Environmental Mitigation Plan

Enbridge Energy, Limited Partnership

Line 6B 2012 Maintenance and Rehabilitation Project

December 2011
## ENVIRONMENTAL MITIGATION PLAN

### TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.0 GENERAL MITIGATION MEASURES</td>
<td>3</td>
</tr>
<tr>
<td>1.1 TEMPORARY EROSION AND SEDIMENT CONTROLS</td>
<td>3</td>
</tr>
<tr>
<td>1.2 RIGHT-OF-WAY ACCESS</td>
<td>3</td>
</tr>
<tr>
<td>1.3 ROAD REPAIR</td>
<td>3</td>
</tr>
<tr>
<td>1.4 RIGHT-OF-WAY REQUIREMENTS</td>
<td>3</td>
</tr>
<tr>
<td>1.5 LINE LIST AND PERMITS</td>
<td>4</td>
</tr>
<tr>
<td>1.6 UPLAND CLEARING</td>
<td>5</td>
</tr>
<tr>
<td>1.6.1 Disposal of Non-Merchantable Timber</td>
<td>5</td>
</tr>
<tr>
<td>1.6.2 Disposal of Merchantable Timber</td>
<td>5</td>
</tr>
<tr>
<td>1.6.3 Upland Grading and Stump Removal</td>
<td>5</td>
</tr>
<tr>
<td>1.6.4 Trees and Shelterbelts</td>
<td>5</td>
</tr>
<tr>
<td>1.6.5 Irrigation Systems</td>
<td>6</td>
</tr>
<tr>
<td>1.6.6 Drain Tile Inlets</td>
<td>6</td>
</tr>
<tr>
<td>1.6.7 Upland Topsoil Segregation</td>
<td>6</td>
</tr>
<tr>
<td>1.6.8 Temporary Erosion and Sediment Controls</td>
<td>7</td>
</tr>
<tr>
<td>1.6.9 Temporary Slope Breakers</td>
<td>8</td>
</tr>
<tr>
<td>1.6.10 Noise and Dust Control</td>
<td>9</td>
</tr>
<tr>
<td>1.7 PIPE DELIVERY, BENDING &amp; WELDING</td>
<td>9</td>
</tr>
<tr>
<td>1.8 UPLAND TRENCHING</td>
<td>9</td>
</tr>
<tr>
<td>1.8.1 Timing</td>
<td>10</td>
</tr>
<tr>
<td>1.8.2 Pipeline Depth</td>
<td>10</td>
</tr>
<tr>
<td>1.9 PIPE INSTALLATION</td>
<td>10</td>
</tr>
<tr>
<td>1.10 TRENCH BREAKERS</td>
<td>10</td>
</tr>
<tr>
<td>1.11 DRAIN TILE REPAIR</td>
<td>11</td>
</tr>
<tr>
<td>1.12 UPLAND BACKFILLING</td>
<td>12</td>
</tr>
<tr>
<td>1.13 WET WEATHER SHUTDOWN</td>
<td>12</td>
</tr>
<tr>
<td>1.14 CONTROLLING SPREAD OF UNDESIRABLE SPECIES</td>
<td>12</td>
</tr>
<tr>
<td>1.14.1 Prevention and Control Measures</td>
<td>13</td>
</tr>
<tr>
<td>1.15 CLEANUP AND ROUGH/FINAL GRADING</td>
<td>14</td>
</tr>
<tr>
<td>1.16 TIMING</td>
<td>14</td>
</tr>
<tr>
<td>1.17 PERMANENT EROSION AND SEDIMENT CONTROLS</td>
<td>14</td>
</tr>
</tbody>
</table>
1.18 SOIL COMPACTION TREATMENT ................................................................. 15
1.19 OFF-ROAD VEHICLE CONTROL MEASURES ........................................... 15
1.20 REPAIR OF DAMAGED CONSERVATION PRACTICES ......................... 16
1.21 LAND LEVELING FOLLOWING CONSTRUCTION ................................. 16

2.0 STREAM AND RIVER CROSSING GENERAL REQUIREMENTS ......................... 17
2.1 TIME WINDOW FOR CONSTRUCTION ......................................................... 17
2.2 PRE-CONSTRUCTION CONSIDERATIONS ................................................... 17
  2.2.1 Hazardous Materials ........................................................................... 17
  2.2.2 Refueling/Equipment Care ................................................................. 18
  2.2.3 Alignment of Crossing ......................................................................... 18
2.3 CLEARING AND GRADING ....................................................................... 18
  2.3.1 Impaired Waters .................................................................................. 18
2.4 ADDITIONAL WORKSPACE ...................................................................... 18
2.5 BRIDGES .................................................................................................... 19
  2.5.1 Types of Bridges ................................................................................. 19
  2.5.2 Bridge Design and Maintenance ......................................................... 19
2.6 STREAM AND RIVER CROSSING CONSTRUCTION METHODS .................. 20
  2.6.1 Wet Trench Method ........................................................................... 20
  2.6.2 Dam and Pump Method ....................................................................... 21
  2.6.3 Flume Method ..................................................................................... 22
  2.6.4 Directional Drill and/or Guided Bore Method ....................................... 24
2.7 DRAINAGE DITCHES AND INTERMITTENT STREAMS ............................... 24
2.8 PERMANENT RESTORATION .................................................................... 25
  2.8.1 Vegetative Bank Restoration ............................................................... 25
  2.8.2 Rock Riprap Restoration .................................................................... 25
  2.8.3 Bridge Removal ................................................................................ 25
  2.8.4 Swales ............................................................................................... 25
  2.8.5 Drainage Ditches and Intermittent Streams ....................................... 25

3.0 WETLAND CROSSING GENERAL REQUIREMENTS ..................................... 26
3.1 WETLAND ACCESS .................................................................................... 26
3.2 SPILL PREVENTION .................................................................................. 26
  3.2.1 Storage of Fuels and Other Materials ............................................... 26
  3.2.2 Refueling, Fuel Handling, and Equipment Maintenance .................... 26
3.3 CLEARING .................................................................................................. 27
  3.3.1 Additional Workspace in Wetlands .................................................... 27
3.4 GRADING IN A WETLAND ....................................................................... 27
3.5 RIGHT-OF-WAY STABILIZATION .............................................................. 28
3.6 TRENCHING .............................................................................................. 28
  3.6.1 Topsoil Segregation .......................................................................... 28
  3.6.2 Trench Breakers ................................................................................. 28
7.9 Dormant Seeding ........................................................................................................... 40
7.10 Monitoring ................................................................................................................. 40
8.0 WINTER CONSTRUCTION .......................................................................................... 41
9.0 WASTE MANAGEMENT ............................................................................................... 42
9.1 Hazardous Wastes ....................................................................................................... 42
9.2 Abrasive Blast Debris .................................................................................................. 42

FIGURES

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 Biolog 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

Appendices

Appendix A – Typical Construction ROW Configurations

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1 Site-specific plans supersede any design presented in the typical details.
INTRODUCTION

This Environmental Mitigation Plan (“EMP”) outlines construction-related environmental policies, procedures, and mitigation measures developed by Enbridge Energy Company, Inc., Enbridge (U.S.) Inc. and their subsidiaries (collectively referred to herein as “Enbridge”) as a baseline for pipeline construction projects. This EMP was developed based on Enbridge’s experience implementing best management practices during construction. It is intended to meet or exceed applicable federal, state, tribal, and local environmental protection and erosion control specifications and practices. The EMP is designed to address typical circumstances that may be encountered along a pipeline 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 of the EMP describes general mitigation measures, including soil erosion and sedimentation control procedures, to be implemented during upland construction and upland restoration;
- Section 2.0 discusses stream and river construction, crossing, and restoration;
- Section 3.0 describes practices for wetland construction, crossings, and restoration;
- Section 4.0 discusses highway, road, and rail crossings;
- Section 5.0 discusses 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 requirements.

Alternative construction procedures implemented in lieu of this EMP must provide an equal or greater level of protection to the environment, and must be approved in writing by Enbridge.

Unless otherwise specified, the construction Contractor (Contractor) is responsible for implementing the requirements of this EMP. Enbridge will make the requirements of the EMP and applicable environmental permits known to the Contractor. If the Contractor has questions concerning these environmental requirements, the Contractor will contact an Enbridge representative.

