

ENVIRONMENTAL PROTECTION PLAN FOR THE PROPOSED GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

October 2014
8395

Prepared for:

Grand Rapids
Pipeline Project

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is the general partner of
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1.0 INTRODUCTION

This Environmental Protection Plan (EPP) outlines environmental protection measures to avoid or reduce potential effects during construction of the Grand Rapids Pipeline Project (the Project) proposed by Grand Rapids Pipeline GP Ltd. (the Company), in its capacity as general partner on behalf of Grand Rapids Pipeline Limited Partnership. The Project will comprise one transmission pipeline system (made up of two parallel pipelines, described below), one lateral pipeline system (made up of two parallel pipelines, described below) and various associated pipeline installations.

The Project consists of:

- one approximately 460.5 km pipeline, with an OD of 508 mm, from the Grand Rapids MacKay Terminal to terminals in the Edmonton area (the 508 mm pipeline) to:
 - initially transport approximately 90,000 barrels per day (bbl/d) of blended crude bitumen from the Grand Rapids MacKay Terminal at NW 34-89-14 W4M, approximately 30 km northwest of Fort McMurray to the Edmonton area at 8-5-53-23 W4M; and
 - subsequently, transport approximately 330,000 bbl/d of diluent from the Edmonton or Heartland areas to delivery points in the west Athabasca oil sands area.
- one approximately 460.5 km pipeline, with an OD of 914 mm, from the Grand Rapids MacKay Terminal to terminals in the Edmonton area to transport approximately 900,000 bbl/d of blended crude bitumen from the west Athabasca oil sands area to the Edmonton and Heartland areas (the 914 mm pipeline);
- one 4.5 km, 620 mm OD pipeline to transport approximately 400,000 bbl/d of blended crude bitumen from the Grand Rapids MacKay Receipt Station to the Grand Rapids MacKay Terminal (the 610 mm lateral pipeline)
- one 4.5 km, 460.5 mm OD pipeline to transport approximately 200,000 bbl/d of diluent from the Grand Rapids MacKay Terminal to the Grand Rapids MacKay Receipt Station (the 406 mm lateral pipeline); and
- seven associated pipeline installations, which include two tank farms, and five pump stations located at the following five pipeline installation sites:
 - Grand Rapids MacKay Terminal, located at NW 34-89-14 W4M, which includes a tank farm and pump station;
 - Grand Rapids Thornbury Terminal, located at NE 29-79-14 W4M, which includes a pump station;
 - Grand Rapids Wandering River Pump Station, located at NW 19-73-16 W4M, which includes a pump station;
 - Grand Rapids Grassland Pump Station, located at NE 15-67-18 W4M, which includes a pump station; and
 - Grand Rapids Heartland Terminal, located at SE 28-55-21 W4M, which includes a tank farm and pump station.

Grand Rapids has applied to Alberta Environment and Sustainable Resource Development (AESRD) for Conservation and Reclamation (C&R) Approval with respect to the Project to be constructed in the White Area and Pipeline Agreement (PLA) approval under the *Public Lands Act* with respect to the Project to be constructed in the Green Area. TERA, a CH2M HILL company (TERA) has been retained by Grand Rapids to prepare a C&R Report for the proposed Project (TERA Environmental Consultants 2013a) and Environmental Field Reports to support the PLA applications for the proposed Project. During the application process for the Project, there were substantial changes to the environmental regulatory

system in Alberta. The Energy Resources Conservation Board was dissolved and the Alberta Energy Regulator (AER) was launched in June 2013. On November 30, 2013, the AER took over implementation of the *Public Lands Act* from AESRD as it relates to provincially regulated pipelines. On March 29, 2014, the AER took over implementation of the *Water Act* and the *Environmental Protection and Enhancement Act (EPEA)* from AESRD.

The proposed pipeline route is located both in the Green and White areas of Alberta. For the purpose of this Conservation and Reclamation (C&R) Report, which only includes lands in the White Area, the Project involves the construction of 241 km of pipeline from NW 36-72-17 W4M to SE 5-53-23 W4M.

In order to reduce the overall footprint of the proposed Project, existing rights-of-way and third-party disturbances will be utilized in the Project area, where feasible. The majority of the route parallels existing linear disturbances (*i.e.*, pipeline and transmission line rights-of-way, all-season roads and railways) for approximately 218 km of the 241 km (91%) occurring in the White Area. The construction right-of-way for the White Area will generally consist of a total construction right-of-way width of 65 m. The general breakdown of permanent right-of-way and temporary workspace (TWS) for the White Area is as follows:

Location	Permanent Right-of-Way (m)	TWS (m)	Construction Right-of-way (m)
NW 36-72-17 W4M (White/Green Area boundary) to N1/2 31-55-20 W4M	35	30	65
N1/2 31-55-20 W4M to Heartland Terminal	35	37	72
Heartland Terminal to TUC	24	41	65
TUC to Edmonton	15	50	65

Additional TWS will be taken, where warranted, for soils handling and storage at sharp sidebends, tie-ins, sloping terrain, rollback storage areas, graded areas and at road, railway, watercourse and foreign line crossings. The right-of-way width is designed to safely accommodate the pipeline trenches, spoil pile and topsoil or upper surface material storage pile as well as snow storage piles under winter construction conditions, with adequate separation between soil piles, lay-up area, work lane and travel lane. In order to reduce the overall footprint of the proposed pipeline, the Company plans to utilize third-party disturbances as TWS, where feasible.

Design, construction and operation of the pipeline will be in compliance with all applicable codes, standards and regulations.

The EPP is written in construction specification format and should be read in conjunction with the Environmental Alignment Sheets under a separate cover. This EPP provides Project-related environmental mitigation measures and commitments to be addressed during the detailed engineering design, construction and post-construction reclamation phases.

The EPP is based on:

- TransCanada's Health, Safety and Environment (HSE) Commitment;
- TransCanada's HSE Management System;
- feedback obtained through consultation and engagement;
- results of the biophysical field programs;
- commitments made in the C&R Report; and
- professional experience.

Revisions to the EPP may occur as a result of:

- results of supplemental studies;

- commitments made during the regulatory review process including recommendations and information requests;
- C&R Approval Terms and Conditions; and
- engagement programs with aboriginal communities and other stakeholders.

Pending regulatory approval, construction is scheduled to commence in late fall 2014 with a target completion date of spring 2017. Clean-up and post-construction reclamation of disturbed portions of the right-of-way will be conducted following construction, or as soon as weather, ground and seasonal conditions allow.

2.0 PURPOSE

The purpose of the EPP is to describe the environmental mitigation measures and commitments to be carried out by the Company, their Contractor(s) and subcontractors during construction of the Project to avoid or minimize potential impacts. The EPP includes both general and site-specific environmental protection measures which have been developed based on past project experience, input from stakeholders and regulators during public consultation, and current industry best management practices where they are applicable to the Project activities.

Specifically, the EPP:

- outlines environmental protection measures related to Project activities;
- provides instructions for carrying out construction activities to minimize negative environmental effects; and
- serves as reference information to the construction staff and personnel to support decision making and provide links to more detailed information.

Following completion of construction, this EPP will be used as a guide during Project operation.

3.0 ENVIRONMENTAL PROTECTION PLAN ORGANIZATION

This section provides an overview of the organization and scope of the EPP.

3.1 Organization

The EPP addresses the construction mitigation and reclamation of the Project. A large portion of environmental protection measures are standard across all TransCanada projects. Additional Project specific measures are identified in Section 7.0 of the EPP.

The EPP applies to all Project areas including the pipeline right-of-way, TWS, permanent and temporary access roads and shoo-flies, staging areas, facility sites, construction yards and pipe storage areas.

Environmental protection measures are identified under the headings below in accordance with the progression of construction activities, and are intended to be read in conjunction with the Environmental Alignment Sheets. The Environmental Alignment Sheets identify specific locations where mitigation measures will be applied.

The EPP is intended to provide the Company and their Contractor(s) and subcontractors' personnel with an understanding of the general environmental setting of the Project, extent and limitations of the EPP, specific or unique mitigation measures of the Project, general mitigation measures or best management practices that are typically applied to a pipeline project and generally reflect the sequences of construction of a pipeline project.

Sections 1-3 outline the purpose and organization of the EPP, place the EPP in context with respect to geographic location and identifies where information can be found in the EPP.

Section 4 "Environmental Compliance" provides information about the tools and process to facilitate compliance with all regulatory approvals, permits, commitments and specific requirements of the EPP.

Section 5 "Notification of Concerned Parties" provides details on specific activities to be followed to ensure all relevant stakeholders are properly notified of Project activities before the commencement of construction.

Section 6 "Construction Preparation" outlines activities to clearly delineate the boundaries of approved work areas and to ensure environmentally sensitive features are properly identified prior to any ground disturbance. Proper identification avoids potential impacts to resource features and ensures that the Company and its Contractors are aware of the limits of the approved work areas.

Section 7 "Project Specific Protection Measures" outlines procedures to be undertaken to protect environmental and cultural features that were identified pursuant to the environmental assessment or that are unique to the Project. Information in Section 7 is documented and displayed on the Environmental Alignment Sheets.

Section 8 "Pipeline Construction" outlines the environmental protection measures associated with general pipeline construction, topsoil handling and grading, water crossings, pipe installation activities, backfill, pressure testing, and clean-up and reclamation activities that will be executed. These measures are applicable to the construction of the pipeline, access roads and other Project-related facilities.

Section 9 "Post-Construction Monitoring and Assessment" outlines activities to take place once construction and post-construction reclamation activities have been completed to evaluate the success of mitigation measures, reclamation activities, and the stability of the disturbed lands.

Appendices to the EPP include drawings, Project contacts, contingency plans and management plans to support the specific mitigation measures identified in the EPP and provide guidance to decision making processes should conditions arise that require implementation of contingency measures.

3.2 Environmental Setting

The Project will consist of dual parallel pipelines sharing a common right-of-way, each approximately 460.5 km long between northeastern Alberta and Edmonton, Alberta (Figure 1). The Project will be constructed in two phases over three years. Phase 1 will involve the construction of a 508 mm O.D. pipeline and associated facilities that will transport the initial bitumen blend volumes south from the Grand Rapids MacKay Terminal to the Edmonton area at 8-5-53-23 W4M. Clearing and topsoil stripping of the right-of-way for both of the proposed parallel pipelines will be completed during Phase 1 construction. Phase 1 has a targeted construction start date of late fall 2014, pending regulatory approvals, and an in-service date of spring 2015. Phase 2 will involve a directional flow and product change for the 508 mm pipeline to send diluent north from the Edmonton area at 8-5-53-23 W4M and the construction of a 914 mm O.D. pipeline within the common right-of-way in order to transport blended bitumen volumes south from the Grand Rapids MacKay Terminal. Construction of facilities associated with the 914 mm pipeline will be conducted in Phase 2 of the Project. Phase 2 has a targeted construction start date of spring 2015, pending regulatory approvals and an in-service date of spring 2017.

The construction right-of-way for the White Area will generally consist of a total construction right-of-way width of 65 m. The general breakdown of permanent right-of-way and TWS is as follows:

Location	Permanent Right-of-Way (m)	TWS (m)	Construction Right-of-way (m)
NW 36-72-17 W4M (White/Green Area boundary) to N1/2 31-55-20 W4M	35	30	65
N1/2 31-55-20 W4M to Heartland Terminal	35	37	72
Heartland Terminal to TUC	24	41	65
TUC to Edmonton	15	50	65

Additional TWS will be taken, where warranted, for soils handling and storage at sharp sidebends, tie-ins, sloping terrain, graded areas and at road, railway, watercourse and foreign line crossings. Anticipated right-of-way widths are based on the space required to safely accommodate the pipeline trenches, spoil pile and topsoil, or upper surface material storage pile(s) with separation between piles, lay-up area, work lane and travel lane as well as snow storage piles under the winter construction scenario. Other factors that influence the amount of room required for pipeline construction include: grading requirements; snow depth; depth of cover; and workspace required for soils handling.

The approximately 460.5 km route parallels existing linear disturbances for approximately 412 km (88%) of the Project's total length. In the White Area the route parallels existing linear disturbances for 218 km of the 241 km (91%) occurring in the White Area. In the White Area traversed by the proposed route, the Project will parallel portions of 10 major projects.

Within the White Area, the proposed Project route crosses both privately-owned lands and Crown-owned lands administered by the AER and crosses the counties of Athabasca, Thorhild, Sturgeon, Lamont, and Strathcona. The proposed Project also traverses the Town of Bruderheim, the City of Edmonton and the City of Fort Saskatchewan.

The proposed right-of-way crosses primarily cultivated land in the White Area of the Project. Cultivated land occupies approximately 51% of the route and occurs mainly in the central and southern portions. Forested or treed land occurs mainly in the northern most portion and occupies about 25% of the route within the White Area. Some of the treed land (about 3%) is utilized as pasture land. Hay fields occupy 12% of the proposed route while tame pasture constitutes approximately 8%. Other minor lands uses include a tree farm, the rivers, and disturbed land that are detailed on the accompanying Environmental Alignment Sheets. The terrain is generally undulating to gently rolling with moderate and steeper slopes encountered at watercourse crossings, such as the North Saskatchewan and La Biche rivers.

Primary environmental concerns identified in relation to the Project include soils handling and conservation, disruption to other land users, disruption of wildlife and wildlife habitat, watercourse and wetland crossings and weed/soil disease management. Environmental protection and mitigative measures including appropriate routing and scheduling of activities address these potential concerns.

Additional protection measures designed to mitigate potential environmental impacts, are presented in this EPP and are identified on the Environmental Alignment Sheets under a separate cover.

3.3 Non-Routine Mitigation

Non-routine mitigation measures have been developed for areas which require special attention regarding the protection of environmental resources. All non-routine measures are identified on the Environmental Alignment Sheets and in Section 7.0 of the EPP.

3.4 Extent and Limits of the Environmental Protection Plan

Contents of the EPP apply to pipeline construction under non-frozen and frozen ground conditions. There may also be a need to revise specific measures as a result of on-going consultation and landowner discussions or to address unforeseen site-specific conditions that may arise during construction. If this were to occur, the Company will resolve the issue with the Project Manager, the Construction Manager, the Environmental Inspector and the Environmental Advisor in consultation with the appropriate regulators, as required. The resolution and/or revision will be documented and communicated to the appropriate parties.

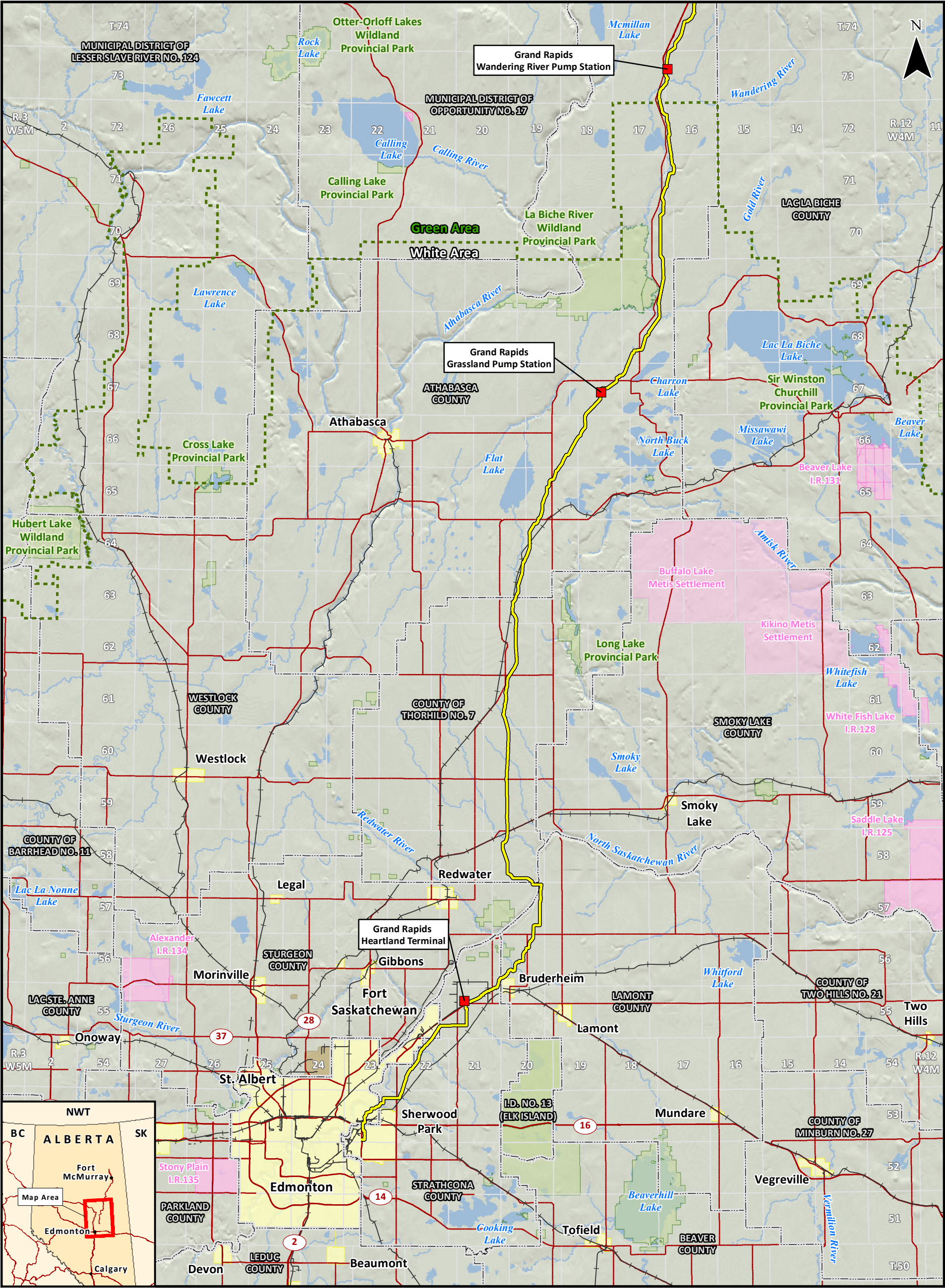


FIGURE 1

REGIONAL LOCATION - WHITE AREA

PROPOSED GRAND RAPIDS PIPELINE GP LTD.
GRAND RAPIDS PIPELINE PROJECT

- | | | |
|-------------------------|----------------|---------------------------|
| Proposed Facility | Watercourse | Indian Reserve/Settlement |
| Proposed Pipeline Route | Waterbody | Park/Protected Area |
| Highway | Populated Area | White Area |
| Railway | Military | Municipal Boundary |



UTM Zone 12N
Proposed Facility, Proposed Pipeline Routing: Focus Corporation 2014; Highway: IHS Inc. 2014; Railway: Natural Resources Canada 2012; Hydrology: IHS Inc. 2004; Populated Area, Municipal Boundary: AltaLIS 2014; Military: IHS Inc. 2013; Indian Reserve/Settlement: Government of Canada 2014, IHS Inc. 2013; Park/Protected Area: Alberta Tourism, Parks and Recreation 2012; Green/White Area: AltaLIS 2010; Hillshade: TERA Environmental Consultants 2008.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

Grand Rapids
Pipeline Project

SCALE: 1:700,000
0 10 20 km
(All Locations Approximate)

October 2014

8395

Mapped By: LS

Checked By: DS

4.0 ENVIRONMENTAL COMPLIANCE

Introduction

Environmental compliance is facilitated through sharing of information, providing orientations/training, hiring qualified staff and providing onsite inspection of activities through a proactive and adaptive inspection program.

