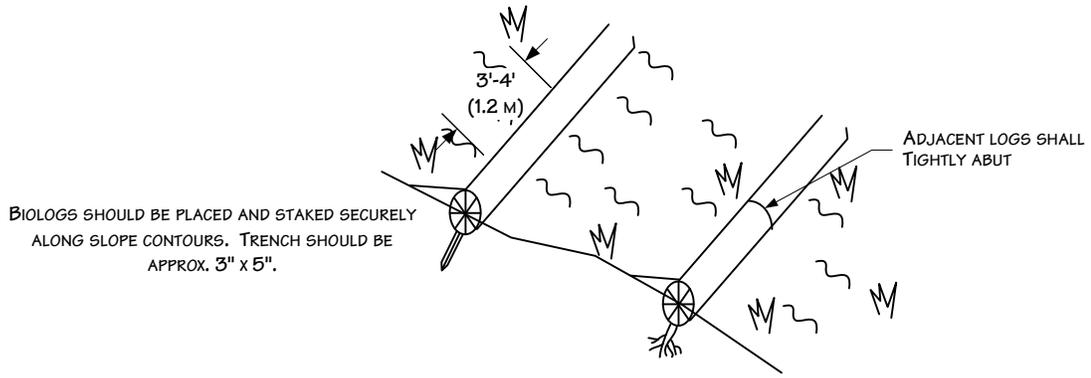
REVISED: 3/24/2011

SCALE: NTS

DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG 9 STAPLE PATTERN_EROSION_CON TROL_FABRIC.VSD



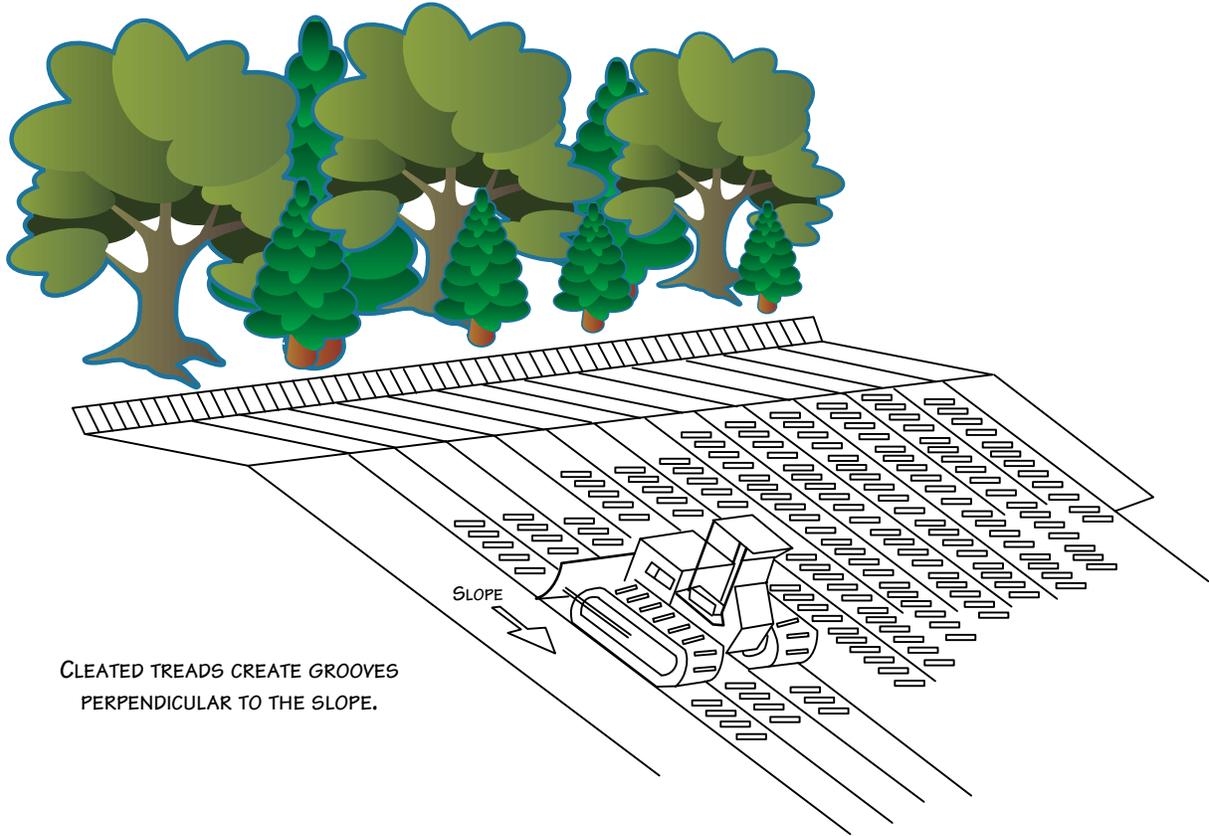


For environmental review purposes only.



Figure 10
Environmental Protection Plan
Typical Biolog Installation

DATE: 5/25/2001	
REVISED: 3/24/2011	
SCALE: NTS	
DRAWN BY: KMKENDALL	
K:\CLIENT PROJECTS\ID-PEEL\2011-019\FIG_10_BIOLOG INSTALL.VSD	



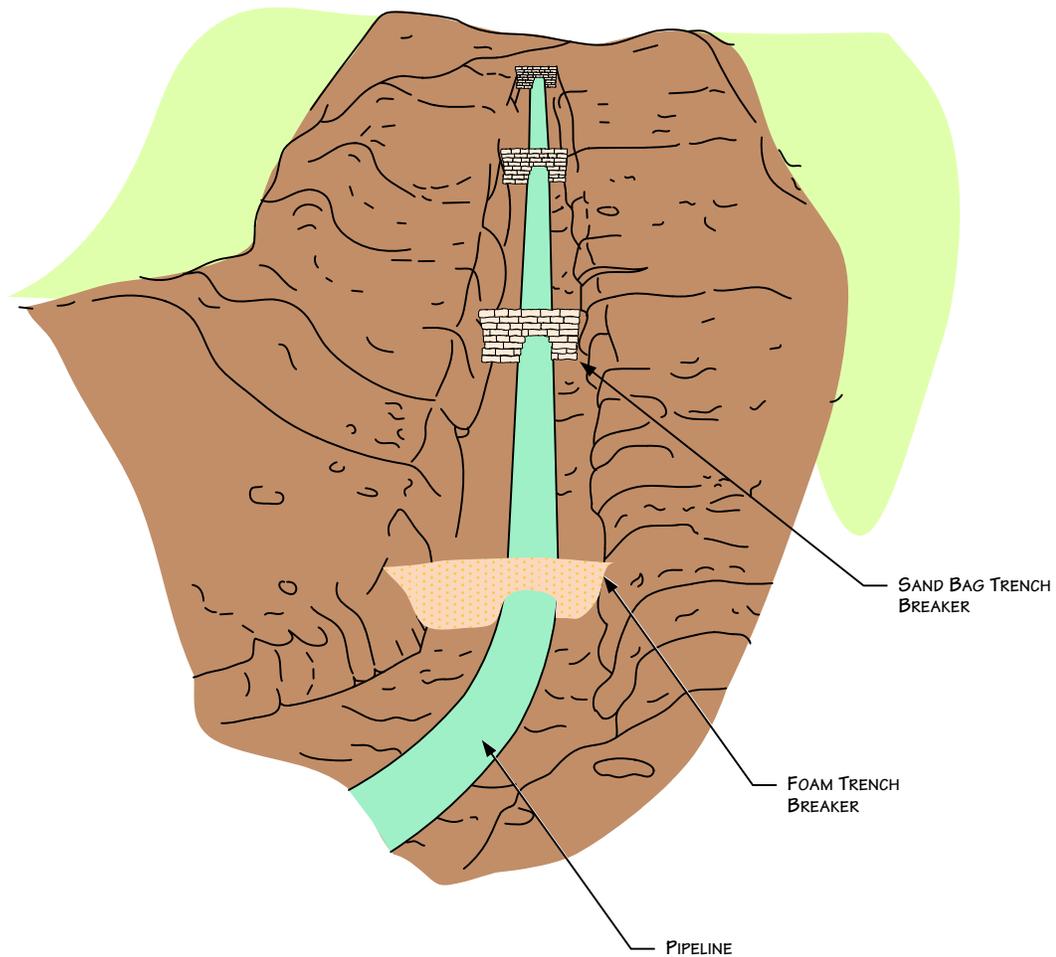
CLEATED TREADS CREATE GROOVES
PERPENDICULAR TO THE SLOPE.

For environmental review purposes only.



Figure 11
Environmental Protection Plan
Typical Cat Tracking

DATE: 5/25/2001	
REVISED: 3/24/2011	
SCALE: NTS	
DRAWN BY: KMKENDALL	
<small>K:\CLIENT_PROJECTS\ID-FEEL\2011-019\FIG_11_CAT_TRACKING.VSD</small>	



NOTES

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

For environmental review purposes only.



Figure 12
Environmental Protection Plan
 Typical Trench Breakers - Perspective View

DATE: 5/25/2001

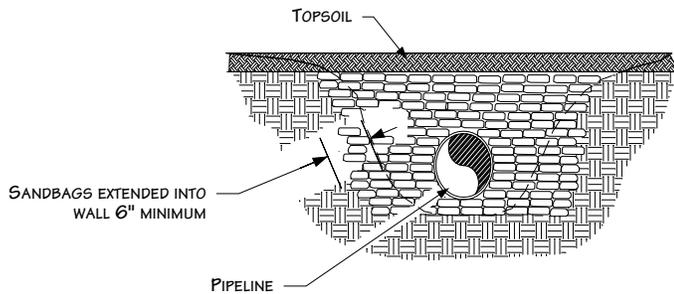
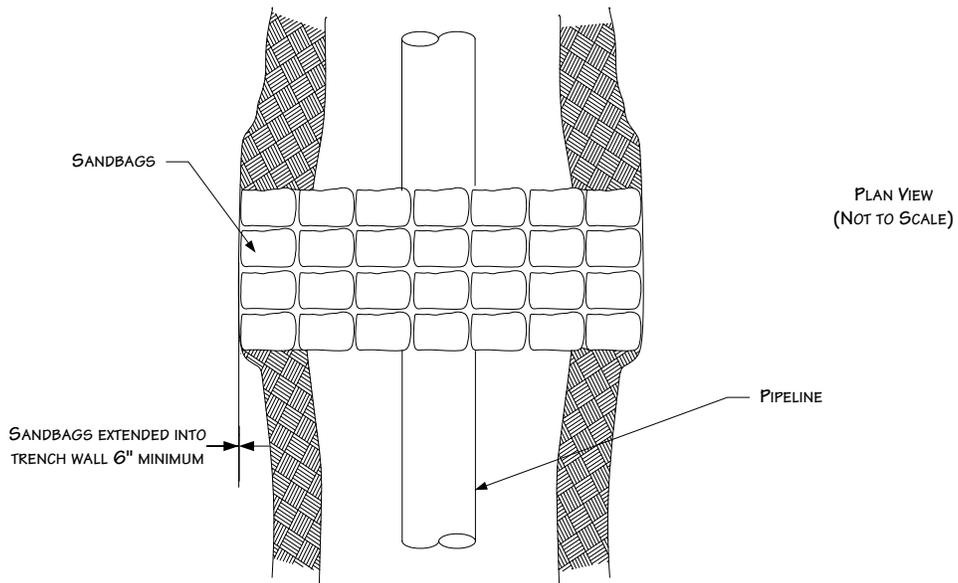
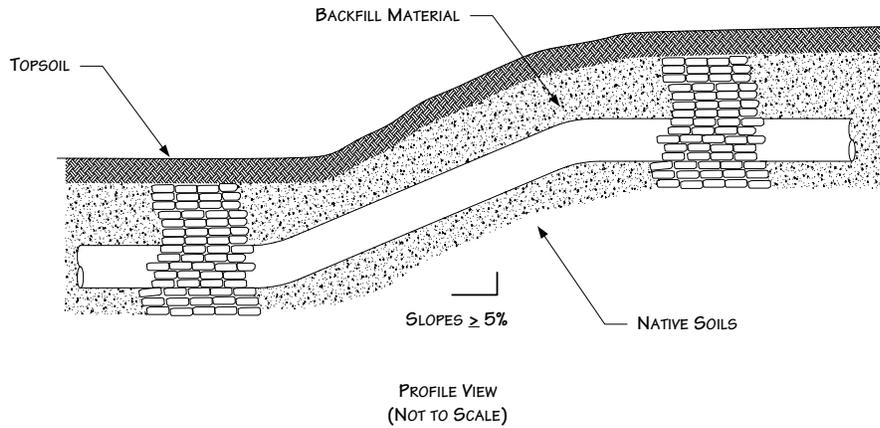
REVISED: 3/11/11

SCALE: NTS

DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG_12_TRENCH_BREAKER_PERSPECTIV E_VIEW.VSD





NOTES

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

For environmental review purposes only.