Enbridge will provide appropriate construction oversight to confirm Company and Contractor compliance with the measures of this EMP 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 EMP, and verify compliance with these procedures for the company. Enbridge employs 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 those unforeseen situations should they occur in the field. The EI 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 EMP, 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 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, biologs, etc.), stormwater diversions, trench breakers, mulch, and revegetation. The goal of ECDs is to minimize erosion onsite, and prevent construction-related sediment from migrating offsite into sensitive resource areas such as streams, wetlands, lakes, or drainage ditches (dry or flowing). The Contractor must, at all times, maintain erosion and sediment control structures as required in the project construction documents and as required by all applicable permits. Non-functional erosion and sediment control features must be repaired, replaced, or supplemented with functional materials within 24 hours after discovery, or as otherwise specified in the project permits.

ECDs must be installed after initial clearing but before disturbance of the soil, and must be replaced by permanent erosion controls as restoration is completed. Additional information on ECDs is provided in the upland, waterbody, and wetland sections.

1.2 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 creating 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 ROW where practicable (off-ROW parking), or equivalent. Installation of stone or timber mat access pads must be in accordance with applicable permits and state/federal specifications. If such BMPs are not adequate to prevent sediment from being tracked onto public roads, street sweeping, or other equivalent means of collecting sediment, must be used. If soil is tracked onto a roadway, the Contractor must remove accumulated material from the road and return it 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 swept and/or graded into the road ditch or onto the shoulder.

1.3 ROAD REPAIR
The Contractor must repair private roads, lanes, and public roads damaged when moving equipment or obtaining access to the ROW.

1.4 RIGHT-OF-WAY REQUIREMENTS
All construction equipment and vehicles will be confined to the approved ROW and additional workspace. Prior to commencement of clearing operations, the outer limits of the construction ROW and additional workspace areas will be marked with distinctive stakes and flagging by Enbridge. Construction activities are restricted to the approved designated areas. Other areas (pipe storage and contractor yards, borrow and disposal areas, access roads, etc.) will be posted for use by the Contractor during construction activities.

The construction ROW (construction workspace) for a project will vary and may include a portion of Enbridge’s existing corridor, new permanent corridor, permitted temporary workspace, and site-specific additional workspaces as defined below and shown in Appendix A. The construction ROW width will be
reduced in selected locations (e.g., wetlands, waterbodies, and forested windbreaks), 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 existing pipelines, if applicable. 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 Workspace

Site-specific additional workspace (“AWS“) 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. AWS will typically be located in uplands adjacent to the construction ROW and set back at least 50 feet from sensitive resource boundaries where site-specific field conditions allow. However, to complete work safely, Enbridge may need to locate AWS within a wetland or within the 50-foot setback from a wetland or waterbody based on site-specific conditions. AWS adjacent to waterbodies and/or wetlands is addressed further in sections 2.4 and 3.3, respectively.

Enbridge will acquire AWS from the landowner where necessary; use of unauthorized workspace is prohibited without Enbridge’s approval. In all cases, the size of AWS will be kept to the minimum necessary to safely conduct work. All approved AWS locations are depicted on the construction alignment sheets.

1.5 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 they conform to the project permits. The Contractor must comply with these special requirements and/or permit conditions.

The CLL reflects requirements and comments provided by Landowners; however it is not a comprehensive list of construction requirements. The CLL must be considered in conjunction with other project documents and permits. Any third party agreements between the Contractor and the Landowner must be pre-approved by Enbridge and in writing.

Unless otherwise noted within this EMP, Enbridge will obtain the necessary permits for the installation of the pipeline. Permit requirements may be more stringent than the requirements of this EMP. In all cases, the more restrictive requirements will apply.
1.6 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.

1.6.1 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 (excluding slash or brush and less than 1.5 inch diameter and/or 12 inches in length) may be uniformly broadcast (less than 1-inch thickness) across the ROW where they 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 acquired all applicable permits and approvals (e.g. agency, tribal, and landowner) and in accordance with all tribal, state, and local regulations. The Contractor must provide Enbridge with copies of these permits and/or approvals prior to initiating burning.

Burning is not allowed within 100 feet of a wetland or waterbody without site-specific approval from Enbridge and in accordance with applicable permits and approvals. Burning is not allowed in wetlands. No chips, mulch, or mechanically cut woody debris will be stockpiled in a wetland and no upland woody debris will be disposed of in a wetland (see section 3.3 for further information on clearing in a wetland). Non-merchantable timber may not be disposed of by placing it off the ROW. No woody debris disposal will be allowed in agricultural areas or wetlands.

1.6.2 Disposal of Merchantable Timber

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

1.6.3 Upland Grading and Stump Removal

Grading generally follows clearing and involves leveling and smoothing the construction ROW, including TWS, and AWS areas as necessary, to create a safe, even working surface for equipment and vehicles. To facilitate proper cleanup and restoration in upland areas, tree stumps outside the ditch line will be ground no less than four-inches 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. Topsoil and subsoil disturbed during grading operations will not be mixed with foreign material (e.g., whole stumps and brush).

1.6.4 Trees and Shelterbelts

Care will be taken to minimize tree removal. To the extent practicable, and in accordance with applicable permits, wind breaks and shelterbelts will be crossed by minimizing the width of the ROW. When clearing, trees will be felled onto the ROW to minimize damage to off-ROW vegetation. Shelterbelts within the TWS and AWS must be replanted as specified in the contract and in accordance with applicable project permits and/or landowner agreements.
1.6.5 Irrigation Systems

If pipeline construction activities interfere with the operation of spray irrigation systems, Enbridge will establish with the landowner or tenant an acceptable amount of time the irrigation system may be out of service. If feasible, temporary measures will be implemented to allow an irrigation system to continue to operate across the ROW during pipeline construction. Any damage to irrigation systems caused by construction-related activities will be repaired following backfilling.

1.6.6 Drain Tile Inlets

Enbridge will attempt to locate existing drain tile inlets that are located near the construction work area prior to construction. Drain tile inlets must be marked using flags. The Contractor must 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 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.

1.6.7 Upland Topsoil Segregation

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, topsoil will be segregated in selected areas where soil productivity is an important consideration. A minimum one foot of separation must be maintained between the topsoil and subsoil piles to prevent mixing. Where the one foot separation cannot be maintained, a physical barrier, such as a thick layer of straw mulch, may be used between the spoil and topsoil piles to prevent mixing. Use of the physical barrier must be reviewed and approved by Enbridge on a site-specific basis.

Upland areas where topsoil will be stripped include 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 trench breakers (refer to Section 1.11) or to pad the pipe. Gaps must 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 (refer to Figures 1 through 3 and Appendix A):

- Modified Ditch-Plus-Spoil Side
- Full ROW
- Trench-Line-Only
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. Based on Enbridge’s experience during previous construction projects, this method will provide a greater level of protection to the topsoil resource while still reducing the amount of topsoil material to be moved relative to the Full ROW technique. Alternative topsoil segregation methods may be used on a site-specific basis or as requested by the landowner. 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.

Trench-line-only topsoil segregation technique will be used in forested areas and nonagricultural open areas, unless specifically requested otherwise by the landowner and/or managing land agency and in compliance with applicable permit conditions. In areas of steep side slopes adjacent to wetlands and waterbodies, including forested areas, where subsoil will be excavated (e.g., two-toned, side-cut, etc.) to create a level workspace, topsoil will be segregated to the extent practicable and at the direction of Enbridge. 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**

Topsoil must be stripped to a maximum depth of 12 inches in active croplands, unless otherwise specified by Enbridge or 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 shall attempt to segregate to the depth that is present.

**1.6.8 Temporary Erosion and Sediment Controls**

ECDs are intended to slow the velocity of water off-site to minimize erosion, stop the movement of sediments off the construction ROW, and prevent the deposition of sediments into sensitive resources that may be on or adjacent to the ROW. ECDs typically used are silt fence and/or trenched-in and staked straw bales/biologs and other barriers such as compacted earth (e.g., drivable berms across travel ways), sand bags, rubber conveyor belt barriers, or other appropriate materials. If temporary ECDs are removed during the day to allow equipment access, they must be reinstalled at the end of the day.

Temporary ECDs must 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 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.

If silt fence is in use, when the depth of sediment reaches about one-third of the height, the sediment must 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 must be properly reinstalled after equipment passage, or activities in the area are completed for the day. These ECDs must also be repaired and/or replaced prior to forecasted inclement weather. The Contractor is responsible for monitoring weather conditions and adjusting resources as needed to address pending and/or existing weather conditions.

**Temporary Stabilization**

Installation of temporary seeding, mulch (straw or hydromulch), and erosion control mats may be required by Enbridge in certain locations 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. Temporary stabilization measures as outlined in Section 7.0 must be implemented to minimize erosion and for sediment control.

The Contractor must install the appropriate class of erosion control blanket in accordance with manufacture recommendations and/or state Department of Transportation specifications on slopes greater than 5 percent that would be exposed over the winter and drain to surface waters (refer to Figure 8). The Contractor must 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.