Objective

The objective of these mitigation measures is to ensure that:

- the Company, its authorized representatives, Contractor(s) and subcontractors are aware of relevant environmental regulatory requirements;
- processes are in-place that allow the Company, its authorized representatives, Contractor(s) and subcontractors to access Project environmental information to aid in decision making at the field level; and
- Environmental Inspectors assigned to the Project are qualified and properly trained.

Specific Measures

Activity	Preparation Measures
<i>Approvals and Licenses</i>	1. Obtain all necessary licenses and approvals before the commencement of construction. The Company, its authorized representatives, Contractor(s), and subcontractors, will comply with all conditions as presented to the Company on permits, approvals, licences, certificates and Project-specific management plans. Resolve any inconsistencies between permit conditions and contract documents as they arise.
<i>Information Sharing</i>	2. The Environmental Inspector(s) and the Environmental Advisor will facilitate the transfer of environmental information and information updates to all Company field staff and the Contractor in a timely manner. 3. Keep a complete set of Environmental Alignment Sheets and documents at each construction field office.
<i>EPP and Distribution</i>	4. Provide controlled copies of the EPP and associated environmental documents to all key Project construction and Contractor staff members during construction. 5. The EPP serves as the construction guide for environmental issues and commitments and includes all pertinent environmental information from the C&R Report.
<i>Environmental Alignment Sheets</i>	6. The Environmental Alignment Sheets provide information regarding environmental requirements and serve as detail to the Construction Alignment Sheets.
<i>C&R Reports and Preconstruction Surveys</i>	7. Provide all Contractor and Project inspection staff with relevant results of preconstruction surveys to identify known locations of environmentally sensitive features. Indicate specific mitigation for these sites on the Environmental Alignment Sheets and/or corresponding tables, with reference to specific environmental information. Identify sites with suitable markers and/or record GPS locations for any post-construction monitoring requirements.
<i>Landowner Line List</i>	8. Review landowner requests as they appear on the landowner line list, or as they arise in the field to ensure conformance with the environmental commitments.

Activity	Preparation Measures
<i>Industry Guidelines, Regulations and Codes of Practice</i>	<p>9. Industry Guidelines, Regulations and Codes of Practice (COPs) have been considered in the creation of the EPP. This includes but is not limited to:</p> <ul style="list-style-type: none"> • <i>Navigation Protection Act</i>; • <i>Fisheries Act</i>, regulations and guidelines; • Fisheries and Oceans Canada (DFO) <i>Measures to Avoid Causing Harm to Fish and Fish Habitat</i>; • Pipeline Associated Watercourse Crossings, 3rd Edition; • <i>Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body</i>; • <i>Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines</i>; • <i>Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines</i>; • <i>Code of Practice for Watercourse Crossings</i>; • <i>Alberta Forests Act Timber Management Regulation</i>; and • <i>Alberta Forest and Prairie Protection Act</i>. <p>10. <i>Integrated Standards and Guidelines</i> (December 2013) for the Enhanced Approval Process (EAP).</p>
<i>Environmental Inspectors Qualifications</i>	<p>11. The Environmental Inspector(s) hired for the Project is required to have experience in environmental inspection and/or planning. The Environmental Inspector(s) will have an understanding of pipeline construction techniques and take a preventative approach to environmental issues. In addition, the Environmental Inspector(s) will be supported by appropriate Resource Specialists who have expertise in the particular issues associated with the Project and who will be available onsite or consulted, as required.</p>
<i>Environmental Inspection Responsibilities</i>	<p>12. The Environmental Inspector's main responsibility is to ensure that all environmental commitments, undertakings and conditions of authorizations are met and that work is completed in compliance with applicable environmental regulations and Company policies, procedures and specifications in the most efficient and effective way possible.</p> <p>13. Other responsibilities of the Environmental Inspector(s) include:</p> <ul style="list-style-type: none"> • providing expert advice and guidance on major decisions or courses of action to deal with major environmental conditions; • reporting any spills in accordance with federal and/or provincial regulations and advising Company management on the clean-up and disposal of the material and any affected soils or vegetation; • monitoring delivery of environmental orientation presentations to the Company, regulatory, and Contractor staff, as directed by the Construction Manager and the Environmental Advisor; • preparing daily reports; • preparing, collecting, organizing, and disseminating all environmentally-related information and documentation that arises during construction; • liaising with appropriate government agencies; • supervising the environmental Resource Specialists that may be required to support the Project; • organizing onsite meetings as the need arises, to address site-specific issues;

Activity	Preparation Measures
<i>Environmental Inspection Responsibilities (cont'd)</i>	<ul style="list-style-type: none"> • participating in discussions with landowners/occupants, as requested by the land representative and the Construction Manager; • reviewing construction methodologies with the Project team; and • collecting environmental information throughout construction for documentation and project reporting.
<i>Project Training and Orientation</i>	<ol style="list-style-type: none"> 14. Develop and implement an environmental orientation program to ensure that all personnel working on the construction of the Project are informed of the environmental requirements and sensitivities. 15. Hire the Environmental Inspector(s) before the commencement of construction with sufficient lead time to enable training and participation in the orientation of other construction staff, as well as sufficient on site time to facilitate review of environmentally sensitive aspects of the project. 16. The Environmental Inspector(s) will be briefed by the Environmental Advisor on the environmentally sensitive aspects of the project, and the environmental processes and agreements that have taken place to date. 17. The Environmental Inspector(s) will review all Project-related information. 18. The Environmental Inspector(s) will ensure an environmental orientation program is presented to all Construction Activity Inspection Staff and Contractor staff.
<i>Non-Compliances and Resolution</i>	<ol style="list-style-type: none"> 19. The Environmental Inspector(s) will be notified by the responsible person onsite when non-compliance is identified and it will be his/her responsibility to contact the Construction Manager. If the Construction Manager is not available during a non-compliance situation, the Environmental Inspector(s) has the authority to modify work procedures or initiate work stoppage. 20. The Construction Manager will make a determination to either modify the work practice or shut the activity down until corrective actions are determined and implemented. The Environmental Inspector will assist in this decision making process. 21. If the work is shut-down, it will resume only when corrective actions have been developed and approved by the Company. Once approved by the Company, the Contractor will inform the work crew and work will proceed following the corrective action plan. 22. The Environmental Inspector(s) are responsible for documenting all procedure modifications and environmental non-compliances.

Change Management

During the course of construction it may be necessary to modify or create new procedures to address site conditions not anticipated in the EPP. This procedure outlines the process to be followed.

Activity	Preparation Measures
<i>Modifications</i>	<ol style="list-style-type: none"> 1. Contact the Environmental Inspector(s) if site conditions warrant a change in procedure that has environmental implications. 2. Develop the modification to the procedure in co-operation with the Construction Manager, Environmental Inspector(s), and the Company's Project Management Team.

Activity	Preparation Measures
<i>Modifications (cont'd)</i>	<ol style="list-style-type: none"><li data-bbox="467 233 1429 653">3. The modification to the procedure will include the following:<ul style="list-style-type: none"><li data-bbox="516 275 922 306">• description of the modification;<li data-bbox="516 317 662 348">• location;<li data-bbox="516 359 805 390">• rationale for change;<li data-bbox="516 401 1300 432">• environmental criteria reviewed as part of modification request;<li data-bbox="516 443 1057 474">• consideration of environmental objectives;<li data-bbox="516 485 1101 516">• equivalent or approved standard of mitigation;<li data-bbox="516 527 1211 558">• additional environmental protection measures required;<li data-bbox="516 569 1032 600">• site sketch or photo documentation; and<li data-bbox="516 611 1429 653">• sign-off by the Construction Manager, Environmental Inspector(s), Environmental Advisor and/or Project Manager.<li data-bbox="467 674 1429 852">4. Discuss changes to an existing procedure with the appropriate regulatory agencies, as necessary, and seek the appropriate authorization should the revised procedures require further regulatory approval. If the modification meets the environmental objectives, and there is no specific regulatory approval required for the change, no additional discussions with regulatory agencies are necessary.<li data-bbox="467 873 1429 928">5. Document the resolution and/or revision and communicate it to the appropriate parties.

5.0 NOTIFICATION OF CONCERNED PARTIES

Introduction

Notification of the construction schedule and timing of specific construction activities will facilitate awareness of upcoming activities, and allow landowners, regulatory agencies and other stakeholders to plan as appropriate for construction activities in their area.

Objective

The objective of these mitigation measures is to ensure:

- interruptions to other land use activities are minimized during construction of the Project;
- affected stakeholders are aware of Project activities; and
- communication is maintained with relevant regulatory agencies throughout construction.

Specific Measures

Contacts	Measures
<i>Federal, Provincial and Municipal Agencies</i>	1. Inform all appropriate federal and provincial resource agencies and interested municipal officials of the Project developments as warranted.
<i>Landowners and Lessees</i>	2. Notify all landowners and lessees along the route of the intended Project schedule before the start of construction to prevent or reduce impacts to their operations or activities.
<i>Aboriginal Communities</i>	3. Provide Aboriginal Communities with the proposed construction schedule and pipeline route maps.

6.0 CONSTRUCTION PREPARATION

Introduction

The following measures will be implemented by the Company's Contractor(s) and subcontractor(s) before the initiation of ground disturbance activities.

Objective

The objectives of these mitigation measures are to ensure:

- all resources are properly identified and marked in the field before the initiation of ground disturbance to avoid or minimize potential Project effects;
- the construction right-of-way is properly delineated to prevent inadvertent trespass; and
- all access to and from the work sites are properly marked to maintain safety and environmental compliance.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Staking</i>	<ol style="list-style-type: none"> 1. To prevent inadvertent trespass, stake the right-of-way, staging areas and TWS to clearly delineate all boundaries. 2. Mark and locate all foreign lines and cables using One-Call services before the start of construction to ensure the safety of the workers and public.
<i>Environmental Resource Delineation</i>	<ol style="list-style-type: none"> 3. Clearly mark all sensitive resources identified on the Environmental Alignment Sheets and environmental tables (Table 1 and 2) within the immediate vicinity of the right-of-way before the start of clearing. Following clearing, snow fencing will be installed to delineate the sensitive resources. 4. Supplement fencing with signage after clearing. 5. The Environmental Inspector(s) will confirm the accuracy of all environmentally sensitive resource locations, and will ensure fencing is maintained during construction. 6. The Environmental Inspector(s) will identify and notify the Contractor of the appropriate locations for wildlife gaps.
<i>Access Delineation</i>	<ol style="list-style-type: none"> 7. Clearly delineate areas that have access restrictions. Restrict access to essential construction personnel only. Direct all other personnel to the right-of-way via alternate access routes.
<i>Hot Line Exposure/ Hydrovac</i>	<ol style="list-style-type: none"> 8. Salvage topsoil prior to exposing hot lines. 9. Empty the hydrovac truck onto subsoil at approved locations (e.g., at road crossings where the topsoil has been stripped). Ensure that hydrovac material is contained within the designated release area (i.e., will not migrate to a waterbody or onto topsoil). Refer to the Hydrovac Cutting Handling Plan (Appendix 1F).
<i>Grade Plan</i>	<ol style="list-style-type: none"> 10. Before the start of construction, the Contractor shall provide a preliminary right-of-way grade plan. The grade plan will be reviewed by the Construction Manager, and Environmental Inspector(s) to ensure environmental resources are not compromised as a result of grading. 11. Obtain approval for additional TWS required for storage of grade or ditch spoil during construction from the Environmental Inspector(s) and Construction Manager before disturbance.

7.0 PROJECT SPECIFIC PROTECTION MEASURES

7.1 Resource Specific Protection Measures

Introduction

This section of the EPP describes the specific mitigation measures that will be used on the Project to protect sensitive environmental features as identified in Part A of the C&R Report. All specific resource protection measures are marked on the Environmental Alignment Sheets and entered in the Resource-Specific Mitigation Table (Table 1). Topsoil depth and handling procedures are indicated on the Environmental Alignment Sheets. Watercourse crossing requirements are provided in Table 2 and in Section 8.4 of the EPP, and are indicated on the Environmental Alignment Sheets.

Objective

The objectives of these mitigation measures is to:

- ensure the identification and protection of biophysical and cultural resources identified in the C&R Report; and
- where avoidance of wetlands is not technically or economically feasible, to implement construction and reclamation mitigation measures to minimize disturbance to wetlands and to allow affected wetlands to return to full functionality following temporary disturbances.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Signage</i>	1. Post signs to clearly identify sensitive environmental features to ensure they are protected. See the Environmental Alignment Sheets as well as Table 1 and Table 2 for a listing of sensitive environmental features located along the pipeline right-of-way.
<i>Water Wells</i>	2. Provide shallow domestic well owners within 200 m of the Project the option to participate in a water well monitoring program prior to construction to determine preconstruction quality and quantity conditions.
<i>Hydrology</i>	3. If springs and ground water are encountered, the Company will review the area and determine the appropriate mitigation. 4. Leave gaps in windrows at obvious drainages, on sidehill terrain and wherever seepage occurs to reduce interference with natural drainage patterns.
<i>Wildlife</i>	5. Discuss wildlife issues that are identified during construction as necessary between the Environmental Inspector(s), Wildlife Resource Specialists and the appropriate regulatory agencies. 6. If wildlife or livestock are discovered in the trench, or in association with any other activity or facility, report to the Environmental Inspector(s) who will contact the applicable regulatory agencies, as required. In the case of livestock, the land agent assigned to the Project will contact the landowner. 7. In the event of clearing or construction activities within the restricted activity period (RAP) for migratory birds (May 1 to August 10), conduct nest sweeps to identify any active nests. 8. Project personnel are not permitted to hunt or fish on the work site.

Activity/Concern	Mitigation Measures
<i>Wildlife (cont'd)</i>	9. Do not harass or feed wildlife or livestock. Do not permit construction personnel to have dogs on the right-of-way. Firearms are not permitted in project vehicles, on the right-of-way, or at associated Project facilities. In addition, prohibit the recreational use of all-terrain vehicles (ATVs) or snowmobiles by construction personnel on the right-of-way. Report any incidents with wildlife or collisions with wildlife to provincial regulators and the local police detachment, if applicable.
<i>Species with Special Conservation Status</i>	10. If species with special conservation status are identified during construction of the Project, implement the Wildlife Species of Concern Discovery Contingency Plan (Appendix 1E). 11. Report sightings of species with special conservation status to the Environmental Inspector(s). Specific protection measures may be implemented and the sighting will be recorded.
<i>Wildlife, Livestock and Vehicle Passage</i>	12. Leave gaps in windrows (<i>i.e.</i> , grubbing piles, topsoil, grade spoil, rollback) and strung pipe at obvious drainages and wildlife trails, and to allow for livestock and vehicle passage across the right-of-way. Locations where wildlife gaps are appropriate will be determined in the field by the Environmental Inspector(s). Gaps should align.
<i>Rare Plants/ Rare Ecological Communities</i>	13. If previously unidentified rare plants or rare ecological communities are found on the right-of-way prior to construction, implement the Plant Species and Ecological Communities of Concern Discovery Contingency Plan (Appendix 1E). 14. Clearly mark identified rare plant or rare ecological community locations before the start of right-of-way preparation and construction. 15. Review mitigation for rare plants / rare ecological communities with Contractor personnel in advance of construction to ensure there is full understanding of the procedures involved.
<i>Use of Herbicides</i>	16. Restrict the general application of herbicide near rare plants or rare ecological communities. Spot spraying, wicking, mowing, or hand-picking are acceptable measures for weed control in these areas. 17. Prohibit the use of herbicides within 30 m of an open body of water, unless the herbicide application is conducted by ground application equipment, or otherwise approved by the relevant regulatory agency.
<i>Weeds and Clubroot Disease</i>	18. Develop construction planning sequences to avoid exposing new lands to risk. Clearing and topsoil handling will be carried out in a manner to significantly reduce the risk of transferring spores between fields, including movement from regions of low infection to regions of high infection. Refer to Appendix 1F. 19. All equipment must arrive at the Project site clean and free of soil or vegetative debris. Equipment will be inspected by the Environmental Inspector(s), or designate, and if deemed to be in appropriate condition will be identified with a suitable marker or tag. Any equipment which arrives in a dirty condition shall not be allowed on the right-of-way until it has been cleaned. 20. When travelling on foot, footwear and any equipment that are in contact with topsoil on infected fields will be cleaned prior to entering another quarter-section. 21. All vehicles, quads and equipment driving on topsoil (prior to stripping or after topsoil replacement) are required to arrive daily on site in a clean state.