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

DATE: 11/15/2000

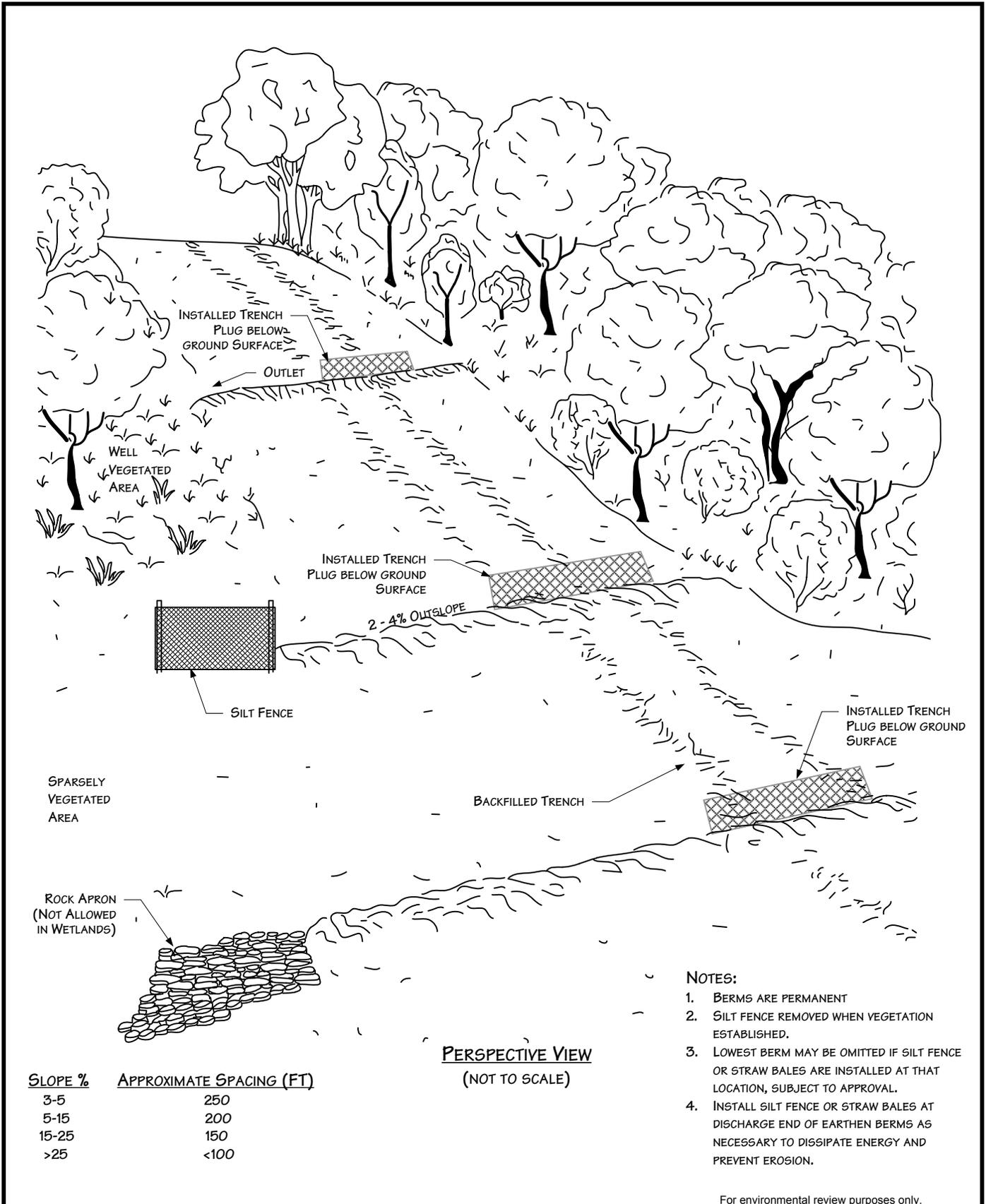
REVISED: 3/11/11

SCALE: NTS

DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG_13_TRENCH_BREAKER_PLAN_PROFIL_E_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.

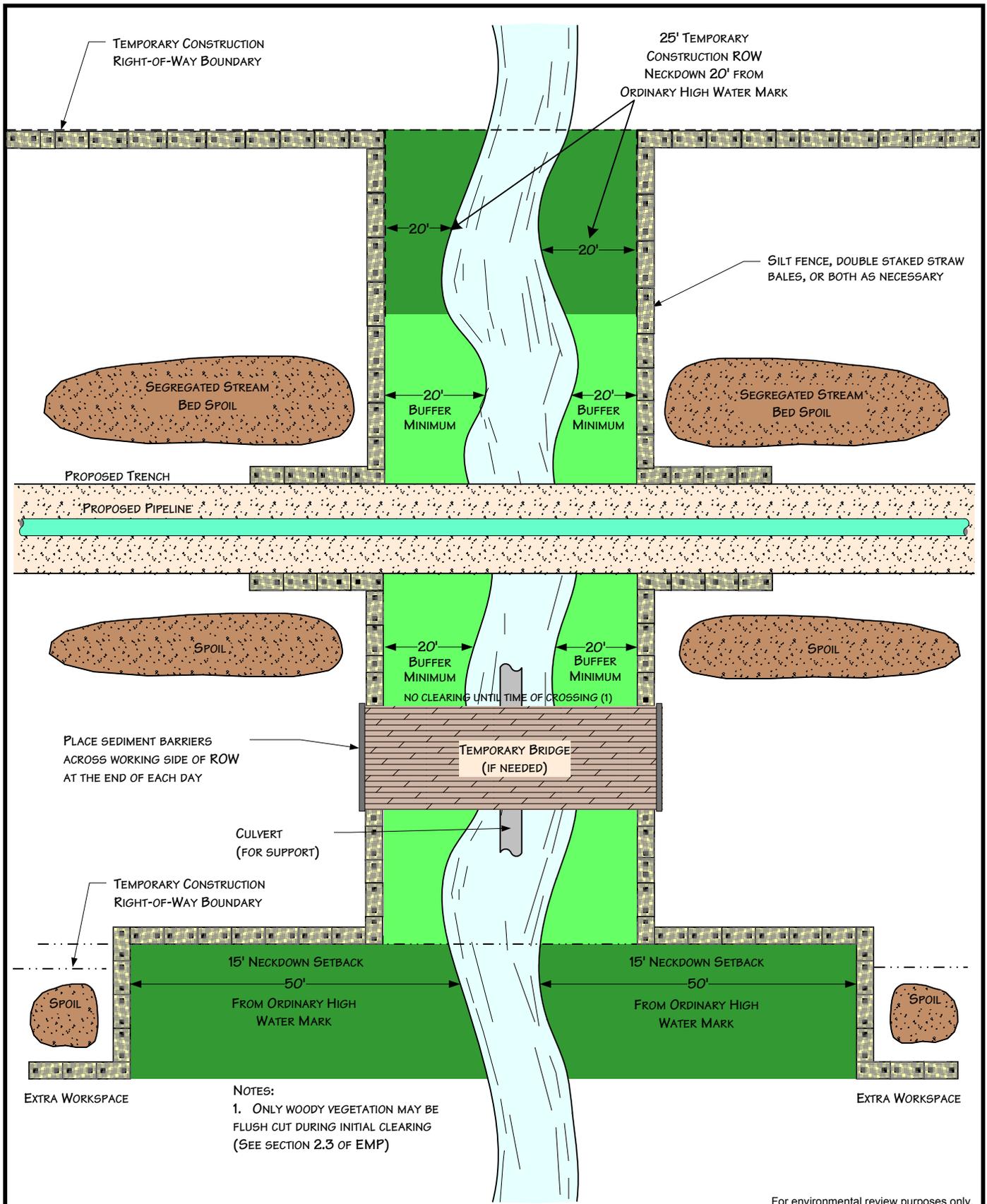
For environmental review purposes only.



Figure 14
Environmental Mitigation Plan
Permanent Slope Breakers - Perspective View

DATE: 5/25/2001
 REVISED: 3/11/11
 SCALE: NTS
 DRAWN BY: KMKENDALL

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG 14_SLOPE_BREAKERS_PERSPECTIVE_VIEW.VSD



For environmental review purposes only.



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\0-FEEL\2011-019\FIG_15_WATERBODY_OPENCUT_WETTRENCH.VSD



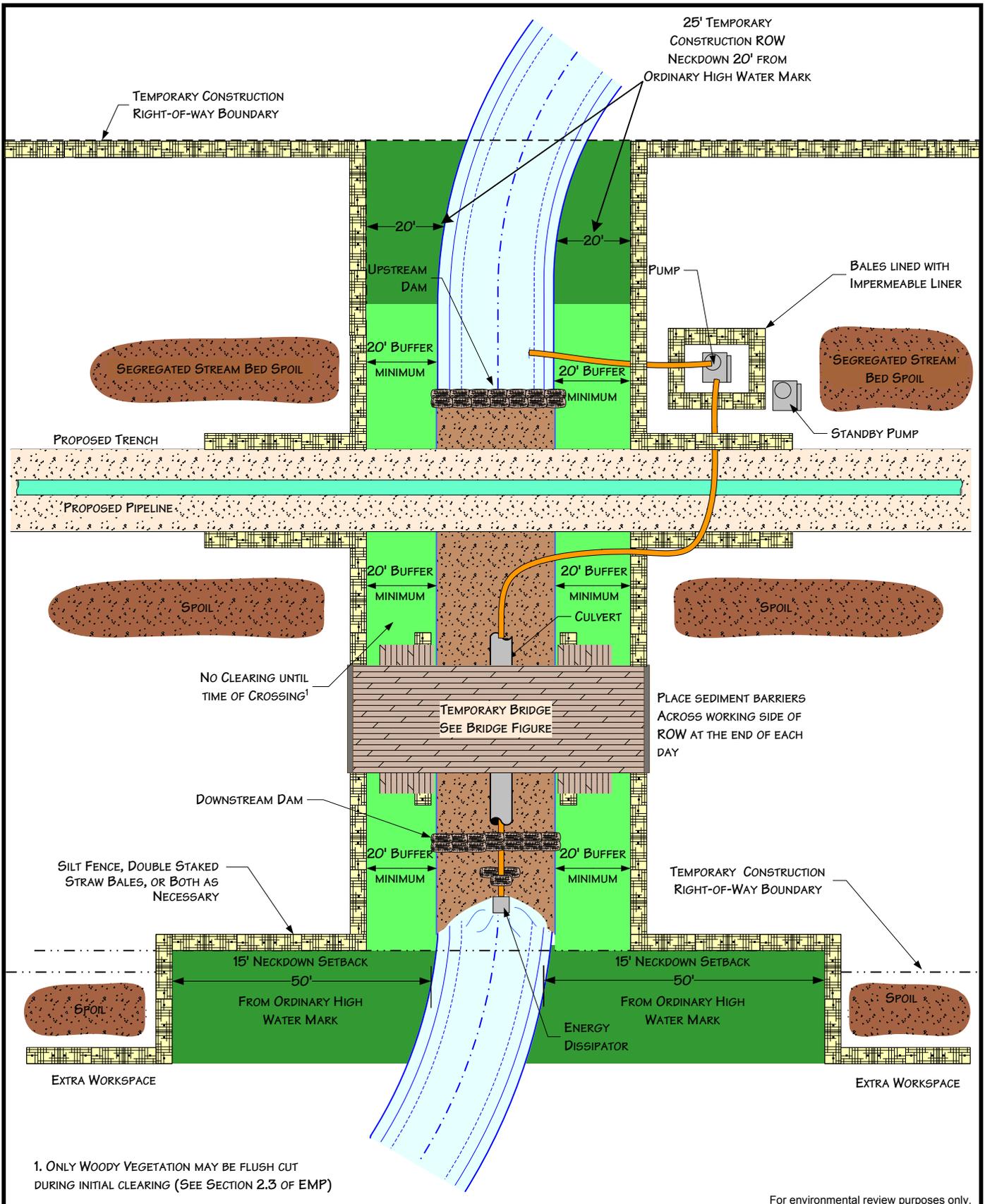
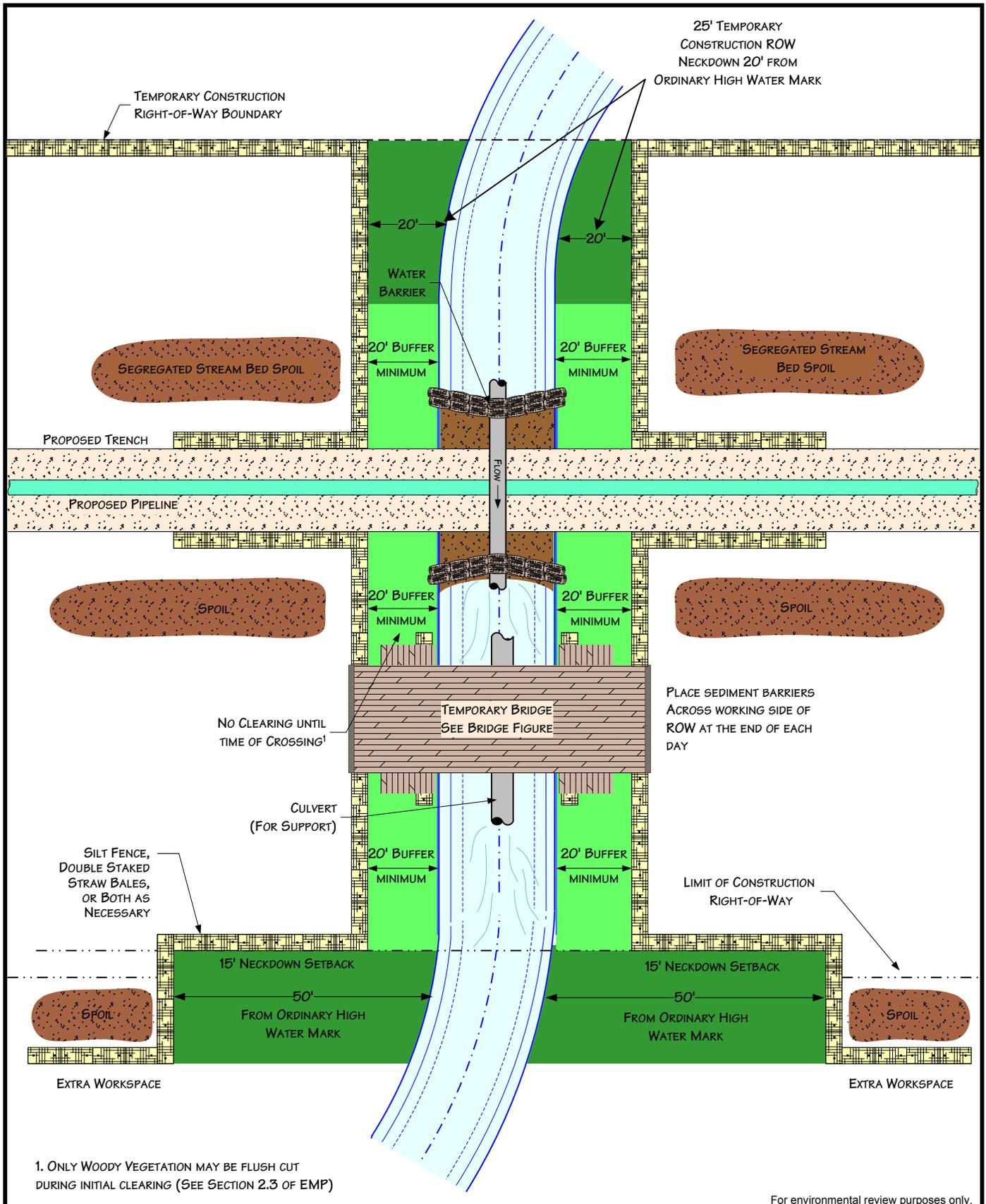