**Mulch**

Mulch will be applied as indicated in Section 7.7. If exposed soils have not been stabilized prior to freezing of the ground, and soil conditions are such that disk in straw is still effective, crimp in straw mulch to help stabilize these areas, but on steeper slopes erosion controls blankets are still preferable.

**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.

### 1.6.9 Temporary Slope Breakers

Temporary slope breakers must 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.

<table>
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<th>Slope (%)</th>
<th>Approximate Spacing (ft)</th>
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<tr>
<td>3-5</td>
<td>250</td>
</tr>
<tr>
<td>5-15</td>
<td>200</td>
</tr>
<tr>
<td>15-25</td>
<td>150</td>
</tr>
<tr>
<td>&gt;25</td>
<td>&lt;100</td>
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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) 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 either earthen berms or rocked trenches must be used whenever possible.

Temporary slope breakers must be constructed according to the following specifications:

- earthen berms must be installed with a 2 to 4 percent out slope, with a minimum 6 foot base and a minimum height of 1.5 feet;
- straw bales used as slope breakers must 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 must 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;
- proper slope breaker outfalls must be established where topsoil segregation and/or grading has created a barrier at the edge of the construction workspace;
- gaps must be created through spoil piles where necessary to allow proper out letting of temporary berms;
- temporary slope breakers must be inspected daily and repaired as necessary, but no more than 24 hours after discovery or as soon otherwise specified in the project permits, to maintain operational integrity and prevent erosion in active construction areas.

1.6.10 Noise and Dust Control

The Contractor must take all reasonable steps to control construction-related noise and dust near residential areas and other areas as directed by Enbridge. Control practices may include wetting the ROW and access roads, limiting working hours in residential areas, reestablishment of vegetation and/or additional measures as appropriate based on site-specific conditions.

1.7 PIPE DELIVERY, BENDING & WELDING

Typically, individual joints of pipe will be strung along the construction ROW before excavating the pipeline trench. This operation involves specially designed equipment to deliver pipe from pipe storage yards to the ROW. Where practical, the Contractor will drive stringing trucks along an alignment which corresponds closely to the pipeline centerline to minimize the potential for soil compaction in actively cultivated areas.

1.8 UPLAND TRENCHING

Trenching in uplands consists of excavating the trench for the pipeline, and 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 (refer to section 1.7.8), 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 soil in the ditch or will construct temporary access bridges across the trench for the landowner to move livestock or equipment. Trenches will also be sloped where started and ended to allow ramps for wildlife to escape.

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

1.8.2 Pipeline Depth
At a minimum, the pipeline will be buried in accordance with U.S. Department of Transportation regulations (40 CFR Part 195). The depth of cover may vary 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 workspace for storage of the spoil.

1.9 PIPE INSTALLATION
Once the trench has been inspected for proper depth, rocks, or other obstructions, the welded pipe is lowered into the trench. In rocky soils, the pipe may be wrapped with a protective shielding if necessary to prevent damage to the pipe coating during backfilling. Use of foam pillows must be approved by Enbridge in advance and implemented in accordance with applicable Project permits, local/state/federal regulations, and manufactures recommendations.

1.10 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 must be approved by Enbridge in advance and implemented in accordance with applicable Project permits, local/state/federal regulations, and manufactures recommendations. They will be placed from the bottom of the trench to near the top of the trench, completely surrounding the pipe and must 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 spaced as described for permanent berms or as otherwise specified 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.

1.11 DRAIN TILE REPAIR

If underground drainage tile is damaged by the pipeline’s construction, it will be repaired in a manner that assures the tile line’s proper operation at the point of repair. The following standards and polices shall apply to the tile line repair:

• Enbridge will endeavor to locate all tile lines within the ROW prior to construction so that repairs can be made if necessary. Enbridge will contact affected landowners/tenants to attempt to obtain their knowledge of tile line locations prior to construction. If the location of the tile lines is known precisely, those tile lines will be staked or flagged prior to construction to alert construction crews to the possible need for tile line repairs. If previously unidentified tile lines are encountered and cut during grading or trenching activities, they will be flagged at that time.

• Tile lines that are damaged, cut, or removed must be staked and/or flagged by the Contractor in such a manner that they will remain visible until permanent repairs are made prior to final backfilling of the trench. The location of damaged, cut, or removed tile lines will also be recorded using GPS technology or equivalent.

• All damaged lines must be screened or otherwise protected to prevent the entry of foreign materials, small mammals, etc. into the tile lines.

• If water is flowing through any damaged tile line, the tile will be immediately temporarily repaired until such time that permanent repairs can be made. If the tile lines are dry and water is not flowing, temporary repairs are not required if the permanent repairs can be made within 14 days of the time the damage occurred.

• Rain events during dry periods produce flow and require temporary repairs to facilitate draining of the fields to prevent crop damage. All damaged tiles must be temporarily or permanently repaired within 48 hours after a one inch rain event, or flow occurs in a previously non-flowing drain tile.
• Permanent repairs must be conducted in accordance with the contract specifications and must utilize double-walled drain tile and have rock shield installed between the drain tile and newly installed pipeline.

• The original tile alignment and gradient shall be maintained. A laser transit shall be utilized to ensure the proper gradient is maintained for repairs, regardless of length.

• Before completing permanent repairs, the Contractor will probe the tile lines or examine by other suitable means on both sides of the trench for their entire length within the work areas to check for tile that might have been damaged by vehicular traffic or construction equipment. If tile lines are found to be damaged, they must be repaired so that they function as intended.

• Permanent tile line repairs must be made within 14 days of the pipeline being installed within the trench, weather and soil conditions permitting.

1.12 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 must be dewatered in accordance with the methods discussed in Section 5.0.

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

• plasticity of the surface soil to a depth of approximately 4 to 8 inches;
• 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.

If the above factors cannot be achieved to the satisfaction of Enbridge, the Contractor must cease work in the applicable area until Enbridge determines that site conditions are such that work may continue.

The Contractor is responsible for appropriately planning for work, considering for the potential for wet conditions, and being prepared to implement mitigative measures in the event of wet weather conditions. This is particularly important when conducting work in unsaturated wetlands. The Contractor is responsible for implementing any and all such corrective measures should conditions subsequently worsen where the above described criteria cannot be met.

1.14 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 and noxious weeds) along its ROW due to pipeline construction activities. However, it is not practicable for Enbridge to eradicate undesirable species that are adjacent to its 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 applicable regulatory agencies, Enbridge will identify plant species that are considered noxious weeds and/or invasive plants that may occur within the counties being crossed by the pipeline corridor.

Enbridge may conduct field surveys along the proposed route to identify existing locations of noxious weeds and invasive species. These field surveys are considered reasonably accurate in documenting the locations of invasive species within and adjacent to wetlands, although additional locations may be present. Surveys will focus on natural areas, roadside ditches, and pastures. Surveyed areas will be evaluated for presence of the target invasive species within and adjacent to the proposed construction work area (construction ROW and additional workspaces). Locations where the population of the targeted species comprised at least 20 percent of the species density within a 1,000 square foot area will be recorded using a Global Positioning System ("GPS") device. Results of the surveys, including location maps, will be provided to the Contractor for proper treatment prior to construction.

### 1.14.1 Prevention and Control Measures

To prevent the introduction of noxious weeds and invasive species into the project area from other construction sites, construction equipment must be cleaned prior to arriving at the project site. This cleaning must consist of removing visible dirt from the equipment and blowing loose material from equipment using compressed air. 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. Contractors may use an equipment cleaning log 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 must be reviewed and approved by Enbridge’s Environment Department prior to use. Alternatively, full 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 they stay on the subsoil (clearing, grading, and restoration equipment must still be cleaned). The Contractor(s) must obtain necessary permits and/or certifications for the use of the applicable herbicides and must comply with state laws regarding the use of those herbicides. Contractor(s) must 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.

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 right-of-way. 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 or other designated Enbridge Representative 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. The EI, in consultation with Enbridge Environment staff, will determine where this practice will be implemented. The Contractor(s) must 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 on a certified organic farm must 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 must be approved by Enbridge prior to purchase and copies of the applicable documentation must be provided to Enbridge.

Post-construction monitoring of the restored ROW will be conducted by Enbridge during the first growing season after restoration is complete. Revegetation in non-agricultural areas will be considered successful when the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. If this monitoring indicates a higher density and cover of noxious weeds on the ROW compared to adjacent off ROW areas, Enbridge will take appropriate measures to control the noxious weeds. These measures may include herbicide spraying, mowing, or burning. Enbridge will control noxious weeds in a manner that prevents the spread of weeds onto adjacent agricultural land on land where Enbridge has aboveground facilities (e.g., valve sites, pump stations).