Activity/Concern	Mitigation Measures
<i>Weeds and Clubroot Disease (cont'd)</i>	<ul style="list-style-type: none"> 22. Ensure equipment that is brought to site is sanitized by misting with a weak disinfectant solution (<i>i.e.</i>, 1-2% bleach) prior to its arrival in order to minimize the spread of clubroot disease. 23. Clean equipment involved in clearing/brushing and topsoil handling within designated areas or cleaning stations when moving from an infected area to a non-infected area. Cleaning station locations will be identified prior to construction in consultation with landowners, counties, and municipalities. 24. Record locations of equipment weed cleaning sites and monitor during the following growing season. 25. Post signs at areas identified as having noxious weed infestations prior to start of construction. 26. Conduct shovel and sweep or compressed air cleaning before moving equipment from any locations identified as having a noxious weed infestation. 27. Strip topsoil from the full right-of-way on lands where localized weed infestations are encountered. Store soil piles containing noxious weeds to prevent mixing with the surrounding soil during regrading and final clean-up. 28. Monitor topsoil piles for weed growth during the course of construction and implement corrective measures (<i>e.g.</i>, spraying, hand pulling) to avoid infestation when warranted.
<i>Wetlands</i>	<ul style="list-style-type: none"> 29. Construct wetland crossings as per Code of Practice notifications. 30. Reduce the removal of vegetation in wetlands to the extent possible. 31. Conduct ground level cutting/mowing/mulching of wetland vegetation instead of grubbing. The method of removal of wetland vegetation is subject to approval by the Company. 32. Direct grading away from wetlands. 33. Reduce grading within wetland boundary. Do not use TWS within the boundaries of wetlands, unless required for site specific purposes. TWS within the boundary of a wetland must be approved by the Environmental Inspector(s). 34. Prevent ground disturbance by using a protective layer such as matting or biodegradable geotextile and clay ramps between wetland root/seed bed and construction equipment. 35. Replace trench material as soon as possible, and re-establish preconstruction contours within wetland boundary to ensure cross right-of-way drainage. 36. Install berms, cross ditches and/or silt fences between wetlands and disturbed areas when deemed necessary by the Environmental Inspector(s). 37. Natural recovery is the preferred method of reclamation (<i>i.e.</i>, do not seed wetland areas).
<i>Historical and Palaeontological Resources</i>	<ul style="list-style-type: none"> 38. If historical or palaeontological features (<i>e.g.</i>, arrow heads, modified bone, pottery fragments, fossils) not previously identified are found on the right-of-way or facility site during construction follow conditions outlined in the Heritage Resource Discovery Plan (Appendix 1E). 39. Prohibit the collection of Historical Resources by Project personnel.
<i>Traditional Land Use Resources</i>	<ul style="list-style-type: none"> 40. If traditional land use (TLU) sites not previously identified are found on the right-of-way during construction, follow conditions outlined in the Traditional Land Use Sites Discovered Contingency Plan (Appendix 1E).

Table 1 summarizes the unique resource-specific protection measures required on the Project.

TABLE 1
RESOURCE-SPECIFIC MITIGATION TABLE

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
WILDLIFE – GENERAL				
Active Sensitive Raptor Nests	Impact to Sensitive Raptors	Construction activities should not occur within 1,000 m of an active sensitive raptor nest (e.g., bald eagle) (GoA 2013)	<ul style="list-style-type: none"> In the event an active raptor nest is discovered during clearing or construction activities, a site visit will be conducted to identify the species in order to determine if the nest is subject to site-specific mitigation measures. Nests of sensitive raptor species have a 1,000 m setback (GoA 2013). Measures will be discussed with AESRD and may include a protective buffer and modifying the construction schedule to avoid activities until fledging has concluded. 	<ul style="list-style-type: none"> None
Active Grouse Leaks	Impact to Sharp-tailed grouse	Sharp-tailed grouse leaks have a recommended 500 m year-round setback (GoA 2013)	<ul style="list-style-type: none"> Sharp-tailed grouse leaks have a recommended year-round 500 m setback (GOA 2013). In the event that an active sharp-tailed grouse lek is identified within 500 m of the proposed pipeline route, consult with AESRD to determine appropriate mitigation. Measures may include a protective buffer and modifying the construction schedule. 	<ul style="list-style-type: none"> None
Amphibian Wetlands Within Project Footprint	Impact to Amphibians	Western toad breeding ponds have a 100m year-round setback (GoA 2013)	<ul style="list-style-type: none"> Avoid clearing and construction in proximity to wetlands to the extent practical during the amphibian breeding period (spring). AESRD recommends a 100 m setback for breeding ponds of western toad, northern leopard frog and Canadian toad. In the event that an amphibian breeding pond is discovered on or within 100 m of the proposed pipeline right-of-way during clearing or construction activities, appropriate mitigation will be determined in consultation with AESRD. 	<ul style="list-style-type: none"> None
WILDLIFE - SPECIFIC LOCATIONS (W4M)				
Legal Location: 3-30-73-16 to 6-19-72-16	Caribou Range - East Side of the Athabasca River (Wandering Caribou Herd)	Activity in caribou zones should begin as early as possible in late fall/early winter in order to limit late winter activities (i.e., "early in/early out"). AESRD recommends a timing restriction of February 15 to July 15. Activity undertaken during non-frozen ground conditions should not begin until after mid-July.	<ul style="list-style-type: none"> AESRD recommends a timing restriction of February 15 to July 15 within caribou range to reduce impacts to pregnant cows and their calves (GOA 2013). Employ an "early in/early out" approach to reduce disturbance of caribou by initiating activities as early as possible in the winter and working expeditiously to limit late winter activities. Consult with the AER in regards to activity in caribou range within the period of February 15 to July 15. Share existing access with other industrial users, wherever feasible. Where practical, use multi-passenger vehicles for the transport of crews to and from job sites. Communicate to construction personnel the locations along Project access and construction right-of-way where wildlife are repeatedly observed, and the expectations of following speed limits. Welded pipe that is higher than 0.75 m should not remain on the ground or on skids for more than three days. Gaps can be located in places that also facilitate construction such as at slope changes, crossings (i.e., watercourse, road, pipeline right-of-way) and bends. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 407322E; 6134385N End UTM: 407233E; 6123419N Mitigation to be finalized pending construction schedule and consultation with AESRD.

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: 3-30-73-16 to 6-19-72-16 (cont'd)	See above	See above	<ul style="list-style-type: none"> Where segments of the right-of-way require rollback for access management or erosion control, ensure sufficient timber of appropriate size is available. Delimb conifer trees and retain on-site to provide a potential seed source for natural regeneration (<i>i.e.</i>, scatter or mulch limbs with cones over portions of the construction right-of-way either during clearing or clean-up). Implement minimum disturbance construction techniques (<i>e.g.</i>, restrict grubbing to the trench width, allow integrity of the root layer to be maintained on the majority of the right-of-way, allow rapid recovery of herbaceous and deciduous woody vegetation species, and use snow padding or matting on work areas of the right-of-way to avoid the need for grubbing and to protect shrubs and small trees) to promote rapid recovery of vegetation on the right-of-way. Utilize a combination of natural recovery and accelerated reclamation methods of reclamation that accelerate vegetation regeneration. Accelerated reclamation measures may include: site preparation (<i>e.g.</i>, mounding) to enhance microsite conditions that promote seed germination and/or seedling growth; planting conifer seedlings; willow/shrub staking at riparian areas. Implement techniques, where warranted, for access control and to reduce line-of-sight. Limit vegetation control along the right-of-way during the operation phase to the extent feasible. 	<ul style="list-style-type: none"> See above
Legal Location: NW 8-68-17 to SW 8-68-17	Horned grebe and pied-billed grebe nesting site (Grygus Lake)	<p>The Government of Alberta (2013) recommends a 500 m setback from active horned grebe and pied-billed grebe nest sites from April 15 to July 31. Environment Canada recommends a 100 m setback distance from active horned grebe nests from April 1 to August 31.</p> <p>The extended RAP (April 1 to August 31) is recommended. Given the land use (cultivated) and that the proposed route parallels an existing pipeline along this segment, a 100 m setback is considered suitable and can be discussed with AESRD.</p>	<ul style="list-style-type: none"> Clearing and stripping is scheduled for late fall 2014 and construction in frozen conditions/winter and final clean-up starting in May 2016. Implement the 100 m setback and avoid the timing restriction (April 1 to August 31) during final clean-up Clearing, construction and clean-up activities should be scheduled outside the EC timing restriction from April 1 to August 31 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 399261E End UTM: 6081685N Start and end KPs listed are for the length of the ROW within the 500m setback area

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NW 23-70-17	Beaver Dam Complex	N/A	<ul style="list-style-type: none"> In the event that beaver dams or lodges will be disturbed, an AESRD Wildlife Damage Control License will be required. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405183E; 6104394N End UTM: N/A
Legal Location: NE 23-69-17				<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405501E; 6094732N End UTM: N/A
Legal Location: SW 22-55-21				<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 364985E; 5958812N End UTM: N/A
Legal Location: NE 34-62-20	Beaver Lodges	N/A	<ul style="list-style-type: none"> In the event that beaver dams or lodges will be disturbed, an AESRD Wildlife Damage Control License will be required. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376165E; 6031120N End UTM: N/A
Legal Location: NE 26-53-23	Canadian Toad Breeding Pond	Recommended setback of 100 m (GoA 2013)	<ul style="list-style-type: none"> Avoid clearing and construction in proximity to wetlands to the extent practical during the amphibian breeding period (spring). AESRD recommends a 100 m setback for breeding ponds of western toad, northern leopard frog and Canadian toad (GoA 2013). In the event that an amphibian breeding pond is discovered on or within 100 m of the proposed pipeline route during clearing or construction activities, appropriate mitigation will be determined in consultation with AESRD. The Project parallels several existing pipeline rights-of-way at this location that are located between the wetland and the proposed right-of-way. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 407043E; 6133580N End UTM: N/A
Legal Location: NE 26-53-23	Pied-billed Grebe nesting waterbody	Recommended setback of 500 m from April 15 to July 31 (GoA 2013)	<ul style="list-style-type: none"> Clearing and construction activities within 500 m of the wetland should be scheduled to avoid the timing constraint of April 15 to July 31 The Project parallels several existing pipeline rights-of-way at this location that are located between the wetland and the proposed right-of-way. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 349054E; 5942493N End UTM: N/A Place 500 m buffer around the waterbody and list start and end KPs of the route where it passes through the buffer
Legal Location: SE 28-53-23	Active Osprey Nest	Active osprey nests have a recommended year-round 750 m setback distance (GoA 2013)	<ul style="list-style-type: none"> Consult with AESRD regarding activities scheduled within the recommended 750 m setback distance. Mitigation measures any include scheduling activities within the 750 m setback outside of the sensitive nesting season (i.e., schedule activities between September 1 and March 31) and/or nest monitoring. The Project parallels several existing pipeline rights-of-way and 137 Avenue NE, which are located between the Project and the active osprey nest 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 346467E; 5941684N End UTM: N/A
Legal Location: 16-14-63-20	Western Toad Breeding Pond	Western toad breeding ponds have a 100 m year-round setback (GoA 2013)	<ul style="list-style-type: none"> Avoid clearing and construction in proximity to wetlands to the extent practical during the amphibian breeding period (spring). AESRD recommends a 100 m setback for breeding ponds of western toad, northern leopard frog and Canadian toad (GoA 2013). In the event that an amphibian breeding pond is discovered on or within 100 m of the proposed pipeline route during clearing or construction activities, appropriate mitigation will be determined in consultation with AESRD. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376281E; 6035785N End UTM: N/A