Figure 16
Environmental Protection Plan
 Typical Waterbody Crossing
 Dam and Pump Method

DATE: 11/29/2005	
REVISED: 4/20/09	
SCALE: NTS	
DRAWN BY: JPB	
<small>K:\CLIENT_PROJECTS\SD-FEEL\2011-019\FIG_16_WATERBODY_DAM_AND_PUMP_VSD</small>	



1. ONLY WOODY VEGETATION MAY BE FLUSH CUT DURING INITIAL CLEARING (SEE SECTION 2.3 OF EMP)

For environmental review purposes only.



Figure 17
Environmental Protection Plan
 Typical Waterbody Crossing
 Flume Method

DATE: 11/29/2005

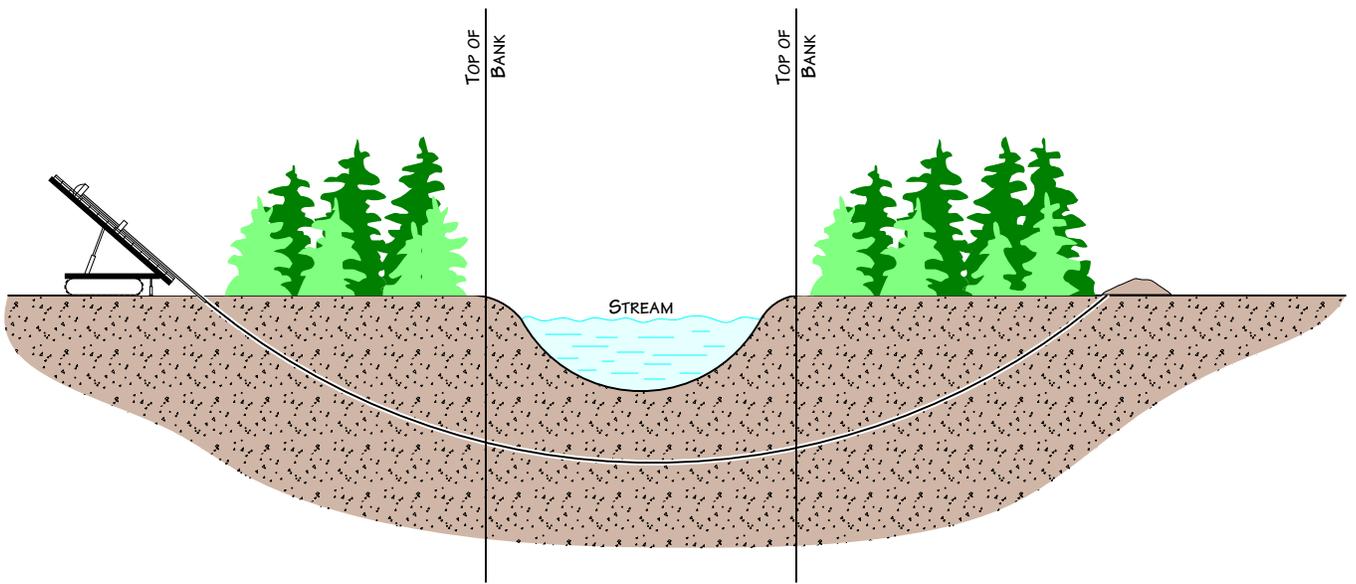
REVISED: 3/11/11

SCALE: NTS

DRAWN BY: JPB

K:\CLIENT_PROJECTS\ID-PEEL\2011-019\FIG_17_WATERBODY_FLUME.VSD





For environmental review purposes only.



Figure 18
Environmental Protection Plan
 Typical Waterbody Crossing
 Directional Drill Method

DATE: 7/14/2000

REVISED: 3/11/11

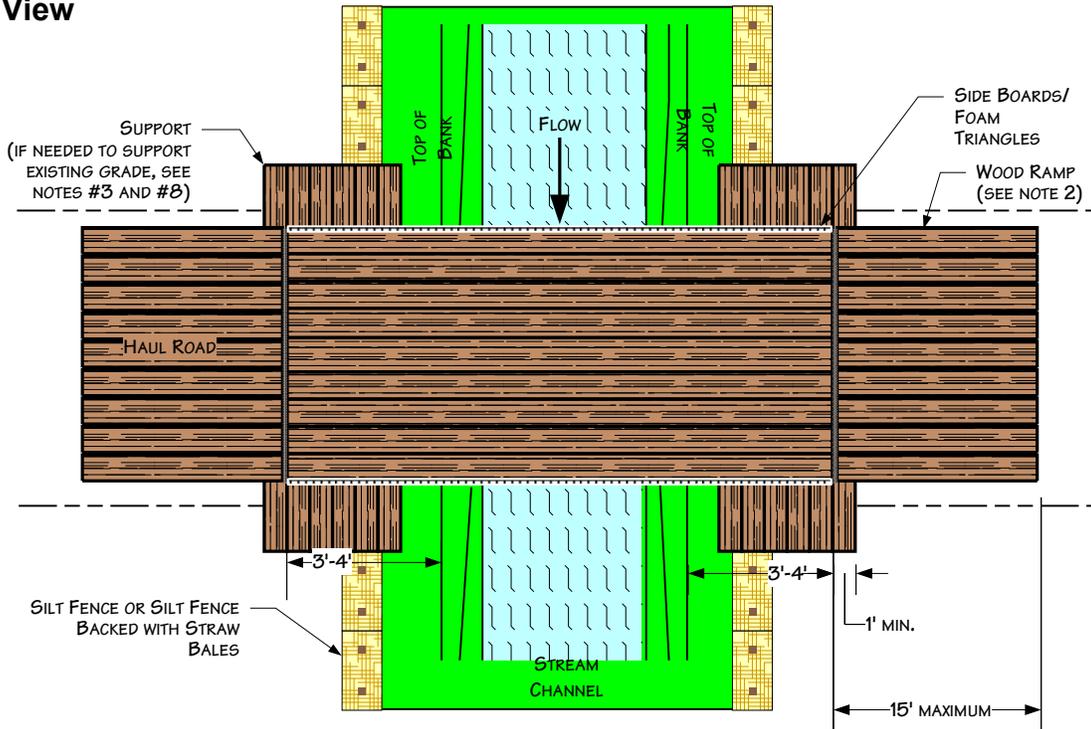
SCALE: NTS

DRAWN BY: KMKENDALL

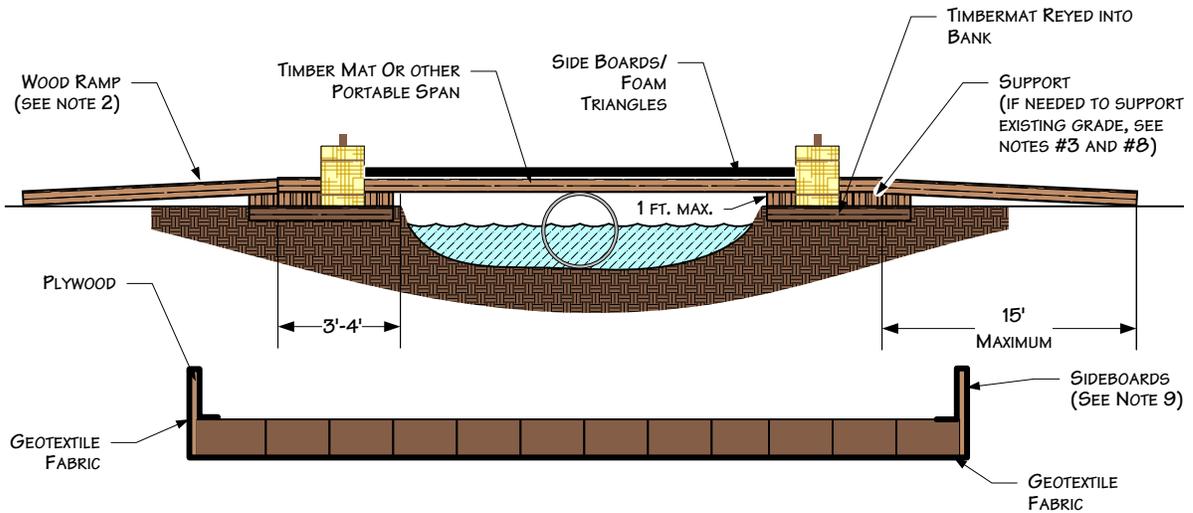
K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG_18_WATERBODY_DIRECTIONAL_DRILL.VSD



Plan View



Profile View



NOTES:

1. INSPECT BRIDGE OPENING PERIODICALLY AND FOLLOWING RAINFALLS OF OVER $\frac{1}{2}$ ". 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. SIDEBARDS WILL BE INSTALLED ON TEMPORARY BRIDGES TO MINIMIZE THE POTENTIAL FOR SEDIMENT TRANSPORT. SIDEBARDS 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 SIDEBARDS IN A CONTINUOUS FASHION.

For environmental review purposes only.