1.15 CLEANUP AND ROUGH/FINAL GRADING
All waste materials, including litter generated by construction crews, are to 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 (greater than 1.5 inch diameter and/or 12 inches in length). 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.

1.16 TIMING
The Contractor must begin cleanup and rough grading (including installation of temporary erosion and sediment control measures) within 72 hours after backfilling. The Contractor must attempt to complete this cleanup within one week, weather and soil conditions permitting.

1.17 PERMANENT EROSION AND SEDIMENT CONTROLS
During final grading, slopes in areas other than cropland will be stabilized with erosion control structures. Erosion control treatments of specific physical land features are described below.

Slopes
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:

<table>
<thead>
<tr>
<th>Slope (%)</th>
<th>Approximate Spacing (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5</td>
<td>250</td>
</tr>
<tr>
<td>5-15</td>
<td>200</td>
</tr>
<tr>
<td>15-25</td>
<td>150</td>
</tr>
<tr>
<td>&gt;25</td>
<td>&lt;100</td>
</tr>
</tbody>
</table>

Permanent berms must be constructed according to the following specifications:

- Permanent berms must be installed with a 2 to 8 percent out slope.
- Permanent berms must be constructed of compacted earth.
- 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 with a deep tillage device or chisel plowed to loosen compacted soils. If subsequent construction and cleanup activities result in further compaction, additional measures will be undertaken to alleviate the soil compaction.

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 or landowner agreements. After the topsoil is replaced, stone removal efforts will cease when the size and density of stones on the ROW are similar to undisturbed areas adjacent to the ROW. 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.

1.19 OFF-ROAD VEHICLE CONTROL MEASURES

Off-road vehicle control measures will be installed as requested by Landowners or as directed by land management agencies at points of entry. Such measures may include installing fences and gates, or placement of other barriers such as boulders or timbers. Visual screening may also be installed to deter use of the pipeline corridor from unauthorized activities, if requested by the landowner. No Trespassing signs will be installed at aboveground facilities, according to the applicable state regulations to provide
clear notice to the public and protect the integrity of the pipeline. All fences and gates removed or damaged will be repaired or replaced.

1.20 REPAIR OF DAMAGED CONSERVATION PRACTICES
All soil conservation practices (such as terraces, grassed waterways, etc.) that are damaged by the pipeline construction will be restored to preconstruction conditions to the extent practicable.

1.21 LAND LEVELING FOLLOWING CONSTRUCTION
Following the completion of the pipeline, the ROW will be restored to its pre-construction conditions as near as practicable. Should uneven settling or documented surface drainage problems occur following the completion of pipeline construction, Enbridge will take appropriate steps to remedy the issue.
2.0 STREAM AND RIVER CROSSING GENERAL REQUIREMENTS

Pre-construction planning is an essential part of stream crossings. 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. Prior to construction, the Contractor must identify alternative provisions 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 must 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.

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. The intent of the mitigation procedures is to minimize construction-related disturbance to streams and waterbodies by limiting the duration of construction in these areas and by minimizing erosion and sedimentation.

2.1 TIME WINDOW FOR CONSTRUCTION

All in-stream work activities (installation of dams, sheet piling, etc.) must 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.

2.2 PRE-CONSTRUCTION CONSIDERATIONS

2.2.1 Hazardous Materials

Hazardous materials, chemicals, fuels, lubricating oils, will not be stored and/or concrete coating activities will not occur within 100 feet of streams and waterbodies and in accordance with Enbridge’s
Spill Prevention, Containment and Control Plan ("Spill Plan"). Refer to the Spill Plan for additional requirements pertaining to hazardous materials and concrete-coating activities.

### 2.2.2 Refueling/Equipment Care

Construction equipment will be refueled at least 100 feet from streams and waterbodies. Where the Contractor and EI determines that conditions require construction equipment to be refueled within 100 feet of streams, the Contractor must follow the procedures described in Enbridge’s Spill Plan and implement additional provisions based on site-specific conditions. No equipment will be washed within 100 feet of streams or waterbodies. Overnight parking of equipment is not allowed within 100 feet of a stream or waterbody unless special provisions have been implemented in accordance with Enbridge’s Spill Plan and prior approval from the EI is obtained. Maintenance (e.g., lubricating) of construction equipment will not be allowed within the 100 foot buffer zone without approval from the EI and with additional special provisions for containment.

### 2.2.3 Alignment of Crossing

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.

### 2.3 CLEARING AND GRADING

The Contractor will leave a 20-foot buffer (from the ordinary high water mark OHWM / OHWL 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 (such as impaired waterways).

Woody vegetation within the 20-foot 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 must 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. This buffer should not be confused with the 50-foot setback required for extra workspace.

#### 2.3.1 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.

### 2.4 ADDITIONAL WORKSPACE

Additional workspaces, as defined in Section 1.5, include 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 AWS will be avoided as much as possible. Woody vegetation in wetlands and riparian areas will typically not be cleared for the purpose of AWS unless approved by appropriate regulatory agencies as stipulated in permits issued for the project. Additional workspaces will be constructed as follows:
• Additional workspaces will be located at least 50 feet away from the ordinary high water mark/level (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, additional workspaces should be located no closer than 20 feet from the OHWM/OHWL, subject to site-specific approval by Enbridge.

• Additional workspaces must be limited to the minimum size needed to construct the stream crossing.

2.5 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.

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.

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

• 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

2.5.2 Bridge Design and Maintenance
Bridges must be designed as close to perpendicular to the axis of the stream channel, creating the shortest crossing length and must be built and maintained in accordance with applicable permits. Equipment bridges must be designed to withstand the maximum foreseeable flow of the stream. Bridges must not restrict flow or pool water while the bridge is in place, and must be constructed with clean materials. Bridges must be designed and maintained to prevent soil from entering the waterbody. Soil that accumulates on the bridge decking must be removed as needed, or as deemed necessary by the EI.
2.6 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.

2.6.1 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 (refer to Figure 15). The following procedures will be used during wet trench crossings:

- Sediment control measures must be in place before grading from the 20-foot vegetative buffer left on each stream bank. Spoil containment structures must be installed back from the stream bank so that spoil does not migrate into the stream. Grading must be directed away from the waterbody to minimize the potential for sediment to enter the stream. Grading of stream banks must 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 must 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 must be dewatered appropriately prior to trench plug removal.

- If trench dewatering is necessary, the pump intake will be suspended off the trench bottom and dewatering will take place into a sediment filter bag and/or a straw bale dewatering structure (refer to Figures 21 and 22A – 22C) where directed by Enbridge. The trench will be dewatered in such a manner that no heavily silt-laden water flows into streams or wetlands (refer to Section 5.0). Only non-woven fabric will be used for filter bags. Landowner approval is required in advance of placement of dewatering structures outside of the approved construction ROW.

- 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 must restore the stream banks as near as practicable to pre-construction conditions unless that slope is determined to be unstable (refer to Section 2.8). Once the banks have been reshaped, ECDs must 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 will be installed upslope of the temporary seeding area.

2.6.2 Dam and Pump Method

Installation

The dam and pump method is a dry crossing method that is suitable for low flow streams and is a preferred alternative to fluming for crossing meandering channels. The dam and pump method involves damming of the stream with sandbags, inflatable/portable dams, sheet piling, and/or steel plates upstream and downstream of the proposed trench before excavation (see Figure 16) and pumping water around the construction area. The following procedures will be used for dam and pump crossings:

- Pumping of the stream across the ROW will commence simultaneously with dam construction to prevent interruption of downstream flow. Stream flow must 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 must be located on the upstream side of the crossing and must be placed in impermeable, sided structures which will act as containment units for the pumps and fuel containers (refer to Enbridge’s Spill Prevention, Containment, and Control Plan for sizing specifications of secondary containment structures). The pumps used for the Dam and Pump crossing method must not be placed directly in the stream or on the streambed. Pumps must have a capacity greater than the anticipated stream flow. The pumping operation must be staffed 24 hours a day and pumping must 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. A backup pump of equal or greater capacity must be on-site at all times in the event that the primary pump fails.

- The pump intake must be suspended to prevent sediment from being sucked from the bottom of stream and must be equipped with a screen with less than one-inch diameter openings, or equivalent device, to prevent fish uptake.

- Spill kits must be stored adjacent to pumps and fuel.

- Dams maybe constructed of sandbags, inflatable dams, aqua-dams, sheet piling, and/or steel plates. The dams must 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.