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: 14-11-63-20 to 2-11-63-20	Ungulate Habitat Protection Area (PNT 900036)	Key wildlife Biodiversity Zones have timing a restriction of January 15 to April 30	<ul style="list-style-type: none">Clearing, construction and clean-up activities within the Ungulate Habitat Protection Area (PNT 930006) is scheduled to occur outside the timing restriction of January 15 to April 30 (GoA 2013)Conduct work expeditiously to maintain a tight construction spread (i.e., interval between front-end work activities such as clearing, grading and back-end activities such as clean-up to reduce the duration of activities within the PNT.	<ul style="list-style-type: none">N/AClearing and construction are scheduled outside the timing restriction
Legal Location: 14-35-68-17 to 6-35-68-17	Key Wildlife and Biodiversity Zone Associated with the La Biche River	Key wildlife and biodiversity zones have a timing restriction of January 15 to April 30 (GoA 2013)	<ul style="list-style-type: none">Follow mitigation outlined in the Key Wildlife and Biodiversity Zone Protection Plan as approved by the AER.	<ul style="list-style-type: none">Current Site (UTM Zone 12U NAD 83)Start UTM: 404575E; 6088474NEnd UTM: 404579E; 6087707N
Legal Location: 5-2-58-20 to 11-36-57-20	Key Wildlife and Biodiversity Zone Associated with the North Saskatchewan River			<ul style="list-style-type: none">Current Site (UTM Zone 12U NAD 83):Start UTM: 377192E:5983363NEnd UTM: 379038E; 5982229N
Legal Location: 5-26-53-23 to 4-26-53-23				<ul style="list-style-type: none">Current Site (UTM Zone 12U NAD 83):Start UTM: 348456E; 5942141NEnd UTM: 348223E; 5941801N
Legal Location 14-22-53-23 to 13-22-53-23				<ul style="list-style-type: none">Current Site (UTM Zone 12U NAD 83)Start UTM: 346988E; 5941275NEnd UTM:346694E; 5941285N
Legal Location: 12-22-53-23				<ul style="list-style-type: none">Current Site (UTM Zone 12U NAD 83)Start UTM: 346635E 5940993NEnd UTM: 346479E; 5940719N
VEGETATION - SPECIFIC LOCATIONS				
Legal Location: SE 30-71-16	Golden Saxifrage	N/A	<ul style="list-style-type: none">Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant.Pay particular attention to restoring pre-construction contours following construction near this location to ensure site microtopography and hydrology are maintained.	<ul style="list-style-type: none">Current Site (UTM Zone 12U NAD 83)UTM: 408029E; 6115404N 408023E; 6115404N 408023E; 6115397N 408031E; 6115394N 408051E; 6115394N
Legal Location: NW 23-70-17	Crystalwort	N/A	<ul style="list-style-type: none">See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures.Pay particular attention to restoring pre construction contours along the banks of the watercourse.	<ul style="list-style-type: none">Current Site (UTM Zone 12U NAD 83)UTM: 405192E; 6104408N 405203E; 6104404N 405219E; 6104390N 405215E; 6104381N 405166E; 6104407N
Legal Location: NW 23-70-17	Few-flowered Salt Meadow Grass	N/A	<ul style="list-style-type: none">Reduce temporary workspace and extra temporary workspace width by 10 m from the east edge at the watercourse crossing.Stake, flag or otherwise delineate this population to avoid accidental encroachment.Do not strip/grade within a 10 m radius of the population, if feasible.Monitor the effectiveness of implemented mitigation measures during PCM.	<ul style="list-style-type: none">Current Site (UTM Zone 12U NAD 83)UTM: 405216E; 6104389N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NW 11-70-17	Alternating Dog Lichen	N/A	<ul style="list-style-type: none"> If soil disturbance can be avoided: <ul style="list-style-type: none"> -stake, flag or otherwise delineate this population prior to construction to avoid accidental encroachment; and -following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. If soil disturbance is necessary: <ul style="list-style-type: none"> -use large equipment to move the stump to a suitable habitat with a similar moisture and light regime; and -record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 405126E; 6101252N
Legal Location: NE/SE 35-69-17	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant. Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405500E; 6097662E 405499E; 6097613N End UTM: 405496E; 6097606N
Legal Location: SE 35-69-17	Purple-fringed Riccia	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405494E; 6097359N End UTM: 405506E; 6097362N
Legal Location: SW 2-69-17	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant. Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83): UTM: 404555E; 6089264N
Legal Location: NW 35-68-17	Purple-fringed Riccia	N/A	<ul style="list-style-type: none"> If a trenchless crossing method is used: <ul style="list-style-type: none"> — no additional mitigation is recommended. If a trenched crossing method is used: <ul style="list-style-type: none"> — see Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures; and — pay particular attention to restoring pre-construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 404601E; 6087944N End UTM: 404523E; 6087932N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NW 35-68-17	Porcupine Sedge	N/A	<ul style="list-style-type: none"> • If a trenchless crossing method is used: fence or flag the population prior to construction to prevent incidental damage. • If a trenched crossing method is used: reduce temporary workspace and extra temporary workspace width by 10 m from the west edge at the watercourse crossing. • Stake, flag or otherwise delineate this population to avoid accidental encroachment • Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> • Current Site (UTM Zone 12U NAD 83) • UTM: 404545E; 6087939N
Legal Location: SW 35-68-17	Macloskey's Violet	N/A	<ul style="list-style-type: none"> • If soil disturbance can be avoided: <ul style="list-style-type: none"> — avoid stripping/grading in the immediate vicinity of the population; — if the population occurs on the spoil side of the right-of-way, leave a gap in the spoil pile where population occurs; — if the population occurs on the travel side of the right-of-way, temporarily cover the site with an appropriate ramp (e.g., packed snow and ice bridge, rig/swamp mats); and — following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. • If soil disturbance is necessary: <ul style="list-style-type: none"> — transplant a portion of the population off the right-of-way to a suitable habitat with similar moisture and light regime; and — record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. • Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> • Current Site (UTM Zone 12U NAD 83) • UTM: 404422E; 6087423N
Legal Location: NE 27-68-17	Golden Saxifrage	N/A	<ul style="list-style-type: none"> • Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant. • Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> • Current Site (UTM Zone 12U NAD 83) • Start UTM: 403955E; 6086857N • End UTM: 403958E; 6086819N
Legal Location: SE 27-68-17	Tinged Sedge	N/A	<ul style="list-style-type: none"> • The bore under the adjacent range road will avoid the population. Fence or flag the population prior to construction to prevent incidental damage. • Ensure construction access from the range road avoids this population. • Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> • Current Site (UTM Zone 12U NAD 83) • Start UTM: 403441E; 6086102N • End UTM: 403442E; 6086099N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NW 5-68-17 NE 6-68-17	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant. Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 399015E; 6080439N 398993E; 6080391N 398937E; 6080197N 398910E; 6080145N 398902E; 6080142N
Legal Location: NE 6-68-17	Meadow Bitter Cress	N/A	<ul style="list-style-type: none"> If soil disturbance can be avoided: <ul style="list-style-type: none"> stake, flag or otherwise delineate this population prior to construction to avoid accidental encroachment; avoid stripping/grading in the immediate vicinity of the population; if the population occurs on the spoil side of the right-of-way, leave a gap in the spoil pile where population occurs; if the population occurs on the travel side of the right-of-way, temporarily cover the site with an appropriate ramp (e.g., packed snow and ice bridge, rig/swamp mats); and following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. If soil disturbance is necessary: <ul style="list-style-type: none"> recommend transplanting a portion of the population off the right-of-way to a suitable habitat with similar moisture and light regime; and record UTM's, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 398952E; 6080339N 398984E; 6080330N 398971E; 6080301N
Legal Location: SE 31-66-18	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant. Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 390154E; 6068601N End UTM: 390196E; 6068580N
Legal Location: SE 31-66-18	Snakeskin Liverwort	N/A	<ul style="list-style-type: none"> Where stripping is required, strip and salvage strippings from the location of the population. Isolate strippings from other spoil piles and identify by labelled stakes or flags. Replace separately salvaged soil to the location of the population. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 390162E; 6068579N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NE 28-65-19	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant. Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 383460E; 6057848N End UTM: 383380E; 6057763N
Legal Location: NE 8-65-19	Crystalwort	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 381729E; 6052973N End UTM: 381713E; 6053009N
Legal Location: SW 36-63-20	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377190E; 6039457N End UTM: 377208E; 6039548N
Legal Location: SW 36-63-20	Riccardia Liverwort	N/A	<ul style="list-style-type: none"> If soil disturbance can be avoided: <ul style="list-style-type: none"> following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. If soil disturbance is necessary: <ul style="list-style-type: none"> use large equipment to move the stump to a suitable receiving site with a similar moisture and light regime; and record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 377209E; 6039509N
Legal Location: NW/SW 25-63-20	Crystalwort	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 376801E; 6038381N 376847E; 6038402N 376768E; 6038406N 376822E; 6038404N 376792E; 6038379N 376817E; 6038404N
Legal Location: NW/SW 25-63-20	Purple-fringed Riccia	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 376823E; 6038403N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NW 24-63-20	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant. Pay particular attention to restoring pre-construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376795E; 6037111N End UTM: 376747E; 6037014N
Legal Location: NW 24-63-20	Macloskey's Violet	N/A	<ul style="list-style-type: none"> If soil disturbance can be avoided: <ul style="list-style-type: none"> avoid stripping/grading in the immediate vicinity of the population; if the population occurs on the spoil side of the right-of-way, leave a gap in the spoil pile where population occurs; if the population occurs on the travel side of the right-of-way, temporarily cover the site with an appropriate ramp (e.g., packed snow and ice bridge, rig/swamp mats); and following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. If soil disturbance is necessary: <ul style="list-style-type: none"> transplant a portion of the population off the right-of-way to a suitable habitat with similar moisture and light regime; record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376740E; 6037016N End UTM: 376736E; 6037007N
Legal Location: SW 24-63-20	Leather Grape Fern	N/A	<ul style="list-style-type: none"> If soil disturbance can be avoided: <ul style="list-style-type: none"> stake, flag or otherwise delineate this population prior to construction to avoid accidental encroachment; avoid stripping/grading in the immediate vicinity of the population and avoid taking extra temporary workspace in this area; if population occurs on spoil side of the right-of-way, leave a gap in the spoil pile where the grape fern population occurs; if population occurs on travel side of the right-of-way, temporarily cover the site with an appropriate protective material (e.g., subsoil and geotextile, rig matting or snow); and following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 376593E; 6036764N 376602E; 6036763N 376613E; 6036760N 376615E; 6036763N 376592E; 6036765N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SW 24-63-20 (cont'd)	See above	See above	<ul style="list-style-type: none"> If soil disturbance is necessary: <ul style="list-style-type: none"> prior to construction, identify transplant sources and transplant receiving sites, in a suitable habitat with a similar moisture and light regime off the right-of-way; during construction utilize equipment to transplant with a backhoe bucketful of material from the transplant source site and place it at the transplant receiving site; and record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> See above
Legal Location: SE 23-63-20	Botrychium species	N/A	<ul style="list-style-type: none"> Revisit the site during the growing season prior to construction and with the assistance of construction staking or the presence of a surveyor, to determine which of the populations are located with workspaces where soil disturbance will not be required and which populations will be on ditchline or other areas where stripping and grading will be necessary. If soil disturbance can be avoided: <ul style="list-style-type: none"> stake, flag or otherwise delineate this population prior to construction to avoid accidental encroachment; avoid stripping/grading in the immediate vicinity of the population and avoid taking extra temporary workspace in this area; if population occurs on spoil side of the right-of-way, leave a gap in the spoil pile where the population occurs; if population occurs on travel side of the right-of-way, temporarily cover the site with an appropriate protective material (e.g., subsoil and geotextile, rig matting or snow); and following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. If soil disturbance is necessary: <ul style="list-style-type: none"> prior to construction, identify transplant sources and transplant receiving sites, in a suitable habitat with a similar moisture and light regime off the right-of-way; during construction utilize equipment to transplant with a backhoe bucketful of material from the transplant source site and place it at the transplant receiving site; and record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376301E; 6036333N End UTM: 376280E; 6036150N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SE 23-63-20	Leather Grape Fern	N/A	<ul style="list-style-type: none"> If soil disturbance can be avoided: <ul style="list-style-type: none"> stake, flag or otherwise delineate this population prior to construction to avoid accidental encroachment; avoid stripping/grading in the immediate vicinity of the population and avoid taking extra temporary workspace in this area; if population occurs on spoil side of the right-of-way, leave a gap in the spoil pile where the grape fern population occurs; if population occurs on travel side of the right-of-way, temporarily cover the site with an appropriate protective material (e.g., subsoil and geotextile, rig matting or snow); and following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. If soil disturbance is necessary: <ul style="list-style-type: none"> prior to construction, identify transplant sources and transplant receiving sites, in a suitable habitat with a similar moisture and light regime off the right-of-way; during construction utilize equipment to transplant with a backhoe bucketful of material from the transplant source site and place it at the transplant receiving site; and record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376280E; 6036152N End UTM: 376292E; 6033136N
Legal Location: NE 14-63-20	Crystalwort	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376239E; 6035905N End UTM: 376243E; 6035892N
Legal Location: NE 14-63-20	Purple-fringed Riccia	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376242E; 6035903N End UTM: 376235E; 6035891N
Legal Location: NE 2-63-20	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376097E; 6032349N End UTM: 376204E; 6032074N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SE 2-63-20	Golden Saxifrage	N/A	<ul style="list-style-type: none"> Schedule clearing, site preparation and construction activities to occur outside of the growing season during dry or frozen conditions when plants are expected to be dormant. Pay particular attention to restoring pre - construction contours following construction near this location to ensure site microtopography and hydrology are maintained. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 376229E; 6031439N
Legal Location: SE 22-62-20	Crystalwort	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376015E; 6027132N End UTM: 376014E; 6027135N
Legal Location: SE 15-62-20	Purple-fringed Riccia	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 376078E; 6025348N
Legal Location: SE 15-62-20	Crystalwort	N/A	<ul style="list-style-type: none"> See Section 8.4 of the EPP for Watercourse Crossing Mitigation Measures. Pay particular attention to restoring pre - construction contours along the banks of the watercourse. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376084E; 6025248N End UTM: 376079E; 6025354N
Legal Location: NW 36-57-20	Green Ash	N/A	<ul style="list-style-type: none"> Stake, flag or otherwise delineate the tree prior to construction to avoid accidental encroachment. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 378748E; 5982244N
Legal Location: SE 28-54-22	Green Ash	N/A	<ul style="list-style-type: none"> Revisit the site prior to construction to flag the single green ash tree and assess whether disturbance to the rare plant can be avoided. In the event that avoidance of the green ash tree and saplings is not feasible, transplant the green ash saplings off the proposed right-of-way. If soil disturbance can be avoided: <ul style="list-style-type: none"> stake, flag or otherwise delineate the green ash tree prior to construction to avoid accidental encroachment; avoid stripping/grading in the immediate vicinity of the green ash tree and avoid taking extra temporary workspace in this area; if the green ash tree and saplings occurs on the spoil side of the right-of-way, leave a gap in the spoil pile where the population occurs; if the green ash saplings occur on travel side of the right-of-way, temporarily cover the site with an appropriate protective material (e.g., subsoil and geotextile, rig matting or snow); and following construction, ensure the pre-construction profile of the trench is restored in the vicinity of the green ash population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 355902E; 5950988N 355909E; 5950988N 355912E; 5950989N 355915E; 5950987N 355914E; 5950994N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SE 28-54-22 (cont'd)	See above	See above	<ul style="list-style-type: none"> If soil disturbance is necessary: <ul style="list-style-type: none"> recommend transplanting the saplings off the right-of-way to a suitable habitat with similar moisture and light regime; Identify receiving sites preferably where future pipeline disturbance will be minimal. Potential receiving sites have been identified along the banks of Ross Creek, approximately 250 m east of the proposed route located at the bend along the creek; and record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. In all instances: <ul style="list-style-type: none"> pay particular attention to restoring pre-construction contours along the banks of the watercourse. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> See above
Legal Location: SW 31-53-20	Hooker's Sedge	N/A	<ul style="list-style-type: none"> Stake, flag or otherwise delineate this population to avoid accidental encroachment. If the population occurs on the spoil side of the right-of-way, leave a gap in the spoil pile where the population occurs. If the population occurs on the travel side of the right-of-way, temporarily cover the site with an appropriate protective material (e.g., subsoil and geotextile, rig matting or snow). Following construction, ensure the pre-construction profile of the trench is restored in the vicinity of these populations and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for these species. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 352146E; 5943606N
Legal Location: SW 31-53-22	False Dragonhead	N/A	<ul style="list-style-type: none"> Stake, flag or otherwise delineate this population to avoid accidental encroachment. If the population occurs on the spoil side of the right-of-way, leave a gap in the spoil pile where the population occurs. If the population occurs on the travel side of the right-of-way, temporarily cover the site with an appropriate protective material (e.g., subsoil and geotextile, rig matting or snow). Following construction, ensure the pre-construction profile of the trench is restored in the vicinity of these populations and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for these species. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 352108E; 5943500N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SW 31-53-22	Pellia liverwort	N/A	<ul style="list-style-type: none"> If soil disturbance can be avoided: <ul style="list-style-type: none"> stake, flag or otherwise delineate this population prior to construction to avoid accidental encroachment; avoid stripping/grading in the immediate vicinity of the population; if the population occurs on the spoil side of the right-of-way, leave a gap in the spoil pile where population occurs; if the population occurs on the travel side of the right-of-way, temporarily cover the site with an appropriate ramp (e.g., snow/ice bridge, rig/swamp mats); and following construction, ensure the pre-construction profile of the trench is restored in the vicinity of this population and allow vegetation to naturally regenerate, in order to maintain existing habitat conditions for this species. If soil disturbance is necessary: <ul style="list-style-type: none"> recommend transplanting a portion of the population off the right-of-way to a suitable habitat with similar moisture and light regime; and record UTMs, stake, flag or otherwise delineate the transplanted population to avoid additional disturbance. In all instances: <ul style="list-style-type: none"> pay particular attention to restoring pre construction contours along the banks of the watercourse. Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 352137E; 5943494N
Legal Location: SE-16-56-20	American water-horehound		<ul style="list-style-type: none"> Monitor the effectiveness of implemented mitigation measures during PCM. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) UTM: 374197E; 5966680N
WETLANDS - SPECIFIC LOCATIONS (W4M)				
Legal Location: NW 19-72-16 to SW 19-72-16	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 407301E; 6123801N End UTM: 407159E; 6122927N
Legal Location: NW 23-70-17	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405213E; 6104444N End UTM: 405189E; 6104374N
Legal Location: NW 23-70-17	Open water pond traversed by the pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405211E; 6104404N End UTM: 405184E; 6104317N
Legal Location: NW 11-70-17 to NW 2-70-17	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405156E; 6101689N End UTM: 405072E; 6099801N
Legal Location: NW 2-70-17 to SE 2-70-17	Treed bog traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405282E; 6099814N End UTM: 405051E; 6098830N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NE 35-69-17	Treed bog traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405382E; 6097974N End UTM: 405186E; 6097716N
Legal Location: SE 35-69-17	Open water pond traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405514E; 6097376N End UTM: 405472E; 6097239N
Legal Location: NE 26-69-17 to SE 26-69-17	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405529E; 6096455N End UTM: 405480E; 6095625N
Legal Location: SE 26-69-17 to NE 23-69-17	Shrubby fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405536E; 6095212N End UTM: 405467E; 6094673N
Legal Location: NE 23-69-17 to NE 14-69-17	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 405503E; 6094701N End UTM: 405154E; 6093335N
Legal Location: NW 11-69-17 to SW 11-69-17	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 404879E; 6091947N End UTM: 404602E; 6090915N
Legal Location: NW 2-69-17	Shrubby fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 404569E; 6089995N End UTM: 404452E; 6089733N
Legal Location: SW 2-69-17	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 404573E; 6089456N End UTM: 404529E; 6088941N
Legal Location: SW 2-69-17 to NW 35-68-17	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 404550E; 6088756N End UTM: 404481E; 6088723N
Legal Location: NW 35-68-17	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 404575E; 6088658N End UTM: 404513E; 6088606N
Legal Location: SW 35-68-17	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 404589E; 6087859N End UTM: 404487E; 6087676N
Legal Location: SW 35-68-17 to NW 22-68-17	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 403048E; 6085552N End UTM: 402872E; 6085381N
Legal Location: NE 8-68-17	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 400276E; 6081666N End UTM: 400178E; 6081600N
Legal Location: NE 8-68-17 to NW 8-68-17	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 400189E; 6081674N End UTM: 399781E; 6081601N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NW 30-67-17 to NE 25-67-18	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 397287E; 6077050N End UTM: 397280E; 6076926N
Legal Location: NE 25-67-18	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 397029E; 6076983N End UTM: 396992E; 6076960N
Legal Location: SW 23-67-18	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 394461E; 6074699N End UTM: 394406E; 6074662N
Legal Location: NE 15-67-18	Treed bog traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 393475E; 6074023N End UTM: 393402E; 6073923N
Legal Location: SE 15-67-18 to SW 15-67-18	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 393382E; 6073486N End UTM: 393059E; 6072990N
Legal Location: NW 10-67-18	Open water pond traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 392466E; 6072074N End UTM: 392418E; 6072039N
Legal Location: NE 30-66-18	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 390133E; 6067903N End UTM: 390113E; 6067855N
Legal Location: NE 30-66-18	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 390137E; 6067411N End UTM: 390086E; 6067364N
Legal Location: SE 30-66-18	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 389669E; 6066876N End UTM: 389605E; 6066796N
Legal Location: NW 19-66-18	Seasonal emergent marsh traversed by temporary workspace	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 389057E; 6065790E End UTM: 389021E; 6065759N
Legal Location: SE 24-66-19	Treed bog traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 388366E; 6064986N End UTM: 388230E; 6064846N
Legal Location: NE 13-66-19	Treed bog traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 388220E; 6064733N End UTM: 388074E; 6064548N
Legal Location: NE 13-66-19 to NW 13-66-19	Treed bog traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 387958E; 6064298N End UTM: 387795E; 6064028N
Legal Location: NW 12-66-19	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 387414E; 6063172N End UTM: 387331E; 6063086N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NW 2-66-19	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 386018E; 6061625N End UTM: 385836E; 6061381N
Legal Location: NW 2-66-19	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 385842E; 6061345N End UTM: 385711E; 6061226N
Legal Location: SE 3-66-19	Treed bog traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 385327E; 6060437N End UTM: 384972E; 6060055N
Legal Location: NW 27-65-19	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 384103E; 6058224N End UTM: 384036E; 6058151N
Legal Location: NW 16-65-19	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 382342E; 6054803N End UTM: 382118E; 6054462N
Legal Location: SE 8-65-19	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 381753E; 6052440N End UTM: 381713E; 6052395N
Legal Location: NE 5-65-19	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 381451E; 6051288N End UTM: 381369E; 6051230N
Legal Location: SW 5-65-19	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 381026E; 6050755N End UTM: 380982E; 6050675N
Legal Location: SW 5-65-19	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 380921E; 6050590N End UTM: 380915E; 6050575N
Legal Location: NE 30-64-19	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 379420E; 6048484N End UTM: 379388E; 6048433N
Legal Location: SW 30-64-19	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 379175E; 6047948N End UTM: 379135E; 6047908N
Legal Location: SW 30-64-19	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 379216E; 6047811N End UTM: 379178E; 6047756N
Legal Location: NW 18-64-19	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 379170E; 6045382N End UTM: 379063E; 6045121N
Legal Location: NW 7-64-19 to NE 12-64-20	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 378356E; 6043418N End UTM: 378295E; 6043288N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SE 1-64-20	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377686E; 6041563N End UTM: 377631E; 6041494N
Legal Location: SE 1-64-20	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377687E; 6041337N End UTM: 377618E; 6041288N
Legal Location: SE 1-64-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377675E; 6041221N End UTM: 377606E; 6041171N
Legal Location: SE 1-64-20	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377663E; 6041101N End UTM: 377553E; 6040850N
Legal Location: NW 25-63-20 to SW 25-63-20	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376854 E; 6038447 N End UTM: 376741 E; 6038363 N
Legal Location: NW 24-63-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376818 E; 6037123 N End UTM: 376755 E; 6037068 N
Legal Location: SE 23-63-20 to NE 14-63-20	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376258 E; 6035983 N End UTM: 376044 E; 6035542 N
Legal Location: SE 11-63-20 to SE 2-63-20	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376294 E; 6032752 N End UTM: 375908 E; 6031356 N
Legal Location: NE 27-62-20 to SE 27-62-20	Treed fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376099 E; 6029177 N End UTM: 376019 E; 6028598 N
Legal Location: NE 22-62-20 to SE 22-62-20	Shrubby fen traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376049 E; 6027244 N End UTM: 375970 E; 6026949 N
Legal Location: NE 15-62-20	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376100 E; 6025710 N End UTM: 376029 E; 6025550 N
Legal Location: SE 15-62-20	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376114 E; 6025530N End UTM: 376038 E; 6025222 N
Legal Location: NW 3-62-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 375575 E; 6022777 N End UTM: 375514 E; 6022667 N
Legal Location: NE 16-61-20 to NW 16-61-20	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373833 E; 6016377 N End UTM: 373713 E; 6016232 N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NE 28-60-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 374130E; 6009468N End UTM: 374106E; 6009433N
Legal Location: SE 28-60-20	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 374157E; 6009088N End UTM: 374135E; 6009052N
Legal Location: NE 21-60-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 374086E; 6008086N End UTM: 374065E; 6008028N
Legal Location: SE 9-60-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373702E; 6003920N End UTM: 373668E; 6003853N
Legal Location: NE 4-60-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373694E; 6003533N End UTM: 373653E; 6003492N
Legal Location: NW 29-58-20	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373028E; 5990411N End UTM: 373012E; 5990394N
Legal Location: NE 17-58-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373092E; 5987402N End UTM: 373049E; 5987377N
Legal Location: NE 17-58-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373253E; 5987073N End UTM: 373156E; 5986979N
Legal Location: NE 17-58-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373289E; 5986865N End UTM: 373287E; 5986860N
Legal Location: SE 8-58-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373333E; 5985184N End UTM: 373306E; 5985125N
Legal Location: SE 8-58-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 373295E; 5984606N End UTM: 373290E; 5984577N
Legal Location: SE 3-58-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376194E; 5983500N End UTM: 376126E; 5983490N
Legal Location: SE 3-58-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376913E; 5983179N End UTM: 376853E; 5983156N
Legal Location: SE 2-57-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377861E; 5973541N End UTM: 377848E; 5973466N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SE 2-57-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377826E; 5973107E End UTM: 377751E; 5973022N
Legal Location: SW 35-56-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377152E; 5971515N End UTM: 377074E; 5971433N
Legal Location: NW 26-56-20 to SW 26-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 377012E; 5970592N End UTM: 376865E; 5970477N
Legal Location: SE 27-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376474E; 5970485N End UTM: 376425E; 5970406N
Legal Location: SE 27-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 376488E; 5970160N End UTM: 376474E; 5970134N
Legal Location: SE 22-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 375864E; 5968571N End UTM: 375813E; 5968524N
Legal Location: NW 15-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 375355E; 5968028N End UTM: 375250E; 5968001N
Legal Location: NW 15-56-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 375208E; 5967984N End UTM: 375144E; 5967955N
Legal Location: NW 15-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 375079E; 5967928N End UTM: 375068E; 5967911N
Legal Location: NE 16-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 374748E; 5967696N End UTM: 374710E; 5967670N
Legal Location: NE 6-56-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 371485E; 5964973N End UTM: 371461E; 5964946N
Legal Location: NE 6-56-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 371505E; 5964863N End UTM: 371473E; 5964850N
Legal Location: NE 6-56-20	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 371529E; 5964836N End UTM: 371497E; 5964820N
Legal Location: NE 6-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 371451E; 5964793N End UTM: 371391E; 5964752N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NE 6-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 371240 E; 5964488 N End UTM: 371203 E; 5964423 N
Legal Location: NE 6-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 371182E; 5964370N End UTM: 371122E; 5964284N
Legal Location: SE 6-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 371101E; 5963893N End UTM: 371076E; 5963851N
Legal Location: SE 6-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 370977E; 5963603N End UTM: 370953E; 5963578N
Legal Location: SE 6-56-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 370932E; 5963475N End UTM: 370846E; 5963448N
Legal Location: NE 31-55-20	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 370875E; 5963429N End UTM: 370850E; 5963412N
Legal Location: SW 36-55-21	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 369007E; 5962514N End UTM: 368972E; 5962490N
Legal Location: SW 36-55-21	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 368300E; 5962255N End UTM: 368271E; 5962221N
Legal Location: SE 35-55-21	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 368212E; 5962152N End UTM: 368186E; 5962126N
Legal Location: NW 26-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 367334E; 5961506N End UTM: 367312E; 5961480N
Legal Location: SE 27-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 366514E; 5961112N End UTM: 366493E; 5961091N
Legal Location: SE 27-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 366163E; 5960962N End UTM: 366086E; 5960917N
Legal Location: SE 27-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 366011E; 5960903N End UTM: 365981E; 5960887N
Legal Location: SE 27-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 365916E; 5960832N End UTM: 365887E; 5960805N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SE 27-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 365864E; 5960845N End UTM: 365797E; 5960773N
Legal Location: SE 28-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 364840E; 5960488N End UTM: 364753E; 5960392N
Legal Location: NE 21-55-21	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 364824E; 5960066N End UTM: 364737E; 5959969N
Legal Location: SE 21-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 364746E; 5959439N End UTM: 364711E; 5959393N
Legal Location: SW 22-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 365043E; 5959050N End UTM: 365033E; 5959042N
Legal Location: SW 15-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 364955E; 5957424N End UTM: 364896E; 5957279N
Legal Location: SE 7-55-21	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 361244E; 5956372N End UTM: 361173E; 5956321N
Legal Location: SW 7-55-21	Wet meadow traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 360656E; 5956335N End UTM: 360607E; 5956308N
Legal Location: SW 7-55-21 to SE 12-55-22	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 359856E; 5956263N End UTM: 359834E; 5956245N
Legal Location: SW 1-55-22	Seasonal emergent marsh traversed by temporary workspace	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 358575E; 5954376N End UTM: 358537E; 5954324N
Legal Location: NE 34-54-22	Seasonal emergent marsh traversed by temporary workspace	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 357724E; 5953366N End UTM: 357674E; 5953278N
Legal Location: SE 34-54-22 to SW 34-54-22	Seasonal emergent marsh traversed by temporary workspace	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 357591E; 5953154N End UTM: 357355E; 5952917N
Legal Location: SW 34-54-22	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 357222E; 5952874N End UTM: 357140E; 5952764N
Legal Location: SE 28-54-22 to NE 21-54-22	Shrubby swamp traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 355909 E; 5950874 N End UTM: 355792 E; 5950695 N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: SW 21-54-22	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 355524 E; 5949750 N End UTM: 355501 E; 5949725 N
Legal Location: NW 8-54-22	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 353408E; 5947175N End UTM: 353368E; 5947102N
Legal Location: NW 8-54-22 To SW 8-54-22	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 353300E; 5946924N End UTM: 353252E; 5946863N
Legal Location: SE 6-54-22	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 352660E; 5944605N End UTM: 352562E; 5944511N
Legal Location: SE 36-53-23	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 350788E; 5943104N End UTM: 350727E; 5943077N
Legal Location: SW 36-53-23	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 350203E; 5943099N End UTM: 350185E; 5943095N
Legal Location: NE 26-53-23	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 348991E; 5942531N End UTM: 348918E; 5942289N
Legal Location: NE 22-53-22	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 347506E; 5941422N End UTM: 347414E; 5941366N
Legal Location: SE 21-53-23	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 345778E; 5940463N End UTM: 345690E; 5940305N
Legal Location: SW 9-53-23	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 345292E; 5937160N End UTM: 345150E; 5936944N
Legal Location: SW 9-53-23	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 345307E; 5936894N End UTM: 345289E; 5936802N
Legal Location: SW 4-53-23	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 345325E; 5935482N End UTM: 345257E; 5935352N
Legal Location: NW 33-52-23	Open water pond traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 345281E; 5934898N End UTM: 345263E; 5934618N
Legal Location: NW 33-52-23	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 344917E; 5934433N End UTM: 344769E; 5934346N