Figure 19
Environmental Protection Plan
 Typical Span Type Bridge
 With or Without Instream Support

DATE: 3/11/2003

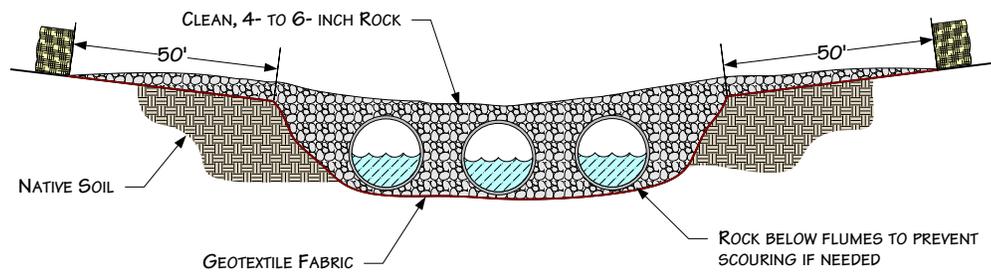
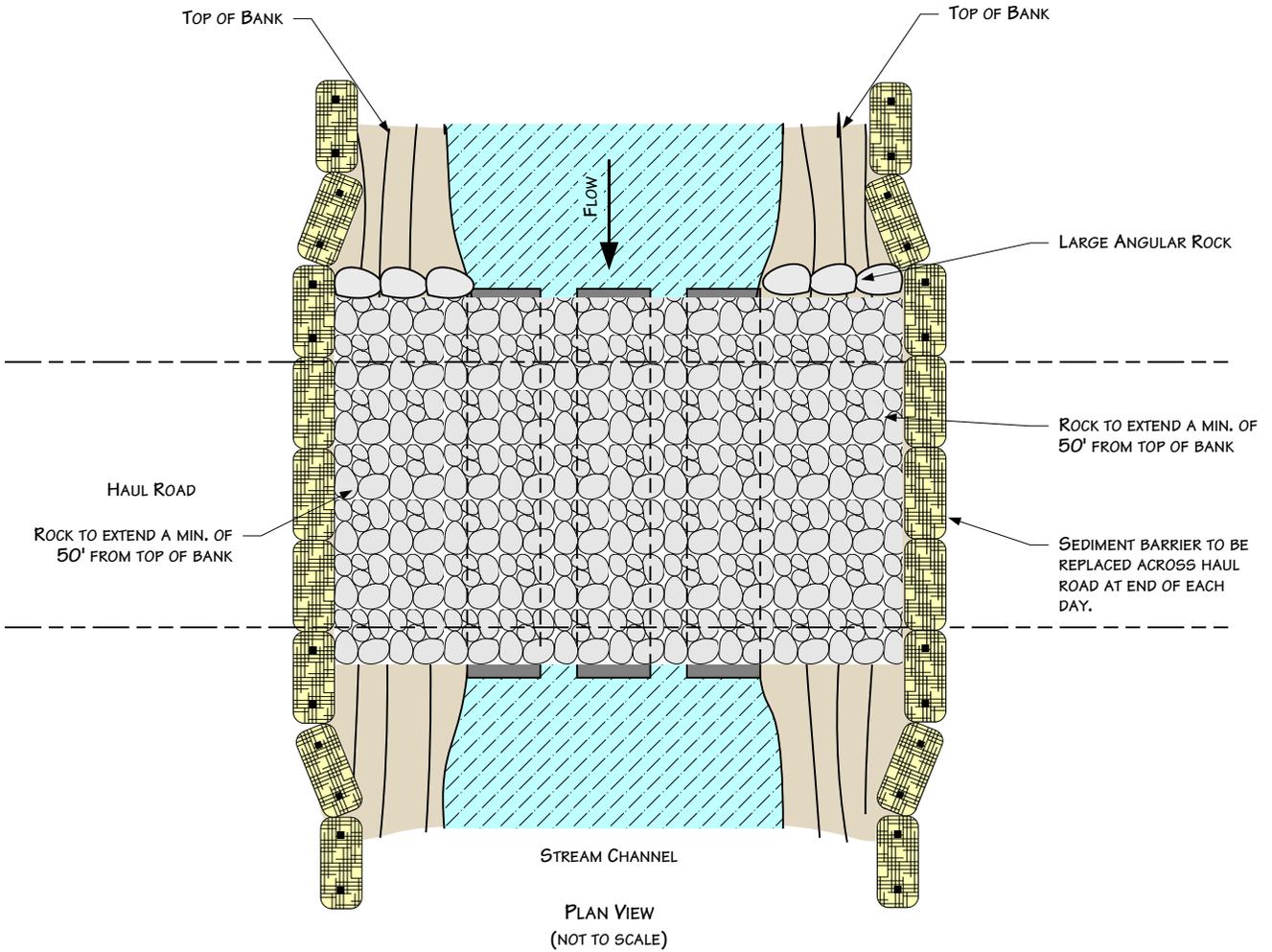
REVISED: 3/25/2011

SCALE: NTS

DRAWN BY: KMK6792

K:\CLIENT PROJECTS\ID-FEEL\2011-019\FIG_19_BRIDGE_SPAN.VSD





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.

For environmental review purposes only.



Figure 20
Environmental Protection Plan
Typical Rock Flume Bridge

DATE: 5/25/2001

REVISED: 3/15/11

SCALE: NTS

DRAWN BY: KMKENDALL

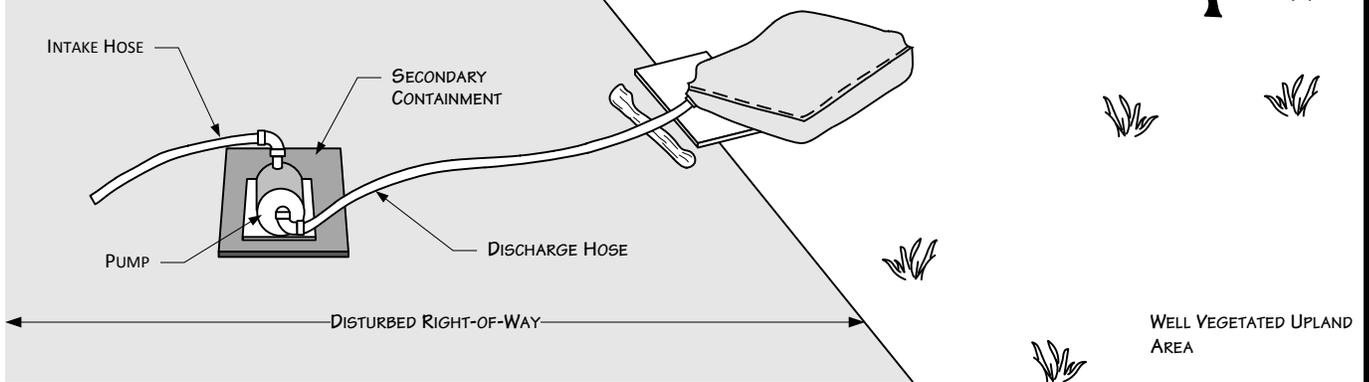
K:\CLIENT PROJECTS\ID-PEEL\2011-019\FIG_20_ROCK_FLUME_BRIDGE.VSD



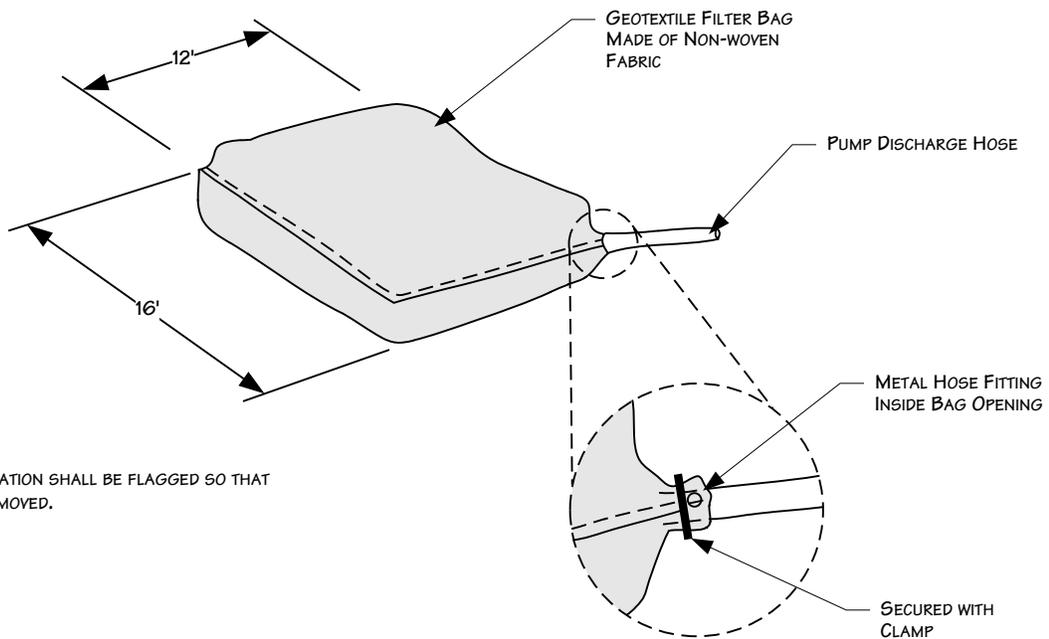
DEWATERING DISCHARGE IN WELL VEGETATED UPLANDS

NOTES:

1. PUMP INTAKE 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.

For environmental review purposes only.



Figure 21
Environmental Protection Plan
Typical Dewatering Measures

DATE: 5/25/2001

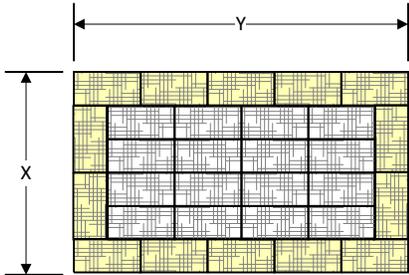
REVISED: 3/15/11

SCALE: NTS

DRAWN BY: KMKENDALL

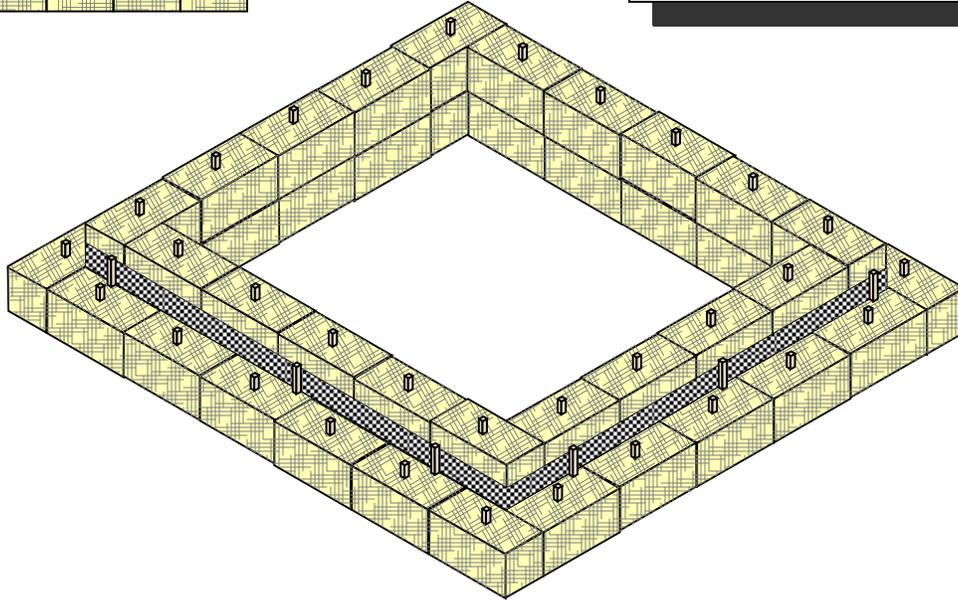
K:\CLIENT_PROJECTS\SD-FEEL\2011-019\FIG_21_DEWATERING_MEASURES.VSD



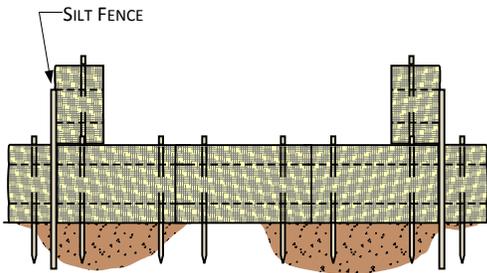


NOTES

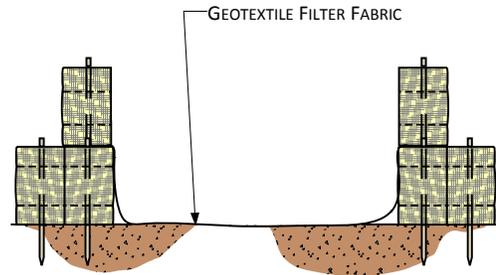
1. ARRANGE THE STRAW BALES TO THE X AND Y DIMENSIONS AS SPECIFIED BELOW.
2. IF BOTTOM OF STRUCTURE IS NOT LINED WITH STRAW BALES (OPTION 1), LINE ENTIRE STRUCTURE WITH GEOTEXTILE FILTER FABRIC.