• Where possible, excavating equipment must 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 ROW). 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 must be dewatered appropriately prior to trench plug removal.

• Standing water that is isolated in the construction area by the dams will be pumped into a sediment filter bag and/or a straw bale dewatering structure located in such a manner that no heavily silt-laden water flows into streams or wetlands (refer to Section 5.0). Only non-woven fabric will be used for filter bags.

• 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 must occur immediately following installation of the pipeline. Once the stream banks have been stabilized, the dams and pump will be removed.

2.6.3 Flume Method

Installation

The flume method is a dry crossing method that is suitable for crossing sensitive, relatively narrow streams that have straight channels and are relatively free of large rocks and bedrock at the point of crossing. 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) must 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,
must 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 must 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) must be incorporated into dams made of sand bags and plastic sheeting (or equivalent). The upstream dam must be constructed first and will funnel stream flow into the flume(s). The downstream dam must prevent backwash of water into the trench and construction work area. The dams must 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 must 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 must 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 pumped 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). Non-woven fabric must be used for filter bags.

- 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 must 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.
2.6.4 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.

Enbridge developed a contingency plan to address measures to be performed in the event of a release of drilling mud onto the ground surface or waterbody (refer to the Enbridge Drilling Mud Containment, Response, and Notification Plan for additional details).

After the pipe is in place, excess drilling mud and slurry will be spread over an upland area approved by Enbridge and the landowner, or hauled off site to an Enbridge approved disposal location.

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.

2.7 DRAINAGE DITCHES AND INTERMITTENT STREAMS

Intermittent streams and agricultural ditches will typically be crossed using the wet trench method (refer to Section 2.6.1) or as otherwise specified in the applicable permits. If rain is forecasted within 24 hours prior to the crossing, a dry crossing technique as previously detailed may be implemented at the discretion of Enbridge. For small, dry intermittent streams and agricultural drainage ditches, standard upland construction procedures may be used, which involve stringing, welding, excavating the trench with backhoes, installing the pipe in the trench, and backfilling the trench with native material. The banks of each crossing will be reshaped, mulched (or erosion control blanket), and, if required, seeded in accordance with Section 7.0 to stabilize the crossing until permanent erosion control is implemented. No refueling, fuel storage, or equipment maintenance is allowed within 100 feet of a drainage ditch or intermittent stream without approval from the EI with additional special provisions for containment. Where dry swales cross the ROW, silt fence or straw bales will be installed at the edge of the ROW to prevent the flow of sediment from the ROW.
2.8 PERMANENT RESTORATION

Stream banks disturbed during installation of the pipeline will be stabilized with erosion control materials such as jute or equivalent 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 must restore the slopes as near as practicable to pre-construction conditions unless that slope is determined 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.

2.8.1 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, biologs, silt fences, etc.) will be installed as necessary based on site-specific conditions.

2.8.2 Rock Riprap Restoration

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.

2.8.3 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.

2.8.4 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 ROW.

2.8.5 Drainage Ditches and Intermittent Streams

Drainage ditches and intermittent streams will be permanently restored and stabilized with erosion control blanket, permanent seeding, or other appropriate measures.
3.0 WETLAND CROSSING GENERAL REQUIREMENTS

Typical pipeline construction in wetlands consists of clearing, stringing, trenching, dewatering, installation, backfilling, final grading, cleanup, and revegetation. However, due to the unstable nature of some wetland soils, construction activities may differ somewhat from those described for upland areas. Construction activities must be minimized in wetlands to the extent practicable. The Contractor will also use special construction techniques to minimize the disturbance to plants and soils and to protect wetland hydrology.

Pre-construction planning is an essential part of wetland crossings. 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 and federal agencies and applicable tribes. 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. Prior to construction, the Contractor must identify alternative provisions that would provide an equal or greater level of protection to wetland ecosystems. 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.

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.

3.1 WETLAND ACCESS

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

3.2 SPILL PREVENTION

3.2.1 Storage of Fuels and Other Materials

No storage of hazardous materials, chemicals, fuels, and lubricating oils, and no concrete coating activities will be permitted in, or within 100 feet of, any wetland unless special provisions have been implemented in accordance with Enbridge’s Spill Plan and prior approval is obtained from the EI. Vehicles and equipment left on the ROW overnight must be parked at least 100 feet from a delineated wetland unless special provisions have been implemented in accordance with Enbridge's Spill Plan, secondary containment structures are functional and properly placed, and prior approval is obtained from the EI.

3.2.2 Refueling, Fuel Handling, and Equipment Maintenance

Construction equipment will be refueled in upland areas at least 100 feet from a wetland. Where the Contractor and EI determines that conditions require construction equipment (e.g., swamp hoe, trench dewatering pumps, or portable generators) to be refueled within 100 feet of a wetland, the Contractor must follow the procedures described in Enbridge's Spill Plan and implement additional provisions based on site-specific conditions. No equipment will be washed within 100 feet of streams or waterbodies. Overnight parking of equipment is not allowed within 100 feet of a wetland unless special provisions have been implemented in accordance with Enbridge's Spill Plan and approval from the EI. Maintenance
(e.g., lubricating) of construction equipment will not be allowed within the 100 foot buffer zone without approval from the EI with additional special provisions for containment.

### 3.3 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 (less than 1.5 inch diameter and/or 12 inches in length) can be left in the wetland if spread evenly in the ROW to a depth not to exceed 1 inch in thickness and in a manner, as determined by the EI, which will allow for normal revegetation.

#### 3.3.1 Additional Workspace in Wetlands

In general, Enbridge attempts to locate AWS outside of wetlands wherever practicable; however, AWS 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 AWS will be avoided as much as possible.

- Staging areas, additional spoil storage areas, and other additional work areas will be located in upland areas at least 50 feet away from wetland boundaries (refer to Figure 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 AWS and sensitive resource areas (wetlands or waterways).

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

### 3.4 GRADING IN A WETLAND

Grading in a wetland, if required, must be conducted in a manner consistent with applicable federal, state, and local permits. Grading activities must 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 ROW after backfilling the trench with prior approval from Enbridge.

ECDs (e.g., silt fence) must be installed across the entire construction ROW upslope of the wetland boundary, where necessary, to prevent sediment flow into the wetland. Where wetlands are adjacent to the construction ROW and the ROW slopes toward the wetlands, ECDs must be installed along the edge of the construction ROW as necessary to prevent sediment flow into the wetlands. ECDs must be installed along the edge of the construction ROW as necessary to contain spoil and sediment within the construction ROW through wetlands.

ECDs must 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. When the depth of sediment reaches one-third of the height of a sediment barrier, the barrier will be replaced and/or the sediment removed. Non-functional sediment-control measures will be repaired, replaced, or supplemented with functional features as soon as field conditions allow, but no later than 24 hours after discovery.
3.5 RIGHT-OF-WAY STABILIZATION

Tree stumps, brush riprap, imported soil, and rock fill cannot be brought in to stabilize the right-of-way in wetlands. Where low ground pressure equipment is not used, construction activities will be accomplished from timber construction mats or equivalent means with prior approval from Enbridge (refer to Figure 24). The contractor is responsible for having a sufficient number of construction mats to perform the work. Unless otherwise authorized by Enbridge in advance, timber mats must be free of soil and plant material prior to being transported onto the ROW and/or moved from one area of the ROW to another area to prevent the spread of noxious and invasive plant species. Timber riprap (also known as corduroy road) cannot 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 (greater than 1.5 inch diameter and/or 12 inches in length) 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 duration of open trench must be minimized to the 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 24 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 EWS adjacent to the ROW. The trench will be dug by a backhoe (or equivalent) supported on timber mats or equivalent low ground pressure equipment. 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 the wetland will be restored by a backhoe or similar equipment working from construction mats or by low ground pressure equipment.

### 3.7.2 Temporary Erosion and Sediment Controls

ECDs at approaches to wetlands will be installed as previously described and in accordance with the specifications presented on Figures 6 through 11.

### 3.7.3 Concrete Coating

Concrete will generally be mixed off-site, and concrete coated pipe will be transported to the 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 Enbridge’s Spill Plan. 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. Erosion and sediment controls will be installed down slope of equipment wash areas where needed to capture sediments and minimize erosion from runoff. Concrete coating on the pipe must be cured for a minimum of 3 days prior to installation in a wetland due to potential toxic effects on wetland and aquatic biota.

### 3.8 BACKFILLING

The Contractor shall 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, 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 no more than 12 inches above the adjacent, undisturbed soil. In unsaturated wetlands, Enbridge may specify a lower maximum mound height based on site conditions.