TABLE 1 Cont'd

Location	Issues	Timing Windows and/or Regulatory Guidelines	Mitigation	Comments
Legal Location: NE 32-52-23	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 344518E; 5934386N End UTM: 344392E; 5934324N
Legal Location: NE 32-52-23	Seasonal emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 344203E; 5934433N End UTM: 344132E; 5934352N
Legal Location: NE 32-52-23	Emergent marsh traversed by pipeline route	COP Notification	<ul style="list-style-type: none"> Refer to Section 7.1 for general mitigation measures. 	<ul style="list-style-type: none"> Current Site (UTM Zone 12U NAD 83) Start UTM: 344036E; 5934708N End UTM: 343889E; 5934635N

Note: - All locations are approximate. See Environmental Alignment Sheets under separate cover for additional details.

7.2 Additional Project-Specific Protection Measures

Introduction

This section of the EPP describes the specific mitigation measures that are unique to the Project, in addition to the resource-specific measures outlined in Table 1.

Objective

The objective of these mitigation measures is to:

- ensure that mitigation measures are relevant to the project area and unique circumstances of the project; and
- ensure that unique Project mitigation measures are easily identifiable and clearly understood by the Company, its representatives, Contractors(s), and subcontractor(s).

Topsoil Salvage and Grading Specific Measures

Activity/Concern	Mitigation Measures
<i>Topsoil Salvage – Pump Stations</i>	1. Implement full lease stripping of topsoil on pump station sites as well as 15 cm of subsoil. Store topsoil and subsoil separately in berms along the most appropriate edges of the pump station site boundaries. Where feasible, attempt to complete soil handling activities during non-frozen soil conditions.
<i>Topsoil Handling Measures</i>	2. Salvage topsoil to a maximum depth of 50 cm. Where shallow topsoil is encountered, overstrip topsoil to 10 cm on cultivated, tame pasture and hay lands and to 15-20 cm on treed land, treed pasture or pasture with a poor sod layer. 3. Salvage the upper 20 cm of material where Devon 1 and Devon 2 soils are encountered on improved agricultural lands (<i>i.e.</i> , treed pasture, cultivated, hay, hay-poor sod, tree farm and tame pasture). 4. No topsoil salvage is required for unimproved Devon 2 soils or on disturbed lands. Salvage the upper 50 cm of unimproved Devon 1 topsoil. 5. Salvage both peat material and topsoil to a maximum depth of 50 cm where peaty soils are encountered (peaty Jarvie, peaty Mapova, peaty Newbrook, peaty Onoway peaty Rochester and peaty Sawdy soil areas). 6. Where full width stripping is not conducted, salvage topsoil over a wide enough area to prevent topsoil loss if unstable trench walls are encountered in sandy textured soil areas (Elk Point, Gabriel, Helliwell, Massawawi, Mundare, Nicot, Peace Hills, Rochester, and Ukalta soil areas as well as their phases). 7. Conduct three-lift soils handling in areas containing Malmo soils with a saline lower subsoil, shallow Ponoka soils with overlying stony till, Rolly View soils with a saline lower subsoil and Uncas soils with a saline lower subsoil. Locations are identified on the Environmental Alignment Sheets. 8. Additional TWS will be acquired in areas where three-lift soils handling is to be conducted on cultivated lands during non-frozen conditions. 9. In areas of three-lift soils handling, full right-of-way stripping will be conducted to the depth indicated on the Environmental Alignment Sheets.
<i>Topsoil Stockpile Erosion Control</i>	10. Broadcast a cover crop (such as a sterile cereal) on the topsoil pile following track packing to establish vegetation the following spring to assist in avoiding soil erosion and to control weeds.

Pipe Activities (Trenching, Stringing, Bending, Coating, Lowering-In) Specific Measures

Activity/Concern	Mitigation Measures
<i>Water Management</i>	1. Dewater the right-of-way as necessary. Water will be pumped onto stable and well vegetated areas in a manner that does not cause erosion or siltation of a watercourse, as per landowner consent.

8.0 PIPELINE CONSTRUCTION

8.1 General Environmental Protection Measures

Introduction

The general environmental protection measures provided below are applicable to all work areas and activities throughout the construction phase. These general measures are followed by detailed protection measures for each new pipeline construction activity.

Objective

The objective of these mitigation measures is to avoid and reduce the potential environmental effects associated with general pipeline construction activities.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Regulatory Contact</i>	1. Document all field regulatory contacts and forward to the Construction Manager and the Environmental Advisor.
<i>Waste Disposal</i>	2. The Contractor will collect all construction debris and other waste materials and dispose of daily at an approved facility and in accordance with the Waste Management Plan (Appendix 1F) and the Spill Contingency Plan (Appendix 1E) unless otherwise authorized by the Environmental Inspector(s).
<i>Contaminated Soils</i>	3. In the event contaminated soils are encountered during construction, implement the TransCanada Waste and Hazardous Materials Management Manual.
<i>Fire Prevention</i>	4. Ensure that personnel are made aware of the proper disposal methods for welding rods, cigarette butts and other hot or burning material. 5. Smoke only in designated areas. 6. Ensure the Contractor has the necessary fire-fighting equipment on hand that is capable of controlling any fire that may occur as a result of their activities. 7. Only burn slash if permission is granted from the regulating authorities and if conditions permit. If burning is delayed, store slash along the right-of-way in approved push-outs. 8. In the event of a fire or high fire hazard conditions, follow the measures outlined in the Fire Suppression Contingency Plan (Appendix 1E).
<i>Use of Workspace</i>	9. Restrict all construction activities to the approved surveyed right-of-way, and approved TWS, existing roads and approved shoo-flies. All construction traffic will adhere to safety and road closure regulations.
<i>Fences</i>	10. Properly brace all fences cut for construction and equip with temporary gates. Temporary gates will be a minimum of three-wire. Keep gates closed, except during passage of vehicles.
<i>Equipment Refuelling and Servicing</i>	11. The Contractor will ensure equipment is well-maintained and free of fluid leaks. 12. Bulk fuel trucks, service vehicles, and pick-up trucks equipped with box-mounted fuel tanks shall carry spill prevention, containment, and clean-up materials that are suitable for the volume of fuels or oils carried. Spill contingency material carried on bulk fuel and service vehicles shall be suitable for use on land and water.