PERSPECTIVE VIEW



OPTION 1



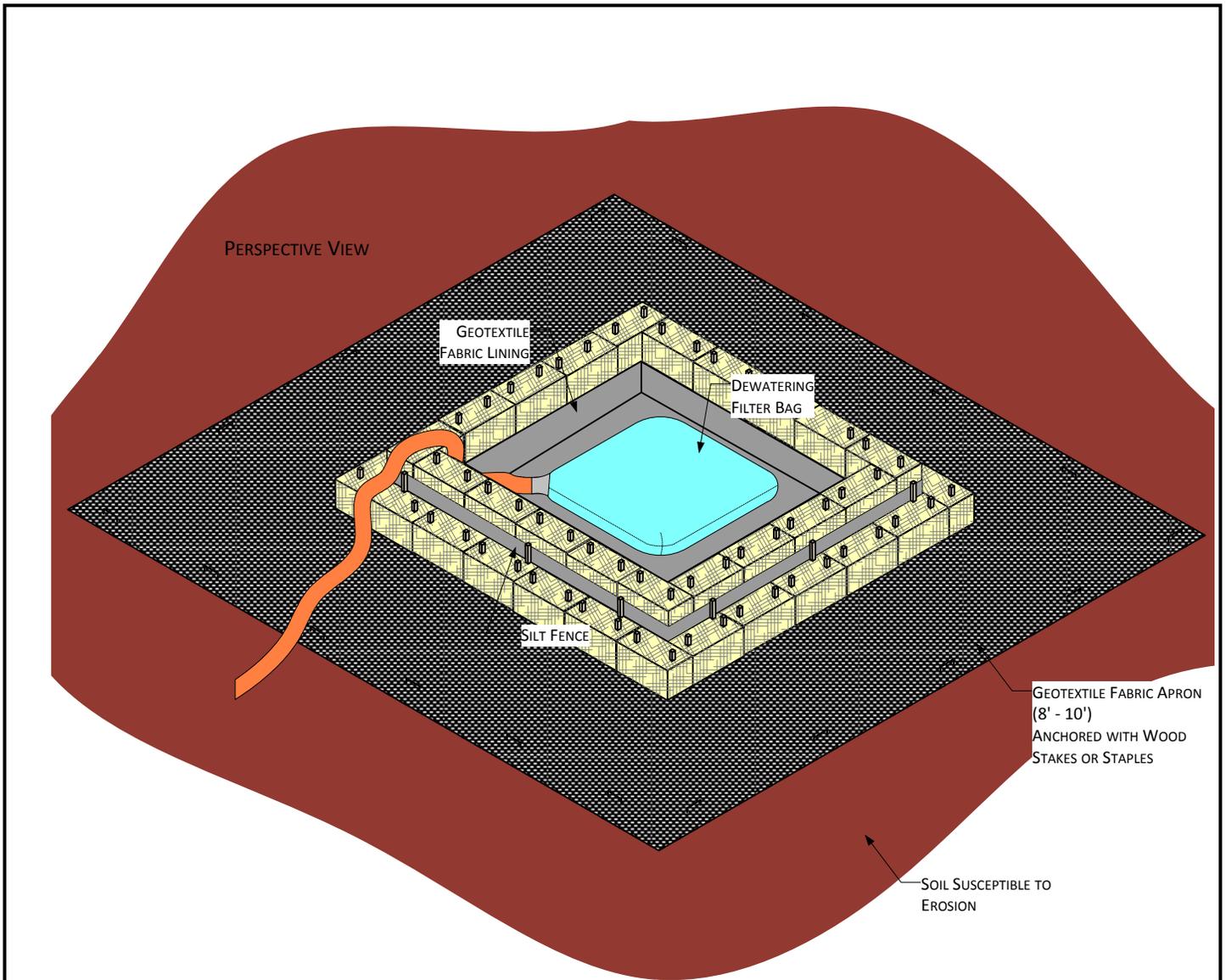
OPTION 2

TYPICAL MINIMUM SUMP DIMENSIONS (FEET)		MAXIMUM PUMPING RATE GALLONS PER MINUTE
X	Y	
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





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:

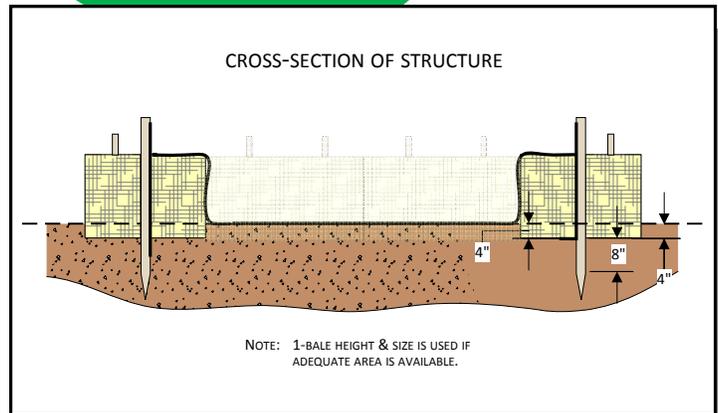
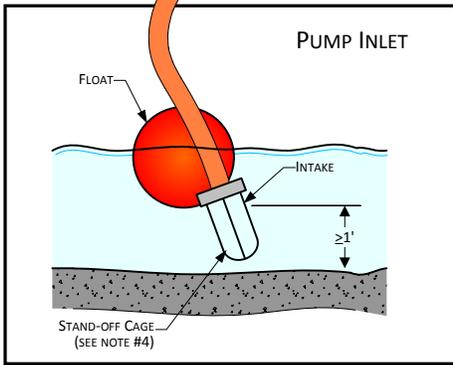
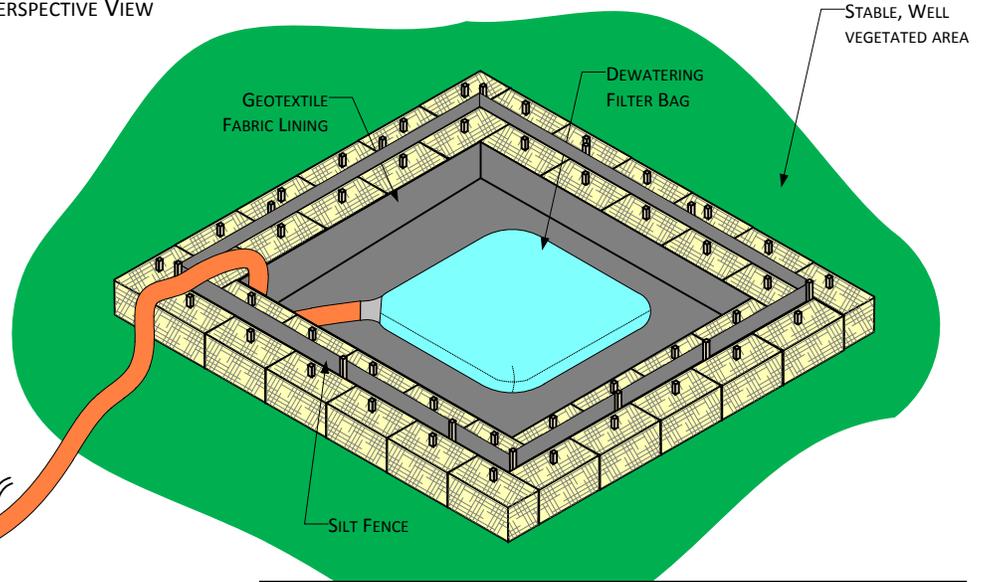
1. SILT FENCE ENDS MUST BE WRAPPED TO JOIN TWO SECTIONS.
2. INSTALL SILT FENCE 2 INCHES ABOVE TOP OF STRAW BALES, AND ANCHOR A MINIMUM OF 8 INCHES STRAIGHT DOWN.
3. SILT FENCE POST STAKING MUST BE 4 FEET OR LESS.
4. DEWATERING INTAKE HOSE SUPPORTED AT LEAST 1 FOOT FROM BOTTOM OF TRENCH BEING DEWATERED.
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



PERSPECTIVE VIEW



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:

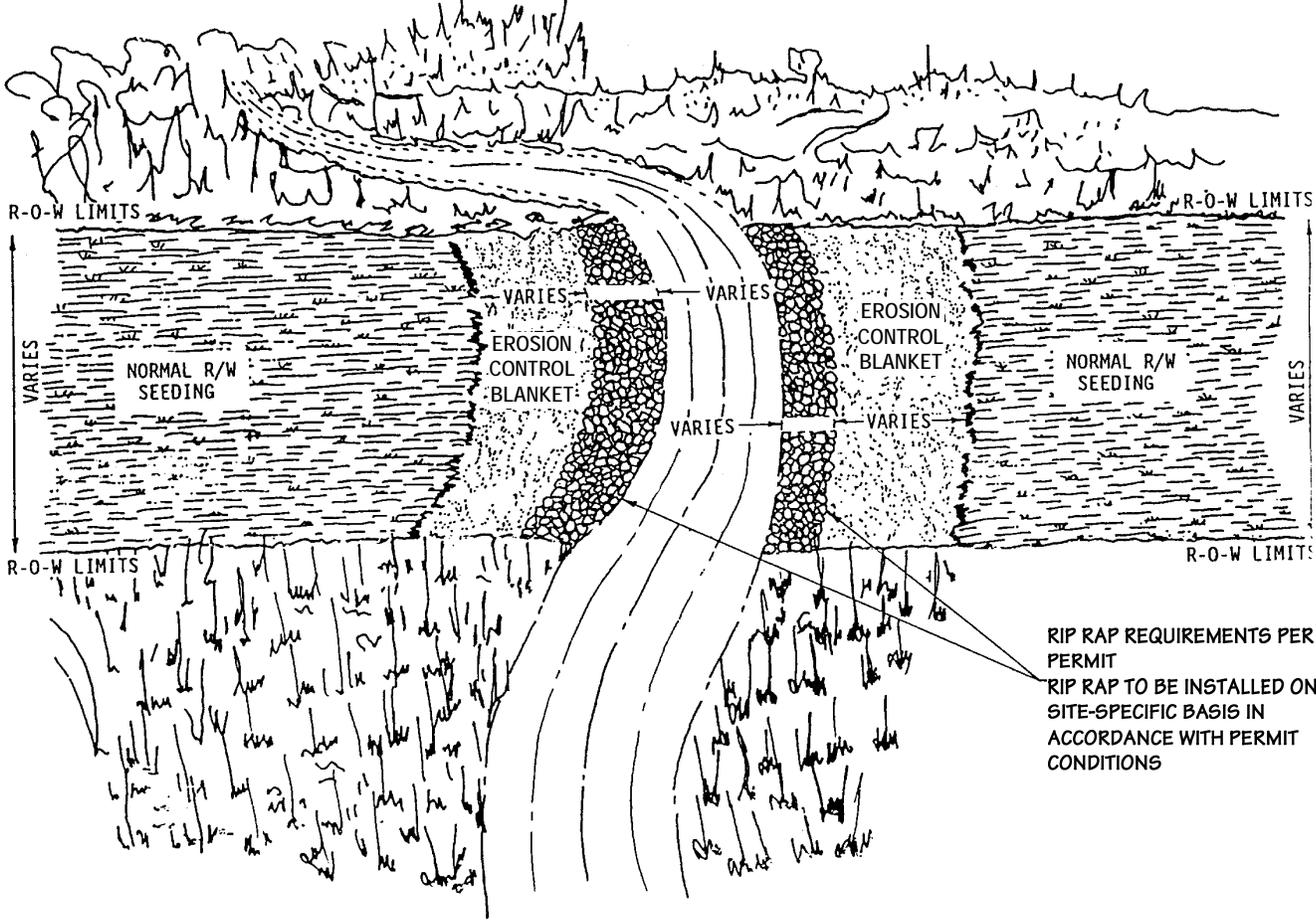
1. SILT FENCE ENDS MUST BE WRAPPED TO JOIN TWO SECTIONS.
2. INSTALL SILT FENCE 2 INCHES ABOVE TOP OF STRAW BALE, AND ANCHOR A MINIMUM OF 8 INCHES STRAIGHT DOWN.
3. SILT FENCE POST STAKING MUST BE 4 FEET OR LESS.
4. DEWATERING INTAKE HOSE SUPPORTED AT LEAST 1 FOOT FROM BOTTOM OF TRENCH BEING DEWATERED.
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.

For environmental review purposes only.