### 3.9 ROUGH GRADING, CLEANUP, AND TEMPORARY RESTORATION

Cleanup and rough grading activities may take place simultaneously. Cleanup typically will involve removing construction debris and replacing fences removed during construction. Rough grading will include restoring original conditions within the disturbed areas (i.e., ditch line, spoil storage areas, and equipment travel lane) and installing or repairing temporary erosion control measures. 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 revegetated 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. It has been Enbridge’s experience that the natural seed bank within the wetland provides the most effective revegetation.
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
(refer to Section 1.2).

Rock tracking pads, constructed of stone no smaller than 4-inch or 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 must 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 must 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 must 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

At each location where dewatering is to be conducted, the contractor must consider the following conditions in planning the dewatering event. Prior to initiating dewatering activities, the EI must check the water discharge situation to ensure that the best management practices are applied in such a way as to minimize the potential for water containing sediment from reaching a waterbody. Furthermore, landowner approval is required in advance of placement of dewatering structures outside of the approved construction ROW.

1. **Water Discharge Setting** – The contractor shall assess each water discharge situation to include:
   
a. **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.
   
b. **Ground Surface** - The topography in the area that would influence the surface flow of the discharged water.
   
c. **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)
   
d. **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.

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

3. **Overwhelming Existing Drainage** - If the discharge (assumed to be clean) does enter a stream, the flow added to the stream cannot 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).

4. **Filtering Mechanism** – All dewatering discharges will be directed through a filtering device as indicated below.

   a. **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.
   
b. **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 Figures 21 and 22A through C). A straw bale dewatering structure should be used...
in conjunction with a geotextile filter bag to provide additional filtration near sensitive resource areas.

c. Alternative dewatering methods (e.g., use of water cannons) may be approved by Enbridge on a site-specific basis.

5.1.1 Regulatory Notification and Reporting

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

Reports regarding the volume and quality of the water withdrawn and discharged will be submitted by Enbridge, as required by the applicable state and/or tribal permits. The Contractor will provide Enbridge with the appropriate data to determine volumes of water appropriated.

5.1.2 Flow Measurement

The volume of water discharged from the trench must be recorded as required by the applicable permits. The volume may be determined using a flow meter, or equivalent method as dictated by permit stipulations.

5.1.3 Water Sampling

Water discharged from trench dewatering locations may need to be sampled as required by tribal permits and/or state-issued discharge permits. If required, the Contractor will assist Enbridge in obtaining these samples and will be responsible for complying with the permit limitations.

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 Office of Pipeline Safety regulations. Hydrostatic testing will be done to assess the integrity of the pipe and welds. Pre-built sections may be hydrostatically tested prior to installation at significant streams and wetland crossings. Water used for hydrostatic testing will be discharged back to the waterbody it was appropriated from or to an Enbridge-approved discharge location. After the hydrostatic test is completed, the line will be depressurized and the water expelled. During withdrawal and discharge, the water will be sampled as required by permits. Water volumes must be measured and recorded.

If site conditions or engineering constraints make adhering to these hydrostatic testing procedures and documentation impractical, Enbridge will propose alternative provisions to the regulatory agency issuing the NPDES permit and/or applicable tribal permits. Any such alternative will provide an equal or greater level of protection to the environment than the condition from which Enbridge or its Contractor seeks relief.

5.2.1 Refueling

The operation and refueling of hydrostatic test equipment will be in accordance with the conditions outlined in Enbridge’s Spill Plan.
5.2.2 Permit Requirements

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, across watersheds, or major drainage divides. Chlorinated source water will be sampled at appropriation. If chlorine levels are at or above aquatic toxicity standards, the water will not be discharged to a surface water without proper treatment.

5.2.3 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 must install appropriate erosion control measures where the EI determines that topographic conditions, primarily elevation changes, require test sections to be located in a wetland or riparian area.

5.2.4 Water Sampling

Water discharged from hydrostatic tests will be sampled as required by state-issued appropriation or discharge permits. Hydrostatic water discharges will comply with permit limitations as required by the applicable permit conditions. If required, the Contractor will assist Enbridge in obtaining these samples and will be responsible for complying with the permit limitations.

5.2.5 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 shall be properly disposed 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 must 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 may or may not 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 shall 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.
5.2.6 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.

Where water is appropriated from lakes or streams, the intake hose will be suspended off of the stream or lake bottom and equipped with a screen with less than one-inch diameter openings, 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 must measure the withdrawal rate and total volume 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. Reports regarding the volume and quality of the water withdrawn will be submitted by Enbridge if required by the applicable permits.
7.0 REVEGETATION & MONITORING

This section was developed in conjunction with Natural Resources Conservation Service ("NRCS") guidelines. If it is found that any conditions or requirements of this section or any other supporting documents are not in compliance with any governmental law or ordinance, the applicable law or ordinance will take precedent, but will not nullify other portions of this section or supporting documentation. In addition, project-specific permit conditions and Landowner requests (with exception to wetlands) for specific seed mixes (as indicated in the project Line List) take precedence over this section.

7.1 Project Seed Specifications

Specific seed mixes will be determined based on consultations with the NRCS. 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 must be performed based on 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:

\[
\frac{(95\% \text{ germination} \times 80\% \text{ purity})}{100} = 76\% \text{ PLS} \\
10 \text{ pounds PLS per acre} \div 0.76 \text{ PLS} = 13.2 \text{ pounds per acre actual seeding rate}
\]

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 must be collected by the contractor and provided to Enbridge during seeding activities. The tags will be reviewed by Enbridge 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.
The Contractor’s proposed seed sources must be submitted to Enbridge for review and approval prior to construction. The Contractor must also arrange for appropriate storage of the seed.

**7.2 Temporary Revegetation**

The primary focus of Enbridge’s temporary revegetation measures is to quickly establish ground cover vegetation, minimize potential soil erosion, and minimize noxious weed establishment. Enbridge’s temporary seed mix will be 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 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 revegetation 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 Temporary Use of Mulch**

Straw mulch may be used to help stabilize areas during the establishment of temporary vegetation. The contractor(s) will apply mulch during the establishment of temporary vegetation in areas:

- requested by the Landowner or land managing agency;
- specified by the applicable permits or licenses; and/or
- as requested by Enbridge.

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 must be approved by Enbridge prior to purchase and copies of the applicable documentation must be provided to Enbridge.

Mulch used in conjunction with temporary revegetation efforts will be applied at a rate of 2 tons per acre 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. Strands of mulch will be a minimum of 8 inches in length to allow proper anchoring. Mulch will be anchored/crimped to a depth of 2-3 inches using a mulch-anchoring tool or disc set in the straight position to minimize loss by wind and water, as site conditions allow. Additional erosion control measures (e.g., silt fence, erosion control blankets, hydromulch) may also be applied as previously outlined.
7.5 Permanent Revegetation
Permanent vegetation will be established in areas disturbed within the construction work area (permanent easement, TWS, and AWS) except in actively cultivated areas and standing water wetlands. The seed mixes for permanent seeding will be determined in consultation with the NRCS. Seed mixes will be 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 will be assumed for a drill application and must be adjusted as required for different seeding methods.

7.6 Conservation Reserve Program (“CRP”) Properties
Enbridge’s Land Agents will contact landowners where the 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 must meet the same criteria as other seed described in Section 7.1

7.7 Mulch
Straw mulch 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 requested 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 must be approved by Enbridge prior to purchase and copies of the applicable documentation must be provided to Enbridge.

Mulch will be applied at a rate of 2 tons per acre 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. Strands of mulch will be a minimum of 8 inches in length to allow proper anchoring. Mulch will be anchored/crimped to a depth of 2 to 3 inches using a mulch-anchoring tool or disc set in the straight position to minimize loss by wind and water. In areas not accessible to a mulch-anchoring tool, 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. Mulch will not be applied in wetlands or actively cultivated farmland.

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 must be on the applicable state Department of Transportation product list. Application rates will be at the manufacturer’s recommended rate, equal to or greater than 2 tons per acre of straw mulch.

7.8 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. Erosion control blankets will
be used according to the manufacturer's recommendations as to weight and material for the specific application. Erosion control blankets will be anchored according to the manufacturer’s recommendations.

7.9  Dormant Seeding
Dormant seeding is conducted 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.

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:

- 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.

7.10  Monitoring
Enbridge will monitor and address all areas where stabilization techniques have been implemented in accordance with conditions identified in the applicable project permits and/or licenses.
8.0 WINTER CONSTRUCTION

Frozen conditions can preclude effective topsoil segregation. When soil is frozen to a depth greater than the depth of topsoil, the soil will come off in thick slabs that contain both topsoil and subsoil, and mixing can result. If top-soiling must proceed under these conditions, it should be done at the excavation only. A ripper should be used to break up the frozen topsoil. 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 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 must 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 must stabilize the area and temporary erosion control measures must 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. The Contractor must monitor areas until final restoration is complete.