Activity/Concern	Mitigation Measures
<i>Equipment Refuelling and Servicing (cont'd)</i>	<p>13. Do not allow fuel, oil, or hazardous material storage within 100 m of a watercourse or waterbody except where secondary containment is provided.</p> <p>14. Conduct refuelling at least 100 m away from any watercourse or waterbody.</p> <p>15. Employ the following measures to reduce the risk of fuel spills in water. Where equipment refuelling is required within 100 m of a watercourse, ensure that:</p> <ul style="list-style-type: none">• all containers, hoses, nozzles are free of leaks;• all fuel nozzles are equipped with automatic shut-offs; and• always have operators stationed at both ends of the hose during fuelling. <p>16. In the event of a spill, refer to the Spill Contingency Plan (Appendix 1E).</p> <p>17. Do not wash equipment or machinery in watercourses or waterbodies.</p> <p>18. Equipment to be used in or adjacent to a watercourse or waterbody will be clean or otherwise free of external grease, oil or other fluids, mud, soil and vegetation, prior to entering the waterbody.</p>
<i>Air Quality/Emissions</i>	<p>19. Reduce idling of equipment, where possible.</p> <p>20. The Contractor will ensure equipment is well-maintained.</p> <p>21. Where practical, use multi-passenger vehicles for the transport of crews to and from job sites.</p>
<i>Dust Control</i>	<p>22. Where traffic as a result of the Project creates a hazardous or irritating level of dust to nearby residents, dust control on existing access roads will be achieved through the application of calcium chloride (or equivalent) or water. Only water will be used for dust control on the right-of-way.</p>
<i>Noise</i>	<p>23. Ensure that noise abatement equipment on machinery is in good working order. Take reasonable measures to control construction related noise near residential areas.</p>
<i>Public Access</i>	<p>24. Discourage unauthorized public vehicle access along the right-of-way during construction through the use of signs.</p>

8.2 Clearing and Disposal

Introduction

The following measures will be implemented by the Company's Contractor and subcontractor(s) during the clearing phase of pipeline construction.

Objective

The objectives of these mitigation measures are to:

- restrict the Project Footprint to approved workspace;
- limit the disturbance to vegetation (*i.e.*, crops and native vegetation) to the extent practical; and
- reduce surface disturbance to the extent practical.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Clearing</i>	<ol style="list-style-type: none">1. Clear timber, stumps, brush and other vegetation within the marked right-of-way and TWS boundaries. Clearing methods will take into account landowner/leaseholder requirements.2. Remove off right-of-way trees that are a safety hazard during construction activity following notification to the Environmental Inspector(s).3. Fell all trees damaged during clearing and construction immediately. A damaged tree is defined as one that has fractures or bark loss for 50% of its circumference.4. Conduct clearing near watercourses or wetlands as described in Sections 7.0 and 8.4 of this EPP.5. During clearing, fell trees towards the right-of-way, wherever possible. Recover trees that inadvertently fall into adjacent undisturbed vegetation.6. Avoid disturbance to environmentally sensitive features during clearing as identified by the appropriate signage and/or fencing. The Environmental Inspector(s) and appropriate Resource Specialist will determine the size of avoidance buffer surrounding these features, if appropriate.7. Where practical, leave stumps in place, particularly on streambanks, to provide surface stability. Dispose of stumps removed from the required work areas by burning or chipping.
<i>Known Archaeological Sites</i>	<ol style="list-style-type: none">8. Do not permit clearing in proximity to known archaeological sites unless otherwise approved by the appropriate regulatory agency (Alberta Culture [AC]).
<i>Rollback</i>	<ol style="list-style-type: none">9. Where segments of the right-of-way require erosion control, ensure sufficient timber of appropriate size is available.10. In consultation with the landowner(s) or appropriate regulatory agency, determine potential rollback locations, and material to be used.11. Place rollback in a manner that does not create or enhance a fire hazard along the right-of-way.
<i>Merchantable/ Salvageable Timber</i>	<ol style="list-style-type: none">12. Salvage and deck timber as denoted in the Timber Salvage Plan, or in accordance with landowner requests.13. Do not bulldoze salvageable timber.

Activity/Concern	Mitigation Measures
<i>Merchantable/ Salvageable Timber (cont'd)</i>	14. Suspend timber skidding operations or implement alternative measures, if the potential exists for merchantable timber to be damaged through contact with wet or muddy soils.
<i>Nonmerchantable Timber</i>	15. To assist in maintaining an intact ground surface in areas where grading is not necessary, implement minimum surface disturbance (MSD) techniques such as, brushcutters, brushhogs or other equipment.
<i>Grubbing</i>	16. Grub tree roots, where required, with a hoe and thumb or alternate equipment to preserve surface organic material.
	17. Reduce grubbing near watercourses, muskeg, and other wet areas to facilitate the restoration of shrub communities.
<i>Disposal</i>	18. Timber and brush disposal options are subject to agreements with landowners, occupants and the appropriate regulatory agency where public lands are intersected.
	19. Dispose of all timber material not salvaged for merchantability through burning or mechanical chipping, unless otherwise directed by the Environmental Inspector(s)/Construction Manager.
	20. Obtain applicable permits prior to burning. Follow guidance in the applicable regulations (Alberta Regulation 310/72).
	21. Do not undertake burning within 100 m of a waterbody, unless otherwise authorized by the Environmental Inspector(s).
	22. Implement techniques to limit smoke production including limiting pile size, minimizing moisture content and maintaining loose burning piles with minimal soil.
	23. If timber and brush are disposed of by mechanical means (<i>i.e.</i> , mulching), the maximum depth of mulch is 5 cm or in accordance with the applicable provincial regulation, whichever depth is less. Obtain landowner authorization prior to initiating activity.

8.3 Topsoil Salvage and Grading

Introduction

Topsoil will be salvaged as indicated on the Environmental Alignment Sheets. Topsoil salvage depths and handling procedures have been determined through existing land use and/or through field soil surveys to ensure that appropriate material handling procedures are implemented.

Objective

The objectives of these mitigation measures are to:

- avoid or minimize impacts of pipeline construction on all lands;
- ensure the land's equivalent productivity is maintained;
- reduce effects to soil capability, surface drainage patterns, land use, and wildlife habitat;
- comply with regulatory direction, as well as landowner commitments; and
- employ environmentally and economically responsible construction practices at all times and in accordance with applicable industry standards.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Land Preparation - Non-Frozen Conditions</i>	<ol style="list-style-type: none"> 1. Arrange for landowners to harvest crops, if practical. Mow, cut or bale any remaining crops and remove from the right-of-way to facilitate topsoil handling. 2. Disc the right-of-way prior to topsoil stripping, unless otherwise approved by the Environmental Inspector(s).
<i>General Topsoil Salvage Requirements</i>	<ol style="list-style-type: none"> 3. Conduct topsoil salvage on all arable or potentially arable lands to promote successful reclamation and ensure this resource is returned to an equivalent land capability. 4. Salvage topsoil as indicated on the Environmental Alignment Sheets and in accordance with the typical drawings (Appendix 1D,) referenced on the alignment sheets. 5. Depending on site specific conditions, topsoil salvage techniques may include full width, three-lift, or blade width (Appendix 1D, Dwgs. 1A, 1B, and 2,). The topsoil salvage technique to be used will be determined by the Environmental Inspector(s), Construction Manager, and the appropriate resource specialists where required. 6. Salvage a greater width of topsoil at sharp sidebends and at crossings of watercourses, roads and foreign lines to accommodate a wider and deeper trench. 7. Topsoil handling procedures may be modified based on the need to meet the objective of protecting the soil resources, as directed by the Environmental Inspector(s). Soil storage areas will be approved by the Environmental Inspector(s). 8. Ensure soil storage areas are in approved right-of-way and TWS. 9. If wet soil conditions occur, implement the Wet Soil Contingency Plan (Appendix 1E). 10. Implement the Soil Handling Contingency Plan (Appendix 1E) if any of the following are encountered; uneven boundary between topsoil and subsoil, uneven surface on pasture; or request for alternate soil handling methods by a landowner.

Activity/Concern	Mitigation Measures
<i>General Topsoil Salvage Requirements (cont'd)</i>	<p>11. Use geotechnical matting, rig mats, swamp mats or access mats for access through wet areas.</p> <p>12. A soils specialist will be available as needed to work with the Environmental Inspector(s), inspection team and Contractor to address soils resource issues as they may arise during topsoil stripping operations, as well as during adverse weather conditions to ensure the soils resources are protected and equivalent land productivity is maintained.</p> <p>13. Typical drawings for soil handling (non-frozen and frozen) are provided in Appendix 1D of this EPP.</p>
<i>Topsoil Handling – Frozen Conditions</i>	<p>14. Consult with the Environmental Inspector to ensure that topsoil stripping activities leading up to the onset of frozen conditions do not allow for topsoil/subsoil admixing to occur.</p> <p>15. In the event that topsoil is stripped during frozen conditions, the Environmental Inspector(s) in consultation with the Construction Manager and soils specialist, if warranted, will ensure that proper equipment (<i>i.e.</i>, frozen topsoil cutter, grinder or equivalent) is used to minimize mixing of topsoil and subsoil layers, and the equivalent land productivity is maintained.</p> <p>16. Salvage snow and topsoil separately.</p>
<i>Adverse Weather</i>	<p>17. In the event of adverse weather that could result in rutting and/or compaction, the Environmental Inspector(s), in consultation with the Construction Manager, may implement contingency measures as outlined in the Adverse Weather Contingency Plan (Appendix 1E). A soils specialist and/or regulatory personnel may be consulted, if warranted.</p> <p>18. Following an adverse weather event, the Contractor will confirm the efficacy of sediment and erosion control measures and whether corrective action is required. The Environmental Inspector(s), in consultation with the Construction Manager will implement contingency measures as outlined in the Adverse Weather Contingency Plan (Appendix 1E).</p>
<i>Topsoil Stockpile Erosion Control</i>	<p>19. Following the salvage of the topsoil, if warranted, stabilize topsoil windrows and stockpiles using either water or a suitable tackifier as directed by the Environmental Inspector(s). Refer to the Soil Erosion Contingency Plan (Appendix 1E).</p> <p>20. Should high winds or heavy rains damage the tackifier during construction, the Environmental Inspector(s), in consultation with the Construction Manager, may implement contingency measures as outlined in the Adverse Weather Contingency Plan (Appendix 1E).</p> <p>21. Should construction traffic or other related construction activities disturb the topsoil piles and there is a potential for wind erosion, apply additional water and/or tackifier.</p> <p>22. Leave gaps in topsoil windrow at obvious drainage courses and wherever seepage occurs to accommodate surface runoff.</p>
<i>Grading</i>	<p>23. Undertake all grading with the understanding that original contours and drainage patterns will be re-established during clean-up unless otherwise authorized by the Environmental Inspector(s) or designate.</p> <p>24. Ensure grade material does not spread off right-of-way.</p>
<i>Known Archaeological Sites</i>	<p>25. Do not permit grading in proximity to known archaeological sites unless otherwise approved by AC.</p>

8.4 Watercourse Crossings

Introduction

At watercourse crossings, the method of vehicular crossing and pipeline crossing has taken into consideration engineering and constructability requirements, fisheries values and protection of riparian habitats. The mitigation measures outlined in this section apply to all watercourses. Details on specific watercourse crossing information are provided in Table 2.

Objective

The objectives of these mitigation measures are to:

- avoid or reduce adverse impacts;
- comply with the fisheries protection provisions of the *Fisheries Act* and its supporting Fisheries Protection Policy by applying DFO's *Measures to Avoid Causing Harm to Fish and Fish Habitat*.
- comply with all provincial regulatory requirements;
- comply with all regulatory, permit and approval conditions;
- employ environmentally and economically responsible construction practices at all times, and in accordance with applicable industry standards;
- maintain habitat quality at crossing locations;
- protect riparian areas in proximity to watercourse crossings; and
- maintain the ecosystem function of riparian areas.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Permits and Approvals</i>	1. The Company will obtain and follow all applicable federal and provincial permits or authorizations prior to the commencement on construction and in-stream activities.
<i>Notification</i>	2. The Company will notify an inspector, fisheries officer or prescribed authority of any occurrence that results in serious harm to fish that is not authorized, or when there is an imminent risk of such an occurrence. 3. Ensure all notifications are completed in accordance with the <i>Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body</i> . 4. If directed by the regulatory agency responsible for navigation, install warning signs along the banks both upstream and downstream of the crossing to caution users of a navigational hazard, where appropriate.
<i>Signage</i>	5. Post signs immediately following clearing (including name, number and KP) for watercourses. Signs will be posted 100 m from the watercourse or at the top of the valley slope, whichever is greater, to alert the Contractor of the upcoming watercourse.
<i>Restricted Activity Periods</i>	6. Refer to Table 2 for the restricted activity periods (RAPs) associated with the watercourse crossings traversed by the Project.

Activity/Concern	Mitigation Measures
<i>Restricted Activity Periods (cont'd)</i>	<p>7. No construction activity will occur within the RAP for any watercourse crossing unless:</p> <ul style="list-style-type: none"> • it is dry or frozen to the bottom at the time of construction; • if trenchless techniques are employed; or • approval from the appropriate regulatory agency is obtained.
<i>Riparian Buffers</i>	<p>8. Prohibit clearing of extra TWS within 10 m of a watercourse to protect riparian areas. This area shall be clearly marked prior to clearing operations. The right-of-way will be narrowed through the riparian area, if possible.</p> <p>9. Limit clearing at watercourse crossings to the removal of trees and shrubs to the ditch line and work side areas required for vehicle crossings.</p> <p>10. Fell trees away from watercourses. Immediately remove trees, debris or soil inadvertently deposited below the high watermark of a watercourse.</p> <p>11. If the working surface is unstable, do not permit clearing equipment within the 10 m riparian buffer, unless approved by the Environmental Inspector(s). Following clearing, the 10 m riparian buffer will remain intact (<i>i.e.</i>, consisting of low-lying understory vegetation).</p>
<i>Grading</i>	<p>12. Delay grading of the primary banks of watercourses until immediately before construction of the crossing. If required, appropriate temporary erosion and sediment control structures shall be installed at the discretion of the Environmental Inspector(s), upon initial disturbance of the vegetative mat and topsoil or upper surface material</p> <p>13. Direct grading away from waterbodies. Do not place fill material in a waterbody during grading.</p> <p>14. Ensure that grubbing, stripping and grading on approach slopes to watercourses is restricted to an amount required to allow the safe passage of equipment, excavation of the trench, and installation of the pipeline.</p> <p>15. Do not allow grading within the 10 m riparian buffer immediately adjacent to the water crossing until installation of the vehicle crossing.</p>
<i>Erosion Control</i>	<p>16. Install erosion and sediment control at all watercourses and/or waterbodies as directed by the Environmental Inspector(s) (Appendix 1D, Dwgs. STDS-03-ML-05-001, STDS-03-ML-05-131, STDS-03-ML-05-132)</p> <p>17. Where water erosion is evident, and there is potential for runoff from the right-of-way to flow into a watercourse, refer to the Soil Erosion Contingency Plan (Appendix 1E).</p>
<i>Vehicle Crossings - General</i>	<p>18. Do not permit fording of watercourses.</p> <p>19. Construct or install temporary vehicle access across waterbodies, shorelines, and riverbanks in a manner that protects the banks from erosion and maintains the flows in the waterway and follows the COP as well as DFO's self-assessment process including DFO's <i>Measures to Avoid Causing Harm to Fish and Fish Habitat</i> (DFO 2013).</p> <p>20. Construct/install all watercourse vehicle crossings as outlined in Table 2 and in accordance with the typical drawings (Appendix 1D, Dwgs. STDS-03-ML-05-101, STDS-03-ML-05-102 and STDS-03-ML-05-104).</p> <p>21. Construct all bridges (single-span or ice and snow fill) beyond the ends of the banks and with a minimum depth of 0.5 m of snowfill or fill material at each bank. Do not place fill within primary banks for bridge abutment construction, unless approved by the appropriate regulatory agency.</p>

Activity/Concern	Mitigation Measures
<i>Vehicle Crossings – General (cont'd)</i>	<p>22. If hauling in of fill material is required during the construction of bridge abutments with wings, place geotextile fabric between the fill material and the surface layer.</p> <p>23. Line single-span bridges with impervious geotextile. All watercourse crossing structures must have a minimum of 30 cm high side boards. Side containment for single span bridges must be constructed of plywood. Snow bridges can use watered snow.</p> <p>24. Install and remove any temporary vehicle crossings in a manner that protects the banks from erosion and maintain the flows in the waterway. These crossings will be returned to their preconstruction condition.</p> <p>25. Consider alternate methods of vehicle crossings on a site-specific basis. The decision making process will include the Contractor, Construction Manager and the Environmental Inspector(s). Decision criteria will include protection of the riparian vegetation and fisheries values associated with the crossing, and applicable legislation.</p>
<i>Vehicle Crossings – Frozen Conditions</i>	<p>26. During winter construction, where conditions permit, employ ice and snowfill bridges as temporary crossing structures. Install ice and snowfill bridges using water drawn from an approved source and/or clean snow plowed in from surrounding areas or made.</p> <p>27. If water withdrawal is necessary for the construction of a temporary crossing, ensure that necessary provincial approvals are in place and follow DFO's <i>Measures to Avoid Serious Harm to Fish and Fish Habitat</i> and best practices formerly described in the Temporary Stream Crossing OS, if applicable. Do not withdraw more than 10% of the instantaneous stream flow at any given time. Pump intakes should not disturb the streambed. Pumps must be screened with a maximum mesh size of 2.54 mm and should have a maximum screen approach velocity of less than 0.038 m/s where fish habitat is present. Follow design requirements of DFO <i>Freshwater Intake End-of-Pipe Fish Screen Guidelines</i>.</p> <p>28. Use only clean ice/snow for construction of an ice/snowfill or ice bridge. Approaches to the bridge should be constructed with compacted snow and ice of sufficient thickness to protect the stream channel and banks. Sand, gravel and soils are not to be used for ice bridge approaches.</p> <p>29. Ensure that ice bridges or snowfills do not interfere with or impede winter flows.</p> <p>30. If conditions will not support the construction of ice/snowfill bridges, then employ other temporary crossing structures approved by regulatory agencies.</p>
<i>Beaver Dams and Lodges</i>	<p>31. In the event that beaver dams or lodges will be disturbed, provide notification or obtain the necessary provincial or federal permits prior to commencing activities. Engage the registered trapper(s).</p> <p>32. Breach the beaver dam slowly to avoid the rapid release of water that could cause fish entrapments and/or erosion of the bed and banks resulting in subsequent siltation of downstream waters.</p>
<i>Watercourse Crossing Plans</i>	<p>33. The Contractor shall develop a detailed site specific watercourse crossing plan and submit the plan to the Company prior to initiating watercourse crossing activities.</p>
<i>Pipeline Installation</i>	<p>34. Before the installation of the water crossing and the commencement of instream activity, the Contractor will ensure that all necessary equipment and materials are available and are onsite.</p>