Figure 22C
Environmental Protection Plan
Straw Bale Dewatering Structure



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

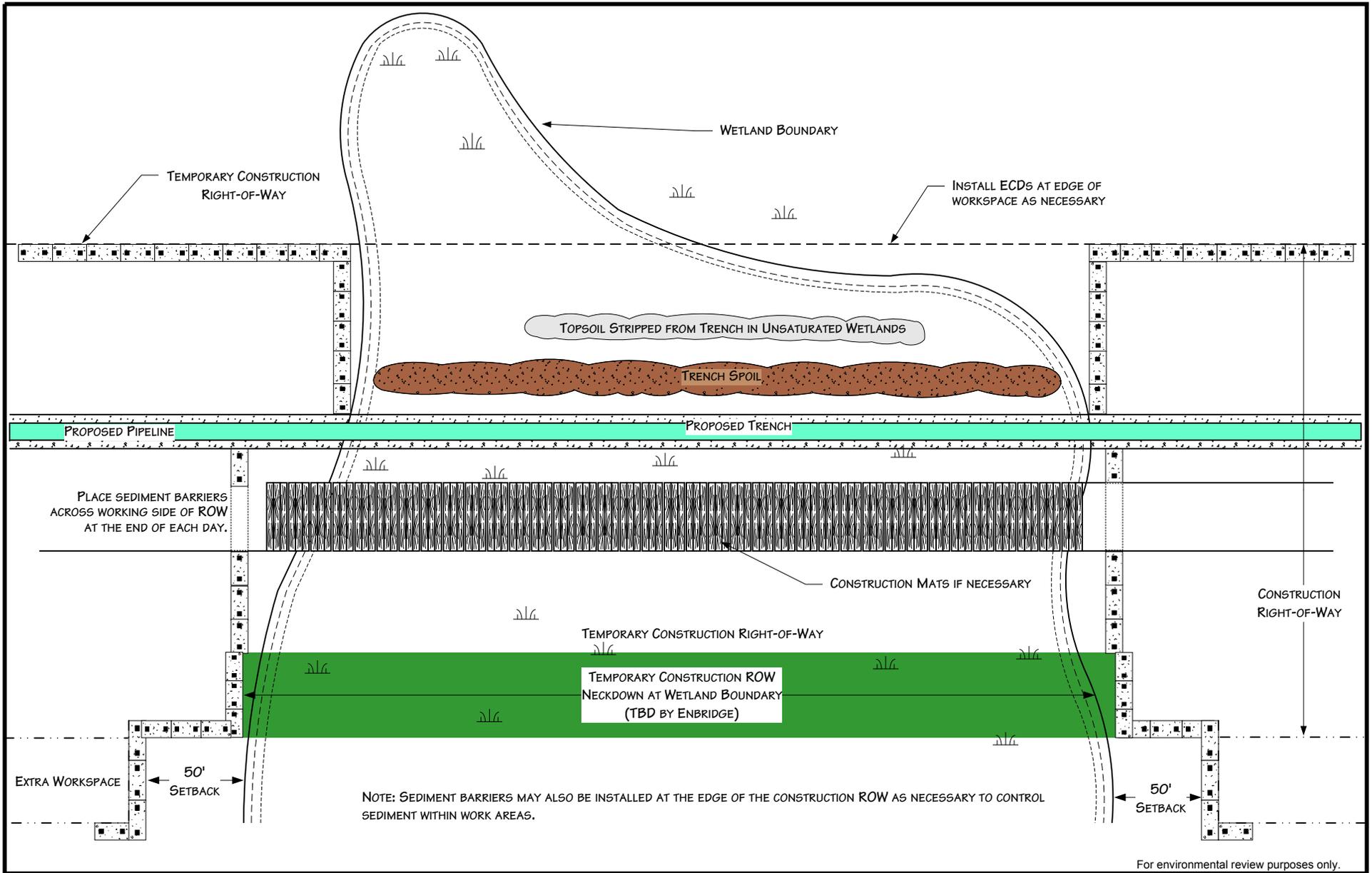
For environmental review purposes only.



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

DATE: 7/19/2000
REVISED: 3/14/11
SCALE: NTS
DRAWN BY: KMKENDALL
K:\CLIENT PROJECTS\SD-FEEL\2011-019\FIG_23_STREAM_BANK_STABILIZATION.VSD



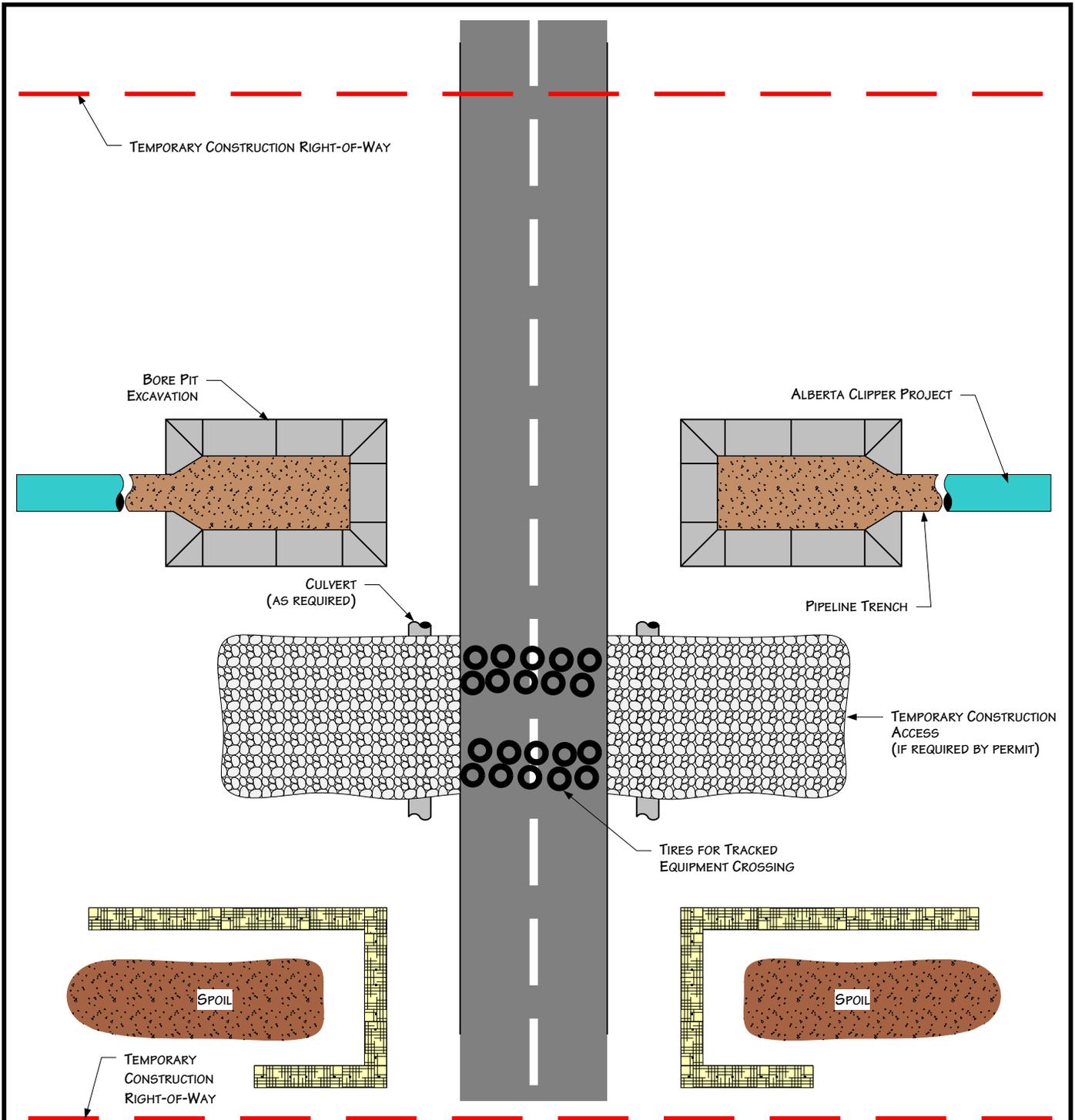


For environmental review purposes only.



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\ID-FEEL\2011-019\ FIG 24_WETLAND_CROSSING_METHOD.V SD	



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.

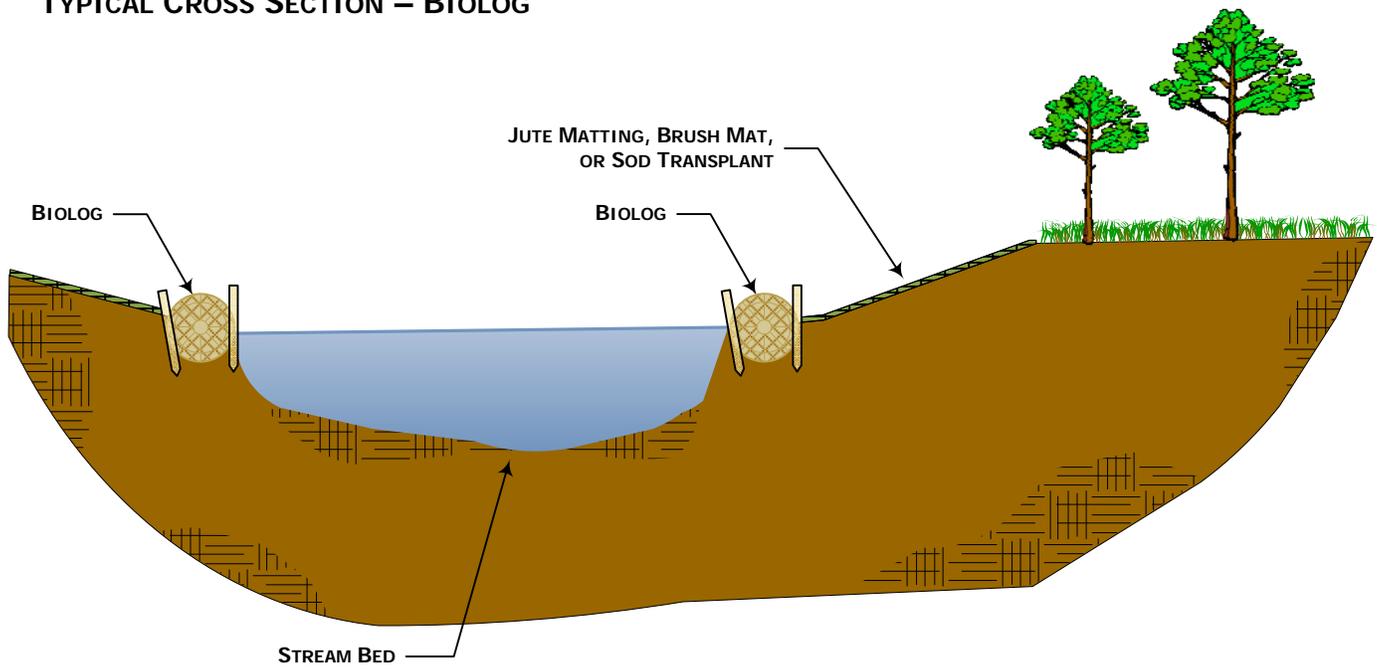
For environmental review purposes only.



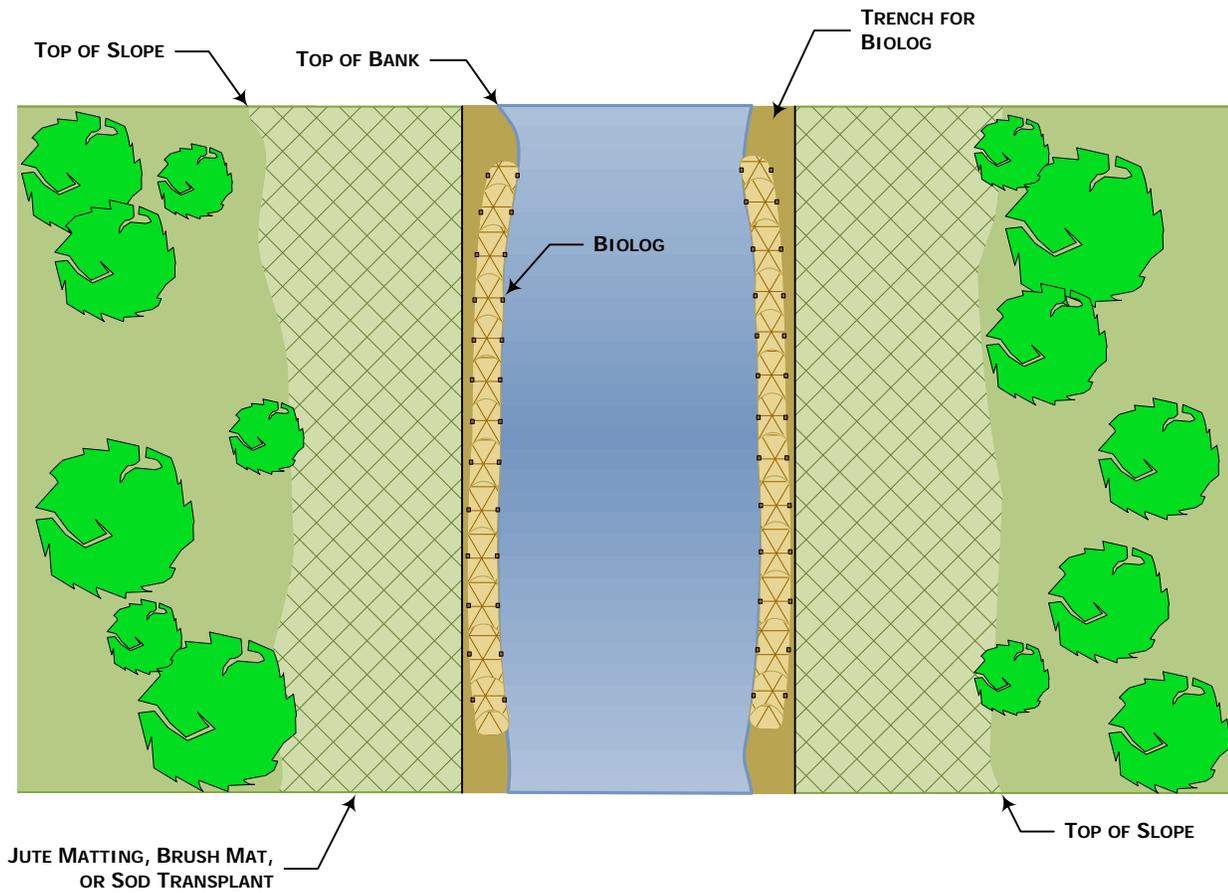
Figure 25
Environmental Protection Plan
 Typical Improved Road Crossing
 Directional Bore Method