Other than those issues discussed above, most environmental requirements can be successfully implemented by the Contractor during winter construction.
9.0 WASTE MANAGEMENT

Proper handling and management of solid and hazardous wastes and materials are an important aspect of every job. The Contractor must 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 must 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 must 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.

All waste materials are to be collected daily by the Contractor. Wastes must be collected in suitable or approved containers (i.e., labeled and meeting any relevant regulatory requirements) provided by the Contractor. On a routine basis, the Contractor must remove the containers of waste from the site and properly dispose of them. Throughout the duration of the project, the Contractor must 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.

Any used oil or other waste liquids generated by the Contractor as a result of maintaining its equipment during the course of the project shall be the responsibility of the Contractor to handle in accordance with all applicable regulations and Enbridge policies. Used oil and all other waste liquids must be stored in approved storage containers in good condition. The containers must be properly labeled. The Contractor is responsible for disposing of waste liquids in accordance with all applicable regulations.

9.1 Hazardous Wastes

It is the responsibility of the Contractor to ensure that all workers are properly trained in the proper storage, handling and disposal of hazardous wastes generated during the project. The Contractor must ensure that wastes classified as hazardous by federal and state regulations are properly labeled and, if liquid, stored on-site with secondary containment and in accordance with all regulatory requirements. Wastes may not be placed, spilled, or poured on or into the ground. If this should occur, the Contractor is responsible for evaluation and cleanup of contaminated soils and associated costs. The Contractor is responsible for immediately reporting the spill to Enbridge. Refer to the Spill Plan for additional details.

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. If a Contractor generates a waste classified as hazardous as a direct result of the constituents coming from an Enbridge facility or equipment (e.g., sandblast debris with lead paint, pipeline coatings, etc.), then Enbridge will coordinate proper waste collection, storage and disposal with the Contractor. 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 must, 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.
Figures
Figure 1
Environmental Mitigation Plan
Typical Topsoil Segregation – Modified Ditch Plus Spoil Side

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

Figure 3
Environmental Mitigation Plan
Typical Topsoil Segregation – Trench Line Only
Figure 4
Environmental Mitigation Plan
Typical Temporary or Permanent Berms
Perspective View

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.
NOTES
1. Berms shall be constructed with 2 to 4 percent outslope.
2. Berms shall be outletted 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.

Figure 5
Environmental Mitigation Plan
Typical Temporary or Permanent Berms
Elevation View
For environmental review purposes only.

**Figure 6**

**Environmental Mitigation Plan**

**Typical Silt Fence Installation**

**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. (Gage 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.

**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.
Figure 7
Environmental Mitigation Plan
Typical Straw Bale Installation

- Bales placed on edge butted tight
- Silt fence
- Straw bale
- Hardwood stake (4 in² x 4' long)
- Compacted earth fill
- Flow

For environmental review purposes only.
**Figure 8**

Environmental Mitigation Plan

Typical Erosion Control Blanket Installation

- **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.

  - DIG IN UPSTREAM EDGE
  - EXTEND DOWN TO WATER'S EDGE

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

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 10
Environmental Mitigation Plan
Typical Biolog Installation

1" X 1" STAKE
LIVE STAKE
(WILLOW, DOGWOOD, OR OTHER NATIVE SPECIES)

BIOLOGS SHOULD BE PLACED AND STAKED SECURELY ALONG SLOPE CONTOURS. TRENCH SHOULD BE APPROX. 3" X 5".

SPACING DEPENDS ON SOIL TYPE AND SLOPE STEEPNESS

SEDIMENT, ORGANIC MATTER, AND NATIVE SEEDS ARE CAPTURED BEHIND THE LOGS

ADJACENT LOGS SHALL TIGHTLY ABUT

8"-10" Dia.
(200-250 mm)

3"-5"
(75-125 mm)

RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND THE LOG.

10-25'
(3-8 m)

(1.2 m)
Cleated treads create grooves perpendicular to the slope.
NOTES
1. BAGS WILL NOT BE FILLED WITH TOPSOIL.
2. ADDITIONAL INFORMATION INCLUDED ON OTHER DRAWINGS.
**Figure 13**

**Environmental Mitigation Plan**

Typical Trench Breakers – Plan & Profile View

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**Notes**

1. Bags will not be filled with topsoil.
2. Additional information included on other drawings.

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**Date:** 11/15/2000  
**Revised:** 3/11/11  
**Scale:** NTS  
**Drawn By:** KMKendall  
**File:** FIG_13_TRENCH_BREAKER_PLAN_PROFIL_E_VIEW_VSD
Figure 14
Environmental Mitigation Plan
Permanent Slope Breakers - Perspective View

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.

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

For environmental review purposes only.
For environmental review purposes only.

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

NOTES:
1. ONLY woody vegetation may be flush cut during initial clearing
   (See section 2.3 of EMP)

Temporary Construction
Right-of-Way Boundary

Segregated Stream
Bed Spoil

Proposed Trench

Proposed Pipeline

Spoil

Place sediment barriers across working side of ROW at the end of each day

Temporary Bridge
(if needed)

Culvert (for support)

Temporary Construction
Right-of-Way Boundary

Extra Workspace

15' Neckdown Setback
-50'
From Ordinary High Water Mark

EXTRA WORKSPACE

Silt fence, double staked straw bales, or both as necessary

25' Temporary Construction Row
Neckdown 20' from Ordinary High Water Mark

50'
SEGREGATED STREAM
BED SPOIL

20'
BUFFER MINIMUM

20'
BUFFER MINIMUM

20'
BUFFER MINIMUM

20'
BUFFER MINIMUM

20'
BUFFER MINIMUM

SPOIL

20'

20'

15' NECKDOWN SETBACK
-50'
FROM ORDINARY HIGH WATER MARK

20'

EXTRA WORKSPACE

NOTE:
1. ONLY woody vegetation may be flush cut during initial clearing
   (See section 2.3 of EMP)
Figure 16
Environmental Mitigation Plan
Typical Waterbody Crossing
Dam and Pump Method

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

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

For environmental review purposes only.
Figure 17
Environmental Mitigation Plan
Typical Waterbody Crossing
Flume Method

1. Only Woody Vegetation may be flush cut during initial clearing (See Section 2.3 of EMP)
Figure 18
Environmental Mitigation Plan
Typical Waterbody Crossing
Directional Drill Method
Figure 19
Environmental Mitigation Plan
Typical Span Type Bridge
With or Without Instream Support

For environmental review purposes only.

NOTES:
1. INSPECT BRIDGE OPENING PERIODICALLY AND FOLLOWING RAINFALLS OF OVER ½". REMOVE ANY DEBRIS RESTRICTING FLOW AND DEPOSIT IT AT AN UPLAND SITE OUTSIDE OF FLOODPLAIN.
2. IF PHYSICAL CIRCUMSTANCES PROHIBIT WOOD OR METAL RAMPS, EARTHEN RAMPS MAY BE USED AS APPROVED.
3. INSPECT BRIDGE ELEVATION SO BRIDGE REMAINS SUPPORTED ABOVE HIGH BANK AND DOES NOT SINK INTO BANK.
4. THE CULVERT SUPPORT MUST BE ANCHORED TO THE STREAM BOTTOM AND MAY NOT BE SUPPORTED WITH FILL.
5. EARTHEN RAMP CANNOT BE TALLER THAN 1' AND CANNOT EXTEND FOR MORE THAN 15' ON EITHER SIDE OF THE CROSSING.
6. THE BRIDGE MUST SPAN FROM TOP OF BANK TO TOP OF BANK.
7. ADDITIONAL SUPPORT MUST BE ADDED ON TOP OF BANK AND UNDER SPAN IF INITIAL SUPPORT STARTS TO SETTLE.
8. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED IN ACCORDANCE WITH THE COMPANY’S ENVIRONMENTAL MITIGATION PLAN.
9. SIDEBOARDS WILL BE INSTALLED ON TEMPORARY BRIDGES TO MINIMIZE THE POTENTIAL FOR SEDIMENT TRANSPORT. SIDEBOARDS MAY BE CONSTRUCTED OUT OF PLYWOOD, OR EQUIVALENT, AND AFFIRED TO THE OUTER SIDES OF THE BRIDGE. GEO-TEXTILE FABRIC, OR EQUIVALENT, MUST ALSO BE ADEQUATELY SECURED TO THE UNDERSIDE OF THE BRIDGE TO PREVENT MATERIAL FROM FALLING THROUGH THE BRIDGE DECK. THE GEO-TEXTILE FABRIC OR AN EQUIVALENT SHOULD BE SECURED TO THE BOTTOM OF THE BRIDGE AND WRAPPED AROUND THE SIDEBOARDS IN A CONTINUOUS FASHION.
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.