Activity/Concern	Mitigation Measures
<i>Pipeline Installation (cont'd)</i>	<p>35. Construct/install all pipeline crossings as outlined in Table 2 and in accordance with the typical drawings (Appendix 1D).</p> <p>36. Develop water quality monitoring plans to monitor for sediment events during instream construction activities where required by the applicable regulatory approvals (<i>i.e.</i>, the DFO Letter of Advice). If monitoring reveals sediment values are approaching threshold values, the water quality monitors will alert the Environmental Inspector(s) and work with them to develop corrective actions. If corrective actions are not successful, construction activities will be temporarily suspended until effective solutions are identified.</p> <p>37. The Contractor shall weld, coat, and weight the water crossing portion of pipe prior to starting instream ditching activities. To reduce the length of time of instream activity, the Contractor shall make every effort to ditch, lower-in, and backfill water crossings during the same working day.</p> <p>38. When implementing a trenched (<i>i.e.</i>, open cut or isolated) pipeline installation method, and where practical, salvage the upper 0.5 m (minimum) of granular material if present. Stockpile separately from the remainder of the trench spoil so that the salvaged, native granular material can be used to cap the upper portion of the trench.</p> <p>39. If spoil is likely to be highly saturated, excavate a pit or construct berms of packed earth to prevent spoil from flowing back into the watercourse. Locate containment berms and spoil outside of the 10 m riparian area (Dwg. STDS 03-ML-05-131).</p> <p>40. Ensure no vehicles or equipment, which contain petroleum, oil, or lubricants are parked or stationed in a watercourse at any time except for equipment that is required for that immediate phase of construction.</p>
<i>Typical Open Cut Crossings</i>	<p>41. Conduct typical open cut of seasonally dry or frozen to the bottom watercourses in accordance with the <i>DFO's Measures to Avoid Serious Harm to Fish and Fish Habitat</i> and best practices as described in the former Isolated or Dry Open-cut Stream Crossing OS.. This is also described in Appendix 1D, Dwg. STDS-03-ML-03-101.</p> <p>42. Store excavation material outside the watercourse during the open cut.</p>
<i>Isolated Open Cut Crossings</i>	<p>43. Refer to Table 2 for locations where an isolated crossing method is proposed. Refer to Appendix 1D, Dwgs. STDS-03-ML-05-111 and STDS-03-ML-05-112.</p> <p>44. Conduct isolated crossings of watercourses in accordance with the <i>DFO's Measures to Avoid Serious Harm to Fish and Fish Habitat</i> and best practices as described in the former Isolated or Dry Open-cut Stream Crossings OS.</p> <p>45. Do not use earthen berms to isolate the crossing construction area.</p> <p>46. Ensure maintenance of downstream flow at all times when constructing an isolated crossing.</p> <p>47. Ensure water from flumes, dam and pumps, diversion or other methods do not cause erosion or introduce sediment into the channel.</p> <p>48. Dewater the trench onto stable surfaces in a manner that does not cause erosion of soils, or sedimentation of the watercourse.</p> <p>49. Ensure pumps, generators and light towers used within 100 m of a watercourse crossing have secondary containment that can hold a capacity of 125% of the fuel tank.</p>

Activity/Concern	Mitigation Measures
<i>Isolated Open Cut Crossings (cont'd)</i>	50. Ensure water and pump intakes reduce or avoid disturbance of the streambed and are screened with a maximum mesh size of 2.54 mm and approach velocity of 0.038 m/s. To accomplish this, where pumps larger than 15 cm diameter are used, place the intakes in a mesh cage (2.54 mm) to reduce the approach velocity that fish are exposed to and prevent them from being impinged on the intakes. Maintain the screens free of debris. If a deeper sump is required for success of the isolated crossing refer to Environmental Inspector(s).
<i>Fish Salvage</i>	51. A Fish Research License (FRL) from ESRD is required for fish salvage activities and must be applied for at least 10 working days prior to isolation of the watercourse. 52. The Contractor shall notify the Company 72 hours before construction of any watercourse crossing or diversions to ensure fish salvage operations are conducted, where required. 53. If an isolated method is employed and where recommended by an aquatics specialist (i.e., Qualified Aquatic Environmental Specialist or provincial equivalent), conduct a fish salvage led by an aquatics specialist. 54. Conduct fish salvage, in accordance with permit conditions, using appropriate methods and equipment. Release all captured fish to areas downstream of the crossing that provide suitable habitat.
<i>Trenchless Crossings</i>	55. For pipeline crossings conducted using a trenchless crossing method, apply DFO's <i>Measures to Avoid Serious Harm to Fish and Fish Habitat</i> and best practices as described in the former High Pressure Directional Drilling and Punch and Bore Stream Crossings OSs. 56. Excavate entry and exit sites back from the ordinary high watermark and far enough from the watercourse to provide for containment of sediments and other deleterious substances above the high watermark. Vegetation removal for the entry and exit sites is only to occur within the approved construction right-of-way and TWS. 57. Ensure that water from dewatering entry and exit sites with a high sediment load is not discharged or allowed to flow into any waterbody. Remove the sediment load (e.g., filter or discharge into a vegetated area) before discharge water is allowed to enter any watercourse. 58. Where warranted, develop a water quality monitoring plan with input from an aquatics specialist that includes monitoring for TSS and/or turbidity if trenchless methods are used. 59. Develop an emergency response plan that will be implemented in the event of sediment releases or spills of deleterious substances during the construction of the trenchless crossings. 60. In the event of sediment releases or spills of deleterious substances during the construction of the trenchless crossings implement the Directional Drilling Procedures and Instream Drilling Mud Release Contingency Plan (Appendix 1E). 61. Dispose of all waste drilling fluid and drilling solids according to and conformance with pertinent regulatory requirements.
<i>Contingency Plans</i>	62. Postpone watercourse crossing construction if excessive flows or flood conditions exist or are anticipated, and construction methods cannot be modified to cope with the increased flow, follow the Flood and Excessive Flow Contingency Plan (Appendix 1E).

Activity/Concern	Mitigation Measures
<i>Backfill Trench</i>	63. Place only native material removed from the trench or imported clean coarse material (gravel or rock) as the final 0.5 m of backfill. Any imported material must be obtained from a Company approved off-site facility.
<i>Reclamation</i>	<p>64. Return the bed and banks of each watercourse as close as possible to their original preconstruction contours. Do not realign or straighten watercourses or change their hydraulic characteristics.</p> <p>65. Implement permanent bank reclamation measures to re-establish riparian vegetation and fish habitat as a part of backfill operations (Refer to Appendix 1D, Dwgs. STDS-03-ML-05-603, STDS-03-ML-05-604, STDS-03-ML-05-606 and STDS-03-ML-05-608).</p> <p>66. Seed disturbed banks and riparian areas with an approved native seed mixture. The Environmental Inspector(s) will determine onsite whether other restoration methods need to be applied to stabilize banks (e.g., soil wraps, brush layers and matting).</p>

TABLE 2

SUMMARY OF PROPOSED WATERCOURSE AND FISH-BEARING DRAINAGES CROSSINGS IN THE WHITE AREA OF THE PROJECT

Site No.	Name	Legal Location (W4M), UTM Coordinates (NAD 83, Zone 12) Latitude/Longitude (DD-MM-SS)	Watercourse Class and RAP	Open Water Mean Channel Morphology (m)	Fish Species Captured or Observed During Open Water Assessment (Previously Documented) ²	Beaver Activity Present	Winter 2013 Results	Recommended Pipeline Crossing Method ³	Recommended Contingency Pipeline Crossing Method	Recommended Vehicle/ Equipment Crossing Method (Frozen)	Recommended Vehicle/ Equipment Crossing Method (Open Water)	Planned Pipeline Crossing Method	DFO Regulatory Requirement for Planned Crossing Methods	QAES Recommendations for Planned Pipeline Method	Comments
CONSTRUCTION SPREAD 4 (WINTER) NOVEMBER 2014 TO APRIL 2015 (20 INCH) AND NOVEMBER 2015 TO APRIL 2016 (36 INCH)															
WC27	Unnamed tributary to the Wandering River	SE 30-71-16 408066E, 6115123N 55° 10' 26.9" N/112° 26' 36.5" W	Mapped Class C April 16 to July 15	Bankfull Width: 8.7 Wetted Width: 6.6 Water Depth: 0.4	Fathead minnow, lake chub, pearl dace, trout-perch, longnose sucker, white sucker, brook stickleback (northern pike previously documented at crossing. Walleye, burbot, northern pike, finescale dace, pearl dace, lake chub, fathead minnow, longnose sucker, white sucker, brook stickleback and trout-perch previously documented in the Wandering River).	Yes – influencing water levels	Ice Depth: 0.1 Water Depth: 0.6 DO: 12.0 mg/L Velocity: 0.2-0.5 m/s	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.Recommend water quality monitoring as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 1 km upstream from the Wandering River.
FD7	Fish-bearing drainage	NW 23-70-17 405178E, 6104407N 55° 4' 38.5" N/ 112° 29' 6.9" W	n/a	Bankfull Width: n/a Wetted Width: 14.3 Water Depth: 0.5	Brook stickleback (brook stickleback, fathead minnow previously documented at the proposed crossing. Burbot, yellow perch, goldeye, northern pike, lake chub, flathead chub, spottail shiner, white sucker, longnose sucker and trout-perch previously documented in the La Biche River).	Yes – influencing water levels	Ice Depth: 0.4 Water Depth: 0.6 DO: 3.5 mg/L Flow: <0.1 m³/s	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Access from both sides	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 3 km upstream from the La Biche River.
WC28	La Biche River	SW 35-68-17 404565E, 6087930N 54° 55' 45.2" N/112° 29' 21.6" W	Mapped Class C April 16 to July 15	Bankfull Width: 31.2 Wetted Width: 27.1 Water Depth: 1.1	Yellow perch, white sucker (Burbot, yellow perch, goldeye, northern pike, lake chub, flathead chub, spottail shiner, white sucker, longnose sucker and trout-perch previously documented in the La Biche River).	No	Ice Depth: 0.4 Water Depth: 0.4 DO: n/r Flow: 1.7 m³/s	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Trenchless	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend water quality monitoring as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 50 km upstream from the Athabasca River.
CONSTRUCTION SPREAD 5 (SUMMER) JUNE TO NOVEMBER 2015 (20 INCH) AND JUNE TO NOVEMBER 2016 (36 INCH)															
WC29	Unnamed tributary to Pine Creek	SE 31-66-18 390159E, 6068580N 54° 45' 8.8" N/112° 42' 24.1" W	Unmapped Class C None	Bankfull Width: 2.0 Wetted Width: 1.9 Water Depth: 0.1	No fish captured or observed (lake chub, fathead minnow, brook stickleback previously documented in Pine Creek).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 10 km upstream from Pine Creek.
WC30	Unnamed tributary to Flat Lake	SW 34-65-19 384330E, 6058936N 54° 39' 52.2" N/112° 47' 36.2" W	Unmapped Class C April 16 to July 15	Bankfull Width: 2.6 Wetted Width: 5.7 Water Depth: 0.5	No fish captured or observed (brook stickleback previously documented in Flat Creek and Flat Lake).	Yes – influencing water levels	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 5 km upstream from Flat Lake.
WC31	Unnamed tributary to Flat Lake	NE 8-65-19 381738E, 6052952N 56° 36' 36.5" N/112° 49' 52.1" W	Mapped Class C April 16 to July 15	Bankfull Width: 10.1 Wetted Width: 18.8 Water Depth: 0.9	Brook stickleback (northern pike and brook stickleback previously documented in unnamed tributary to Flat Lake).	Yes – influencing water levels	Ice Depth: 0.3 Water Depth: 0.6 DO: <1.0 mg/L Flow: <0.1 m³/s	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.Recommend water quality monitoring as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 5 km upstream from Flat Lake.

TABLE 2 Cont'd

Site No.	Name	Legal Location (W4M), UTM Coordinates (NAD 83, Zone 12) Latitude/Longitude (DD-MM-SS)	Watercourse Class and RAP	Open Water Mean Channel Morphology (m)	Fish Species Captured or Observed During Open Water Assessment (Previously Documented) ²	Beaver Activity Present	Winter 2013 Results	Recommended Pipeline Crossing Method ³	Recommended Contingency Pipeline Crossing Method	Recommended Vehicle/ Equipment Crossing Method (Frozen)	Recommended Vehicle/ Equipment Crossing Method (Open Water)	Planned Pipeline Crossing Method	DFO Regulatory Requirement for Planned Crossing Methods	QAES Recommendations for Planned Pipeline Method	Comments
WC32	Unnamed tributary to Flat Creek	SW 30-64-19 379202E, 6047757N 54° 33' 46.4" N/112° 52' 5.7" W	Unmapped Class C April 16 to July 15	Bankfull Width: 0.8 Wetted Width: 2.1 Water Depth: 0.1	No fish captured or observed (brook stickleback previously documented in Flat Creek and Flat Lake).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 1.5 km upstream from Flat Creek.
WC33	Unnamed tributary to Flat Creek	SW 19-64-19 379149E, 6046184N 54° 32' 55.5" N/112° 52' 6.3" W	Unmapped Class C April 16 to July 15	Bankfull Width: 1.4 Wetted Width: 1.2 Water Depth: 0.1	No fish captured or observed (brook stickleback previously documented in Flat Creek and Flat Lake).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 1.4 km upstream from Flat Creek.
WC34	Unnamed tributary to Flat Creek	NW 7-64-19 378517E, 6043658N 54° 31' 33.8" N/112° 52' 2.6" W	Unmapped Class C April 16 to July 15	Bankfull Width: 1.8 Wetted Width: 1.5 Water Depth: 0.1	No fish captured or observed (brook stickleback previously documented in Flat Creek and Flat Lake).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 3 km upstream from Flat Creek.
WC35	Flat Creek	NW 25-63-20 376802E, 6038383N 54° 28' 41.2" N/112° 54' 5.2" W	Mapped Class C April 16 to July 15	Bankfull Width: 2.8 Wetted Width: 12.6 Water Depth: 0.8	Brook stickleback (Brook stickleback previously documented in Flat Creek. Lake chub, fathead minnow, brook stickleback previously documented in Pine Creek).	Yes – influencing water levels	Ice Depth: 0.3 Water Depth: 0.5 DO: 2.9 mg/L Flow: <0.1 m³/s	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 35 km upstream from Pine Creek.
CONSTRUCTION SPREAD 6 (SUMMER) JUNE TO NOVEMBER 2015 (20 INCH) AND JUNE TO NOVEMBER 2016 (36 INCH)															
WC36	Namepi Creek	SE 32-58-20 373368E, 5991088N 54° 3' 8.8" N/112° 56' 3.8" W	Mapped Class C April 16 to June 30	Bankfull Width: 12.5 Wetted Width: 16.0 Water Depth: 0.9	Fathead minnow, brook stickleback, unknown dace species (Brassy minnow, lake chub, river shiner, fathead minnow and brook stickleback previously documented in Namepi Creek. Rainbow trout previously documented near the confluence with the North Saskatchewan River).	Yes – influencing water levels	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.Recommend water quality monitoring as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 9 km upstream from the North Saskatchewan River.
WC37	Unnamed tributary to the North Saskatchewan River	SW 2-58-20 377427E, 5983162N 53° 58' 56.0" N/112° 52' 9.2" W	Unmapped Class C April 16 to July 31	Bankfull Width: 1.4 Wetted Width: 3.8 Water Depth: 0.2	No fish captured or observed. (Mooneye, walleye, shorthead redhorse, longnose sucker, white sucker, longnose dace, river shiner, trout-perch (lake sturgeon, mountain whitefish, rainbow trout, lake trout, burbot, northern pike, sauger, yellow perch, goldeye, emerald shiner, fathead minnow, finescale dace, flathead chub, goldfish, Iowa darter, lake chub, mountain sucker, northern redbelly dace, pearl dace, quillback, silver redhorse, slimy sculpin, spoonhead sculpin, spottail shiner and brook stickleback, previously documented in the North Saskatchewan River).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self-assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 3 km upstream from the North Saskatchewan River.