DATE: 7/13/1999	
REVISED: 3/14/11	
SCALE: NTS	
DRAWN BY: KMKENDALL	
<small>K:\CLIENT_PROJECTS\0-PIEEL\2011-019\FIG_25_IMPROVED_ROAD_BORE_CROSSING.VSD</small>	

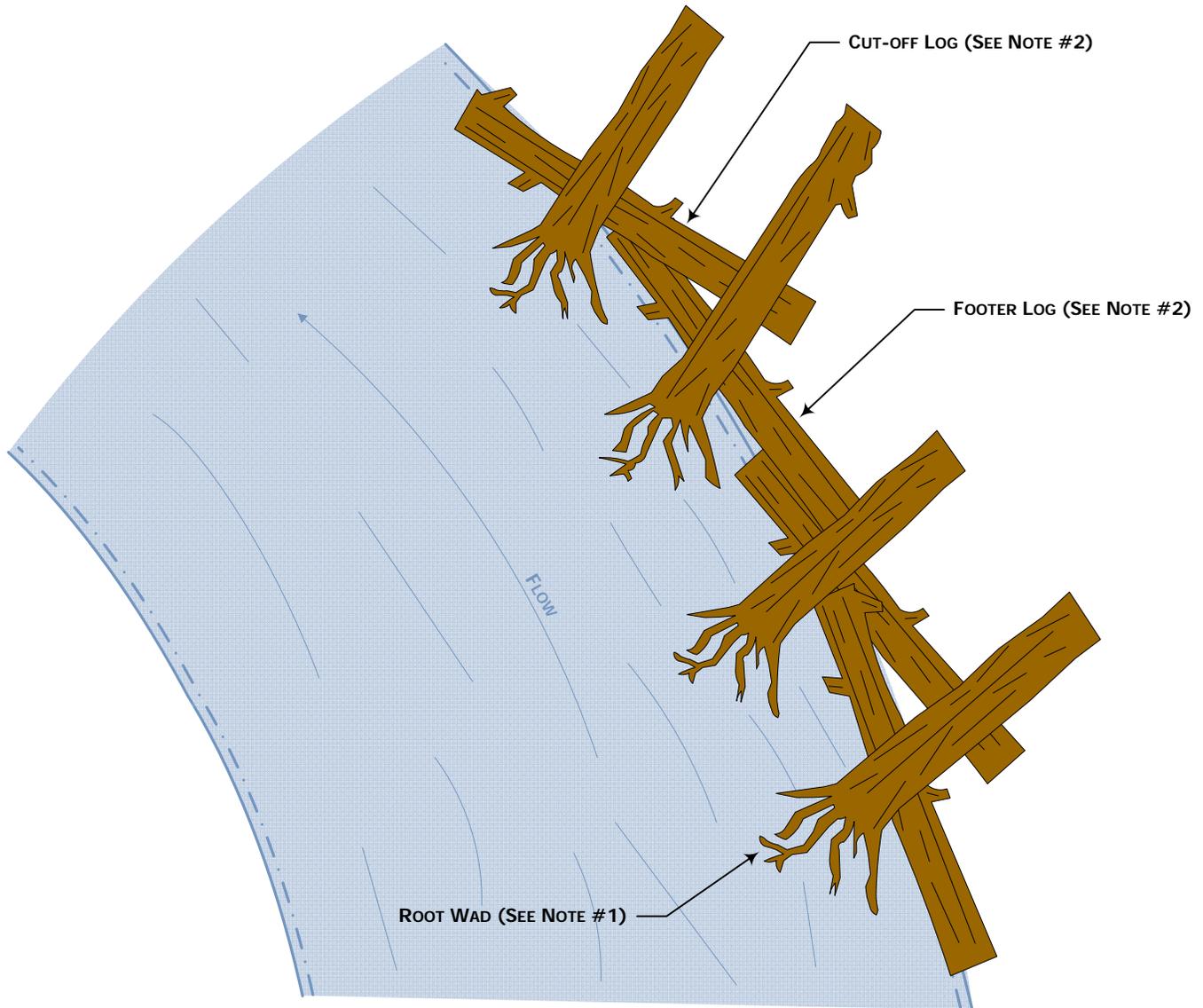
TYPICAL CROSS SECTION – BIOLOG



TYPICAL PLAN VIEW – BIOLOG



TYPICAL PLAN VIEW – NATURAL MATERIAL REVETMENT

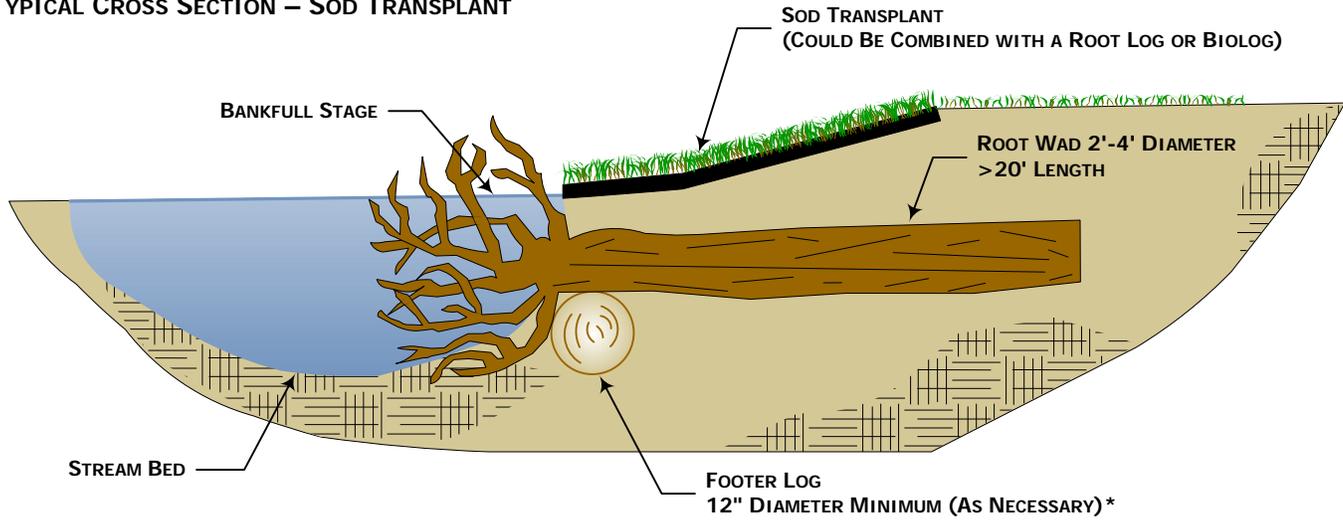


Notes:

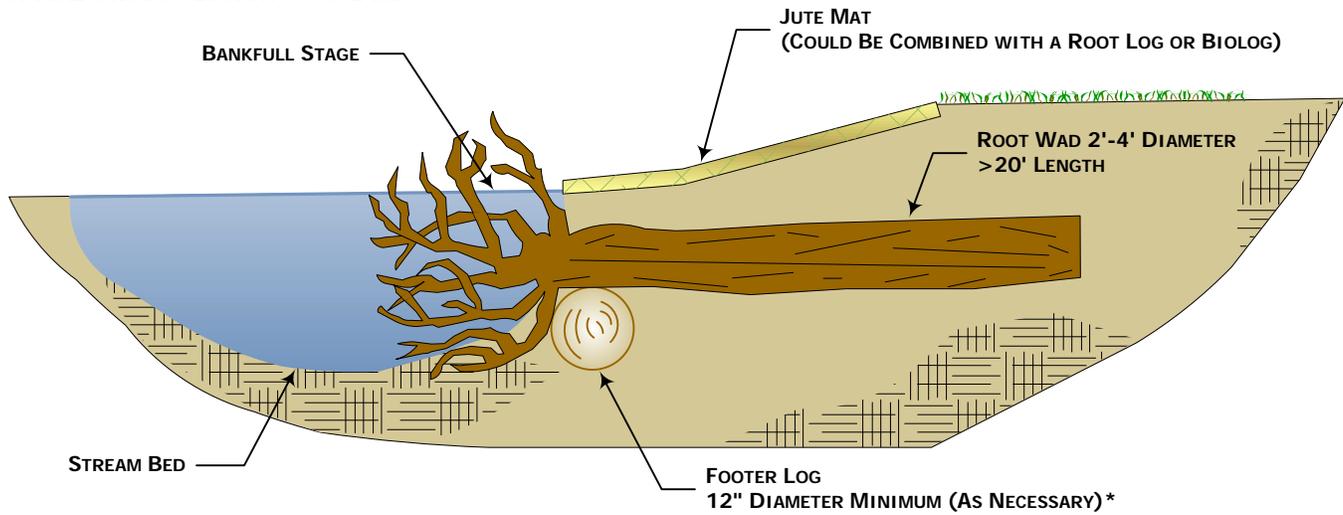
#1 – Root wad logs to be used on steep banks or based on agency recommendations.

#2 - Root wad logs to be anchored appropriately based on site-specific conditions or agency recommendations.

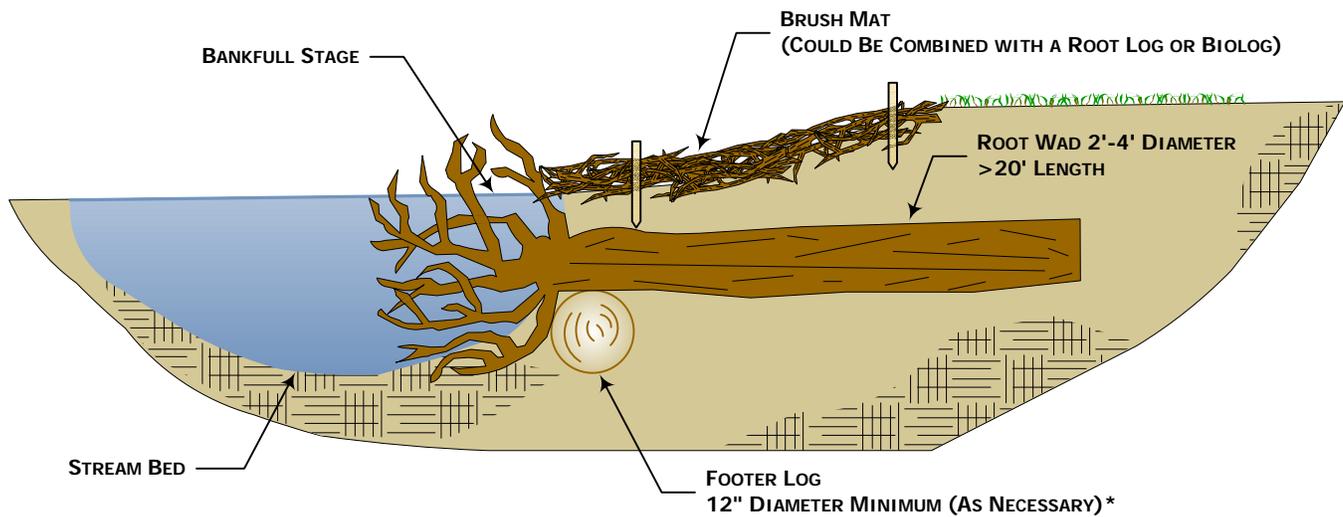
TYPICAL CROSS SECTION – SOD TRANSPLANT



TYPICAL CROSS SECTION – JUTE MAT



TYPICAL CROSS SECTION – BRUSH MAT



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

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

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

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

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

Sandpiper Pipeline Project Noxious and Invasive Weed Species			
State/Weed Type	Common Name	Scientific Name	Regulatory Classification
	Water flea	<i>Daphnia lumholtzi</i>	Prohibited
	Zebra mussel	<i>Dreissena polymorpha</i>	Restricted
<p>North Dakota: ^a Listed Regulated Species</p> <p>Minnesota Control Status: ^b Eradicate ^c Control ^d Restricted</p> <p>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)</p>			