Figure 20
Environmental Mitigation Plan
Typical Rock Flume Bridge
**Figure 21**

**Environmental Mitigation Plan**

**Typical Dewatering Measures**

DEWATERING DISCHARGE IN WELL VEGETATED UPLANDS

**NOTES:**

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

**GEOTEXTILE FILTER BAG**

**NOTES:**

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

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Figure 22A
Environmental Mitigation Plan
Straw Bale Dewatering Structure

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.

Table: TYPICAL MINIMUM SUMP DIMENSIONS (FEET) vs. MAXIMUM PUMPING RATE (GALLONS PER MINUTE)

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Pumping Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20</td>
<td>300</td>
</tr>
<tr>
<td>15</td>
<td>20</td>
<td>350</td>
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<td>30</td>
<td>550</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>660</td>
</tr>
</tbody>
</table>

For environmental review purposes only.
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 Mitigation 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 = 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 Mitigation Plan
Straw Bale Dewatering Structure
RIP RAP REQUIREMENTS PER PERMIT
RIP RAP TO BE INSTALLED ON A SITE-SPECIFIC BASIS IN ACCORDANCE WITH PERMIT CONDITIONS

Figure 23
Environmental Mitigation Plan
Typical Final Stream Bank Stabilization
Rip Rap & Erosion Control
For environmental review purposes only.

NOTE: SEDIMENT BARRIERS MAY ALSO BE INSTALLED AT THE EDGE OF THE CONSTRUCTION ROW AS NECESSARY TO CONTROL SEDIMENT WITHIN WORK AREAS.

Figure 24
Environmental Mitigation Plan
Typical Wetland Crossing Method

DATE: 5/25/2001
REVISED: 3/14/11
SCALE: NTS
DRAWN BY: KMKENDALL
Figure 25
Environmental Mitigation Plan
Typical Improved Road Crossing
Directional Bore Method

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.
Appendix A

Typical Construction R.O.W. Configurations
NOTES:

1. CONSTRUCTION FOOTPRINT WILL TYPICALLY BE 105 FEET WIDE CONSISTING OF UP TO 60 FEET OF NEW PERMANENT RIGHT-OF-WAY EASEMENT AND 45 FEET OF TEMPORARY WORKSPACE. EXTRA TEMPORARY WORKSPACE WILL BE NEEDED AT MAJOR ROAD, RAIL AND RIVER CROSSINGS AND OTHER SPECIAL CIRCUMSTANCES, AS REQUIRED. CERTAIN SITUATIONS MAY REQUIRE A NARROWER WIDTH.

2. THIS DRAWING REFLECTS "TRENCH AND SPOIL SIDE" TOPSOIL STRIPPING PROCEDURE, "TRENCH AND SPOIL SIDE AND TRAVEL LANE" STRIPPING PROCEDURE, AND "TRENCH AND SPOIL SIDE AND FULL R.O.W." STRIPPING PROCEDURE. SALVAGE TOPSOIL AT LOCATIONS IDENTIFIED ON THE CONSTRUCTION ALIGNMENT SHEETS, OR AS DIRECTED BY THE COMPANY’S INSPECTOR. DEPTH OF TOPSOIL STRIPPING IS NOT TO EXCEED 12 INCHES.

3. STOCKPILE TOPSOIL AS SHOWN OR IN ANY CONFIGURATION APPROVED BY THE COMPANY’S INSPECTOR. KEEP TOPSOIL CLEAN OF ALL CONSTRUCTION DEBRIS.

4. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH TOPSOIL INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING TOPSOIL PILE.
NOTES:

1. CONSTRUCTION FOOTPRINT WILL TYPICALLY BE 80 FEET WIDE, CONSISTING OF UP TO 60 FEET OF NEW PERMANENT RIGHT-OF-WAY EASEMENT AND 20 FEET OF TEMPORARY WORKSPACE. EXTRA TEMPORARY WORKSPACE WILL BE NECESSARY AT MAJOR ROAD, RAIL AND RIVER CROSSINGS AND OTHER SPECIAL CIRCUMSTANCES, AS REQUIRED.

2. THIS DRAWING REFLECTS "TRENCH AND TOPSOIL" STRIPPING PROCEDURE, SALVAGE TOPSOIL AT LOCATIONS IDENTIFIED ON THE CONSTRUCTION ALIGNMENT SHEETS, OR AS DIRECTED BY THE COMPANY’S INSPECTOR. DEPTH OF TOPSOIL STRIPPING IS NOT TO EXCEED 12 INCHES.

3. STOCKPILE TOPSOIL AS SHOWN OR IN ANY CONFIGURATION APPROVED BY THE COMPANY’S INSPECTOR. KEEP TOPSOIL CLEAN OF ALL CONSTRUCTION DEBRIS.

4. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH TOPSOIL INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING TOPSOIL PILE.

5. TOPSOIL STRIPPING ALLOWED ONLY ABOVE PIPE TRENCH IN WETLANDS.
NOTES:

1. CONSTRUCTION FOOTPRINT WILL TYPICALLY BE 105 FEET WIDE CONSISTING OF 20 FEET OF EXISTING AND 25 FEET OF NEW PERMANENT RIGHT-OF-WAY EASEMENT AND 60 FEET OF TEMPORARY WORKSPACE. EXTRA TEMPORARY WORKSPACE WILL BE NEEDED AT MAJOR ROAD, RAIL AND RIVER CROSSINGS AND OTHER SPECIAL CIRCUMSTANCES, AS REQUIRED. CERTAIN SITUATIONS MAY REQUIRE A NARROWER WIDTH.

2. THIS DRAWING REFLECTS "TRENCH AND SPOIL SIDE" TOPSOIL STRIPPING PROCEDURE, "TRENCH AND SPOIL SIDE AND TRAVEL LANE" STRIPPING PROCEDURE, AND "TRENCH AND SPOIL SIDE AND FULL R.O.W." STRIPPING PROCEDURE. SALVAGE TOPSOIL AT LOCATIONS IDENTIFIED ON THE CONSTRUCTION ALIGNMENT SHEETS, OR AS DIRECTED BY THE COMPANY'S INSPECTOR. DEPTH OF TOPSOIL STRIPPING IS NOT TO EXCEED 12 INCHES.

3. STOCKPILE TOPSOIL AS SHOWN OR IN ANY CONFIGURATION APPROVED BY THE COMPANY'S INSPECTOR. KEEP TOPSOIL CLEAN OF ALL CONSTRUCTION DEBRIS.

4. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH TOPSOIL INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING TOPSOIL PILE.
CONSTRUCTION DETAIL

30" or 36" LINE 6B 2012 PIPE REPLACEMENT
WETLAND CONSTRUCTION R.O.W.
25' FROM EXISTING LINE
NILES, MENDON, AND MARSHALL SEGMENTS

1. CONSTRUCTION FOOTPRINT WILL TYPICALLY BE 80 FEET WIDE, CONSISTING OF 20 FEET OF EXISTING AND 25 FEET OF NEW PERMANENT RIGHT-OF-WAY EASEMENT AND 35 FEET OF TEMPORARY WORKSPACE. EXTRA TEMPORARY WORKSPACE WILL BE NECESSARY AT MAJOR ROAD, RAIL AND RIVER CROSSINGS AND OTHER SPECIAL CIRCUMSTANCES, AS REQUIRED.

2. THIS DRAWING REFLECTS "TRENCH AND TOPSOIL" STRIPPING PROCEDURE, SALVAGE TOPSOIL AT LOCATIONS IDENTIFIED ON THE CONSTRUCTION ALIGNMENT SHEETS, OR AS DIRECTED BY THE COMPANY'S INSPECTOR. DEPTH OF TOPSOIL STRIPPING IS NOT TO EXCEED 12 INCHES.

3. STOCKPILE TOPSOIL AS SHOWN OR IN ANY CONFIGURATION APPROVED BY THE COMPANY'S INSPECTOR. KEEP TOPSOIL CLEAN OF ALL CONSTRUCTION DEBRIS.

4. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH TOPSOIL INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING TOPSOIL PILE.

5. TOPSOIL STRIPPING ALLOWED ONLY ABOVE PIPE TRENCH IN WETLANDS.