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 <i>if summer seeding</i> (<i>Avena sativa</i>) OR Winter Wheat <i>if dormant (late fall) or spring seeding</i> (<i>Triticum aestivum</i>)	40	50%
Annual Ryegrass (<i>Lolium italicum</i>), Annual Alfalfa (<i>Medicago sativa</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	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 (<i>Pascopyrum smithii</i>)	3.2	20%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (<i>Elytrigia intermedia</i>)	5.2	30%
Alfalfa	1.2	10%
<i>Total</i>	16.6	100%
Associated Companion Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if late fall (dormant) or spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Companion/Cover Crop Total</i>	20	100%
GRAND TOTAL	36.6 pounds	100%

**Sandpiper Pipeline Project
Seed Mixes**

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

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Perennial Ryegrass <i>(Lolium perenne)</i>	2	17%
Canada Wild-rye <i>(Elymus canadensis)</i>	4	33%
Switchgrass <i>(Panicum virgatum)</i> (unimproved native variety)	4	33%
Timothy <i>(Phleum pratense)</i>	2	17%
<i>Total</i>	12	100%
Associated Companion Crop Mix		
Oats <i>if summer seeding (Avena sativa)</i> or Winter Wheat <i>if late fall (dormant) or spring seeding (Triticum aestivum)</i>	16	80%
Annual Ryegrass <i>(Lolium italicum)</i> , OR Slender Wheat Grass <i>(Elymus trachycaulus)</i>	4	20%
<i>Companion/Cover Crop Total</i>	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 <i>(Beckmannia syzigachne)</i>	6	30%
Annual Rye Grass <i>(Lolium perene)</i>	8	40%
Fowl Bluegrass <i>(Poa palustris)</i>	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 <i>(Poa pratensis)</i>	82.5	52%
Perennial Ryegrass <i>(Lolium perenne)</i>	30	19%
Creeping Red Fescue <i>(Festuca rubra)</i>	37.5	23%
Annual Rye Grass <i>(Lolium italicum)</i>	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 (<i>Pascopyrum smithii</i>)	3.2	20%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (<i>Elytrigia intermedia</i>)	5.2	30%
Alfalfa	1.2	10%
<i>Total</i>	16.6	100%
Associated Companion Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if late fall (dormant) or spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	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 (<i>Dactylis glomerata</i>)	6	30%
Vernal Alfalfa (<i>Medicago sativa</i>)	2	10%
Climax Timothy (<i>Phleum pretense</i>)	3	15%
Tetraploid Perennial Ryegrass (<i>Lolium perenne</i>)	4	20%
Alsike Clover (<i>Trifolium hybridum</i>)	2	10%
Medium Red Clover (<i>Trifolium pretense</i>)	3	15%
<i>Total</i>	20	100%
Associated Cover Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if late fall (dormant) or spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
Cover Crop Total	20	100%
GRAND TOTAL	40 pounds	100%

**Sandpiper Pipeline Project
Seed Mixes**

Table 8 – North Dakota Wildlife Area Upland Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (<i>Pascophyrum smithii</i>)	4.0	34.5%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1.0	8.6%
Green needlegrass (<i>Stipa viridula</i>)	2.4	20.7%
Sideoats grama (<i>Bouteloua curtipendula</i>)	2.4	20.7%
Blue grama (<i>Bouteloua gracilis</i>)	0.4	3.4%
Canada wildrye (<i>Elymus Canadensis</i>)	0.6	5.2%
Switchgrass (<i>Panicum virgatum</i>)	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 (<i>Trifolium pretense</i>)	4.5	30%
Alsike Clover (<i>Trifolium hybridum</i>)	4.5	30%
White Clover (<i>Trifolium repens</i>)	4.5	30%
Creeping Red Fescue (<i>Festuca rubra</i>)	1.5	10%
<i>Total</i>	15	100%
Associated Cover Crop Mix		
Oats if summer seeding (<i>Avena sativa</i>) or Winter Wheat if spring seeding (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), Annual Alfalfa (<i>Medicago sativa</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Cover Crop Total</i>	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 (<i>Pascopyrum smithii</i>)	4.0	34.5%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1.0	8.6%
Green needlegrass (<i>Stipa viridula</i>)	2.4	20.7%
Sideoats grama (<i>Bouteloua curtipendula</i>)	2.4	20.7%
Blue grama (<i>Bouteloua gracilis</i>)	0.4	3.4%
Canada wildrye (<i>Elymus Canadensis</i>)	0.6	5.2%
Switchgrass (<i>Panicum virgatum</i>)	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 (<i>Andropogon gerardi</i>)	4	44%
Western Wheatgrass (<i>Pascopyrum smithii</i>)	4	29%
Switchgrass (<i>Panicum virgatum</i>)	0.5	12%
Canada Wildrye (<i>Elymus canadensis</i>)	2	15%
Purple Prairie Clover (<i>Dalea purpureum</i>)	2 (ounces)	
<i>Total</i>	10.5 pounds	100%
Associated Cover Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Cover Crop Total</i>	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.		

**Sandpiper Pipeline Project
Seed Mixes**

Table 12 – North Dakota Roadside Seed Mix

Seed Name	Pure Live Seed (Pounds Per Acre)	% of Seed
Western Wheatgrass (<i>Pascopyrum smithii</i>)	3.2	20%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	1	10%
NewHy bluebunch-quackgrass hybrid	6	30%
Pubescent Wheatgrass (<i>Elytrigia intermedia</i>)	5.2	30%
Alfalfa	1.2	10%
<i>Total</i>	16.6	100%
Associated Companion Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if late fall</i> (<i>dormant</i>) or <i>spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Companion/Cover Crop Total</i>	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 (<i>Poa pratensis</i>)	22.3	32%
Canada Bluegrass (<i>Poa compressa</i>)	9.8	14%
Switch grass (<i>Panicum virgatum</i>)	2.1	3%
Slender Wheatgrass (<i>Elymus trachycaulus</i>)	2.8	4%
Perennial Rye-grass (<i>Lolium perenne</i>)	14.7	21%
Timothy (<i>Phleum pratense</i>)	2.1	3%
Redtop (<i>Agrostis gigantea</i>)	2.1	3%
Creeping Alfalfa (<i>Medicago sativa</i>)	4.2	6%
White clover (<i>Trifolium repens</i>)	2.1	3%
Hairy Vetch (<i>Vicia villosa</i>)	7.8	11%
<i>Total</i>	70 pounds	100%
Associated Cover Crop Mix		
Oats <i>if summer seeding</i> (<i>Avena sativa</i>) or Winter Wheat <i>if spring seeding</i> (<i>Triticum aestivum</i>)	16	80%
Annual Ryegrass (<i>Lolium italicum</i>), Annual Alfalfa (<i>Medicago sativa</i>), or Slender Wheat Grass (<i>Elymus trachycaulus</i>)	4	20%
<i>Cover Crop Total</i>	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 (<i>Thinopyrum ponticum</i>)	2.2	27.5
Intermediate or pubescent wheat grass (<i>Thinopyrum intermedium</i>)	4.3	53.75
Alfalfa (<i>Medicago sativa</i>)	1.1	13.75
Sweet clover (<i>Melilotus officinalis</i>)	0.4	5
GRAND TOTAL	8 pounds	100%

**Sandpiper Pipeline Project
Seed Mixes**

Table 15 – Minnesota Protected Waters Seed Mix¹

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

**Sandpiper Pipeline Project
Seed Mixes**

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
<i>*Andropogon gerardii</i>	Big bluestem
<i>*Panicum virgatum</i>	Switchgrass
<i>*Calamagrostis canadensis</i>	Bluejoint
<i>*Calamagrostis stricta</i>	Slimsteam reedgrass
<i>*Spartina pectinata</i>	Prairie cordgrass
<i>Koeleria macrantha</i>	Prairie junegrass
<i>Bouteloua curtipendula</i>	Sideoats grama
<i>Nassella viridula</i>	Green needlegrass
<i>Pascopyrum smithii</i>	Western wheatgrass
Forb Species	Common Name
<i>Achillea millefolium</i>	Common yarrow
<i>Anemone Canadensis</i>	Canadian anemone
<i>Artemisia ludoviciana</i>	White sagebrush
<i>Pediomelum argophyllum</i>	Silvery scurfpea
<i>Rudbeckia hirta</i>	Blackeyed susan
<i>Polygala verticillata</i>	Milkwort
<i>Ratibida columnifera</i>	Prairie coneflower
<i>Solidago Canadensis</i>	Canada goldenrod
<i>Symphyotrichum ericoides</i>	White heath aster
<i>Vicia americana</i>	American vetch
<i>Dalea purpurea</i>	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: CEG002199

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

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. **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.** 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.



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 ₂ SO 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: _____

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

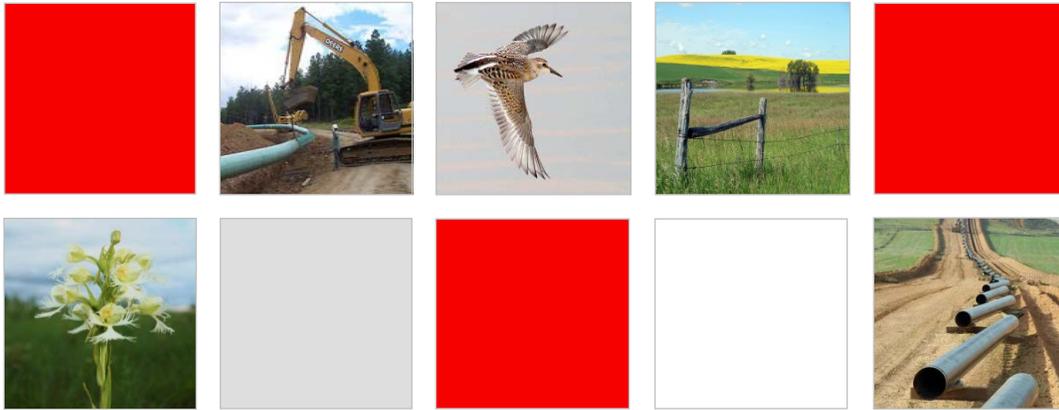
Sandpiper Pipeline Project Spill Reporting Contacts			
Agency	Reporting Criteria	When	Phone Number
Federal Contacts			
National Response Center	Release of a hazardous substance in an amount equal to or greater than its reportable quantity under CERCLA Any quantity of discharged oil that violates state 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 (NDDDES)	As Needed	Immediately	NDDDES 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

DEFINITIONS	ii
PURPOSE AND APPLICABILITY	1
GENERAL PROVISIONS	1
MITIGATION MEASURES.....	3
1. Right-of-Way Width.....	3
2. Pipeline Depth of Cover	4
3. Winter Construction	5
4. Temporary Erosion and Sediment Control	5
5. Topsoil Stripping, Trenching, Soil Storage, and Replacement	5
6. Repair of Damaged and Adversely Affected Tile.....	7
7. Agricultural Drainage Ditches	9
8. Rock Removal	9
9. Removal of Construction Debris	10
10. Compaction, Rutting, and Soil Restoration	10
11. Fertilization and Liming.....	11
12. Land Leveling	11
13. Prevention of Soil Erosion.....	11
14. Repair of Damaged Soil Conservation Practices	11
15. Interference with Irrigation Systems	11
16. Ingress and Egress.....	12
17. Temporary Roads	12
18. Weed Control.....	12
19. Pumping of Water from Open Trenches.....	12
20. Construction in Wet Conditions.....	13
21. Procedures for Determining Construction-Related Damages.....	13
22. Advance Notice of Access to Private Property	13
23. Indemnification	14
24. Tile Repair Following Pipeline Installation	14
Management of Change Procedure	14

APPENDICES

- Appendix A Mitigation Measures for Organic Agricultural Land
- Appendix B Management of Change Onsite Modification Request Form

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):



Enbridge (U.S.) Inc.

UNANTICIPATED DISCOVERIES PLAN

October 2013



TABLE OF CONTENTS

1.0 INTRODUCTION..... 1
2.0 UNANTICIPATED DISCOVERY CONDITIONS 1
3.0 DISCOVERY OF HISTORIC PROPERTIES..... 2
 3.1 FEDERAL AGENCY JURISDICTION..... 3
 3.2 STATE LANDS..... 3
 3.3 PRIVATE LANDS SUBJECT TO STATE ROUTING AUTHORITY
 JURISDICTION 4
4.0 DISCOVERY OF HUMAN SKELETAL REMAINS 5

APPENDICES

Appendix A – Contact Lists: North Dakota, Minnesota, and Wisconsin

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