TABLE 2 Cont'd

Site No.	Name	Legal Location (W4M), UTM Coordinates (NAD 83, Zone 12) Latitude/Longitude (DD-MM-SS)	Watercourse Class and RAP	Open Water Mean Channel Morphology (m)	Fish Species Captured or Observed During Open Water Assessment (Previously Documented) ²	Beaver Activity Present	Winter 2013 Results	Recommended Pipeline Crossing Method ³	Recommended Contingency Pipeline Crossing Method	Recommended Vehicle/ Equipment Crossing Method (Frozen)	Recommended Vehicle/ Equipment Crossing Method (Open Water)	Planned Pipeline Crossing Method	DFO Regulatory Requirement for Planned Crossing Methods	QAES Recommendations for Planned Pipeline Method	Comments
CONSTRUCTION SPREAD 7 (SUMMER) JUNE TO NOVEMBER 2015 (20 INCH) AND JUNE TO NOVEMBER 2016 (36 INCH)															
WC38	North Saskatchew an River	NW 36-57-20 378902E, 5982201N 53° 58' 26.2" N/112° 50' 46.9" W	Mapped Class C April 16 to July 31	Bankfull Width: 276.5 Wetted Width: 272.4 Water Depth: 1.4	Mooneye, walleye, shorthead redhorse, longnose sucker, white sucker, longnose dace, river shiner, trout-perch (lake sturgeon, mountain whitefish, rainbow trout, lake trout, burbot, northern pike, sauger, yellow perch, goldeye, emerald shiner, fathead minnow, finescale dace, flathead chub, goldfish, Iowa darter, lake chub, mountain sucker, northern redbelly dace, pearl dace, quillback, silver redhorse, slimy sculpin, spoonhead sculpin, spottail shiner and brook stickleback, previously documented in the North Saskatchewan River).	Yes but not influencing water levels	No winter data collected	Trenchless	Trenchless (redrill)	Access from both sides	Access from both sides	Trenchless	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">• Implement mitigation measures as per Section 8.4 of the EPP.• Recommend water quality monitoring as per mitigation measures in Section 8.4 of the EPP.• Contingency is to redrill.• Any instream work would require additional site-specific mitigation and should be further discussed with a QAES, DFO and AERSD.	
WC39	Beaverhill Creek	SE 16-56-20 374185E, 5966679N 53° 50' 0.2" N/ 112° 54' 42.7" W	Mapped Class C April 16 to July 31	Bankfull Width: 8.7 Wetted Width: 7.4 Water Depth: 0.8	No fish captured or observed (white sucker, fathead minnow and brook stickleback previously documented in Beaverhill Creek).	Yes – influencing water levels	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">• Implement mitigation measures as per Section 8.4 of the EPP.• Recommend a fish salvage as per mitigation measures in Section 8.4 of the EPP be conducted if water present at the time of construction.• Recommend water quality monitoring as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 10 km upstream from the North Saskatchewan River.
WC40	Unnamed tributary to Beaverhill Creek	SW 8-56-20 372095E, 5965141N 53° 49' 8.6" N/ 112° 56' 34.7" W	Unmapped Class C April 16 to July 31	Bankfull Width: 5.8 Wetted Width: 5.8 Water Depth: 0.3	Brook stickleback (white sucker, fathead minnow and brook stickleback previously documented in Beaverhill Creek).	No	Ice Depth:0.3 Water Depth: FTB DO: FTB Flow: FTB	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">• Implement mitigation measures as per Section 8.4 of the EPP.• Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 3.5 km upstream from Beaverhill Creek.
CONSTRUCTION SPREAD 8 (WINTER/SUMMER) APRIL 2015 to APRIL 2016 (20 INCH) AND OCTOBER 2014 TO JANUARY 2016 (36 INCH)															
WC41	Astotin Creek	SW 22-55-21 364977E, 5958812N 53° 45' 37.4" N/113° 2' 53.7" W	Mapped Class C April 16 to June 30	Bankfull Width: 3.3 Wetted Width: 2.6 Water Depth: 0.3	Brook stickleback (white sucker, fathead minnow and brook stickleback previously documented in Astotin Creek).	No	Ice Depth: 0.1 Water Depth: FTB DO: FTB Flow: FTB	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">• Implement mitigation measures as per Section 8.4 of the EPP.• Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 25 km upstream from Beaverhill Creek.
WC42	Ross Creek	SE 28-54-22 355910E, 5950988N 53° 41' 15.7" N/113° 10' 55.4" W	Mapped Class C April 16 to June 30	Bankfull Width: 3.8 Wetted Width: 3.8 Water Depth: 0.6	Fathead minnow, brook stickleback (white sucker, fathead minnow and brook stickleback previously documented in Ross Creek).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">• Implement mitigation measures as per Section 8.4 of the EPP.• Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 7 km upstream of the North Saskatchewan River.
WC43	Pointe-Aux-P ins Creek	SW 31-53-22 352119E, 5943492N 53° 37' 9.6" N/ 113° 14' 8.8" W	Mapped Class C April 16 to June 30	Bankfull Width: 4.2 Wetted Width: 5.7 Water Depth: 0.6	Fathead minnow, brook stickleback (longnose sucker, white sucker, fathead minnow and brook stickleback previously documented approximately in Point-aux-pins Creek. Northern pike previously documented approximately in Point-aux-pins Creek near its confluence with the North Saskatchewan River).	Yes – influencing water levels	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom (concurrent pipeline construction)	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">• Avoid construction on meander bend.• Implement mitigation measures as per Section 8.4 of the EPP.• Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 11 km upstream from the North Saskatchewan River.

TABLE 2 Cont'd

Site No.	Name	Legal Location (W4M), UTM Coordinates (NAD 83, Zone 12) Latitude/Longitude (DD-MM-SS)	Watercourse Class and RAP	Open Water Mean Channel Morphology (m)	Fish Species Captured or Observed During Open Water Assessment (Previously Documented) ²	Beaver Activity Present	Winter 2013 Results	Recommended Pipeline Crossing Method ³	Recommended Contingency Pipeline Crossing Method	Recommended Vehicle/ Equipment Crossing Method (Frozen)	Recommended Vehicle/ Equipment Crossing Method (Open Water)	Planned Pipeline Crossing Method	DFO Regulatory Requirement for Planned Crossing Methods	QAES Recommendations for Planned Pipeline Method	Comments
WC44	Oldman Creek	SW 26-53-23 348337E, 5941965N 53° 36' 16.3" N/ 113° 17' 32.0" W	Mapped Class C April 16 to June 30	Bankfull Width: 3.1 Wetted Width: 10.0 Water Depth: 0.9	Longnose sucker, white sucker, brook stickleback (fathead minnow and lake chub previously documented in Oldman Creek).	Yes – influencing water levels	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom (concurrent pipeline construction)	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.Recommend water quality monitoring as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 2 km upstream from the North Saskatchewan River.
WC45	Unnamed tributary to the North Saskatchew an River	NE 22-53-23 347456E, 5941380N 53° 35' 56.4" N/113° 18' 18.9" W	Mapped Class C April 16 to June 30	Bankfull Width: 1.1 Wetted Width: 4.5 Water Depth: 0.4	No fish captured or observed (lake sturgeon, mountain whitefish, rainbow trout, lake trout, burbot, mooneye, walleye, northern pike, sauger, yellow perch, goldeye, longnose sucker, white sucker, mountain sucker, river shiner, emerald shiner, spottail shiner, fathead minnow, longnose dace, finescale dace, northern redbelly dace, pearl dace, flathead chub, lake chub, goldfish, Iowa darter, quillback, shorthead redhorse, silver redhorse, slimy sculpin, spoonhead sculpin, trout-perch and brook stickleback previously documented in the North Saskatchewan River).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Trenchless ⁴	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend water quality monitoring as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 700 m upstream from the North Saskatchewan River.
FD8	Fish-bearing drainage	NE 21-53-23 346414E, 5940702N 53° 35' 33.4" N/113° 19' 14.3" W	n/a	Bankfull Width: n/a Wetted Width: 284.5 Water Depth: 0.4	Brook stickleback, fathead minnow (brook stickleback previously documented in the fish-bearing drainage).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Access from both sides	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 1.3 km upstream from the North Saskatchewan River.
WC46	Unnamed tributary to Clover Bar Creek	SE 21-53-23 346006E, 5940591N 53° 35' 29.2" N/113° 19' 36.2" W	Unmapped Class C April 16 to June 30	Bankfull Width: 2.4 Wetted Width: 1.7 Water Depth: 0.9	Longnose sucker, white sucker, fathead minnow, brook stickleback (Brook stickleback previously documented at proposed crossing. Brook stickleback and fathead minnow previously documented in Clover Bar Creek.)	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 1.4 km upstream from the North Saskatchewan River. Watercourse may become subterrian downstream and not be directly connected to the North Saskatchewan River.
WC46.1	Clover Bar Creek	SE 21-53-23 345843E, 5940537N 53° 35' 27.5" N/113° 19' 45.1" W	Unmapped Class C April 16 to June 30	Bankfull Width: 4.9 Wetted Width: 9.3 Water Depth: 0.5	Brook stickleback, fathead minnow (Brook stickleback and fathead minnow previously documented in Clover Bar Creek.)	Yes – influencing water levels	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 1.5 km upstream from the North Saskatchewan River. Watercourse may become subterrian downstream and not be directly connected to the North Saskatchewan River.

TABLE 2 Cont'd

Site No.	Name	Legal Location (W4M), UTM Coordinates (NAD 83, Zone 12) Latitude/Longitude (DD-MM-SS)	Watercourse Class and RAP	Open Water Mean Channel Morphology (m)	Fish Species Captured or Observed During Open Water Assessment (Previously Documented) ²	Beaver Activity Present	Winter 2013 Results	Recommended Pipeline Crossing Method ³	Recommended Contingency Pipeline Crossing Method	Recommended Vehicle/ Equipment Crossing Method (Frozen)	Recommended Vehicle/ Equipment Crossing Method (Open Water)	Planned Pipeline Crossing Method	DFO Regulatory Requirement for Planned Crossing Methods	QAES Recommendations for Planned Pipeline Method	Comments
WC46.2	Clover Bar Creek	SE 21-53-23 345680E, 5940333N 53° 35' 20.7" N/113° 19' 53.5" W	Unmapped Class C April 16 to June 30	Bankfull Width: 1.0 Wetted Width: 18.3 Water Depth: 0.8	Brook stickleback, fathead minnow (Brook stickleback and fathead minnow previously documented in Clover Bar Creek).	Yes – influencing water levels	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 1.6 km upstream from the North Saskatchewan River. Watercourse may become subterrian downstream and not be directly connected to the North Saskatchewan River.
WC47	Clover Bar Creek	SW 21-53-23 345494E, 5939871N 53° 35' 5.5" N/ 113° 20' 2.8" W	Unmapped Class C April 16 to June 30	Bankfull Width: 1.2 Wetted Width: 2.4 Water Depth: 0.6	Brook stickleback, fathead minnow (Brook stickleback and fathead minnow previously documented in Clover Bar Creek).	Yes – influencing water levels	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Clear span bridge	Trenchless ⁴	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.	Proposed crossing is approximately 2 km upstream from the North Saskatchewan River. Watercourse may become subterrian downstream and not be directly connected to the North Saskatchewan River.
FD9	Fish-bearing drainage	SW 4-53-23 345266E, 5935471N 53° 32' 43.0" N/113° 20' 7.4" W	n/a	Bankfull Width: n/a Wetted Width: 18.4 Water Depth: 0.2	Small-bodied fish species observed (fathead minnow, river shiner and brook stickleback previously documented in fish- bearing drainage).	No	No winter data collected	Isolate if water present/open cut if dry or frozen to bottom	n/a	Snowfill/ice bridge	Access from both sides	Isolate if water present/open cut if dry or frozen to bottom	Meets DFO's self- assessment process if all QAES recommendations and mitigation measures are implemented.	<ul style="list-style-type: none">Implement mitigation measures as per Section 8.4 of the EPP.Recommend a fish salvage be conducted if water present at the time of construction, as per mitigation measures in Section 8.4 of the EPP.	Proposed crossing is approximately 10 km upstream from the North Saskatchewan River.

- Notes:
- n/a (not applicable), n/r (not recorded), FTB (frozen to bottom)
 - 1 Determined from the *Code of Practice Management Area Maps* for Fort McMurray, Lac La Biche, St. Paul and Camrose (AENV 2006a,b,c,d).
 - 2 FWMIS 2014.
 - 3 A trenchless pipeline crossing method can be used at any proposed crossing.
 - 4 An isolated open-cut trenched crossing method is considered acceptable by TERA Aquatic Specialists; however, a trenchless HDD method is planned due to engineering reasons.

8.5 Pipe Activities (Trenching, Stringing, Bending, Coating, Lowering-In)

Introduction

The following mitigation measures will be implemented during mainline construction, including trenching, stringing, bending, coating and lowering-in.

Objective

The objectives of these mitigation measures are to:

- prevent impacts to watercourses and waterbodies;
- reduce interference with other land uses; and
- prevent harming wildlife.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Wet Soils</i>	1. Implement the Wet Soils Contingency Plan (Appendix 1E), as required.
<i>Soil Pulverization</i>	2. Where pulverization of soils has the potential of causing soil loss or long-term structural impact, stabilize the right-of-way using a tackifier or water.
<i>Trenching</i>	<p>3. To facilitate free movement of livestock and wildlife, follow trenching operations as closely as possible with lowering-in and backfill operations, unless for construction purposes there is a need to have the trench open for an extended period of time.</p> <p>4. Minimize the amount of open trench at any one time.</p> <p>5. The Contractor will monitor the open trench for trapped wildlife. Should any wildlife be identified, the Contractor will contact the Environmental Inspector(s) and Construction Manager. The Environmental Inspector(s) will contact the appropriate provincial regulatory agency or a Wildlife Resource Specialist, where required, for direction.</p> <p>6. As trenching proceeds, identify areas of potential trench wall instability that may affect unstripped topsoil areas. Strip a wider area if the trench walls slough into the ditch and the potential for mixing of topsoil and subsoil exists. Back slope trench wall until stable.</p> <p>7. If unstripped topsoil is sloughing into the trench, suspend trenching operations until the topsoil is stripped wide enough to prevent loss.</p>
<i>Spoil Handling</i>	<p>8. Place trench spoil to maintain an adequate separation between topsoil and subsoil piles. Avoid overlap of the trench spoil and topsoil in agricultural lands. If the potential of overlap is identified, move the topsoil, or in some space restricted cases, protect with a geotextile cover.</p> <p>9. Ensure spoil does not spread off right-of-way.</p> <p>10. If construction occurs under frozen conditions, do not mix snow with spoil material.</p>
<i>Water Management</i>	<p>11. Monitor water levels in all open trenches.</p> <p>12. Where practical, grade the right-of-way to divert surface water away from the open trench.</p> <p>13. Where the open trench has the potential to dewater a wetland, undertake trenching in a manner that prevents the flow of water along the trench.</p>

Activity/Concern	Mitigation Measures
<i>Water Management (cont'd)</i>	<p>14. The location of all discharge areas shall be approved by the Environmental Inspector(s).</p> <p>15. If the trench requires dewatering, pump water onto stable, well vegetated areas, tarpaulins, sheeting, rocks, sand bags, or into settling ponds, filter bags, or other appropriate sediment filtering devices. Complete dewatering in a manner that does not cause erosion or allow sediment to re-enter a watercourse.</p> <p>16. Do not permit pumped trench water to flow directly into any watercourse. If water is released onto private land, landowner consent must be acquired prior to release.</p> <p>17. The Contractor will ensure the pump intake is elevated from the bottom of the trench to minimize the pumping of sediment.</p> <p>18. The Contractor will ensure hoses and pumps are of sufficient length and capacity to transfer trench water to the desired location.</p> <p>19. The Contractor will ensure hoses are in good working condition, and hoses with tears or ruptures will be repaired or replaced.</p>
<i>Welding Waste</i>	<p>20. Use magnets to collect bevel shavings on a daily basis. Collect all welding refuse generated by each welding rig and dispose of at an approved waste facility.</p>
<i>Coating</i>	<p>21. Where spray or paint-on coatings are applied, use a tarp or alternative device of sufficient size to block over spray from contacting the ground. Clean-up any over spray that comes in contact with the ground.</p>

8.6 Backfill

Introduction

The following mitigation measures will be implemented during backfill operations.

Objective

The objectives of these mitigation measures are to:

- protect the pipeline and prevent subsidence of the trench;
- ensure excavated materials from the trench are replaced and properly compacted;
- properly re-establish subsurface drainage; and
- facilitate cross right-of-way drainage.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Padding</i>	<ol style="list-style-type: none">1. Do not use topsoil to pad the pipe under any circumstances.2. Where sand padding has been employed on agricultural land resulting in excess spoil, remove the displaced spoil that cannot be adequately feathered out on the right-of-way to an approved location.
<i>Displaced Backfill</i>	<ol style="list-style-type: none">3. Excess spoil material displaced by the pipe will be spread evenly over the stripped portion of the right-of-way
<i>Rock In Backfill</i>	<ol style="list-style-type: none">4. Do not backfill large rocks into the upper 0.5 m of the trench on agricultural lands.5. Pick all rocks greater than 10 cm in width in the top 30 cm of subsoil and remove from the right-of-way, unless otherwise directed by the Environmental Inspector(s) or designate. On forested land, rock and root picking will be in accordance with landowner or regulatory agency guidance.
<i>Topsoil Separation</i>	<ol style="list-style-type: none">6. Place spoil back into the trench in such a way as to prevent loss or mixing of topsoil.
<i>Backfill Trench (Non-Frozen Conditions)</i>	<ol style="list-style-type: none">7. Backfill the trench as soon as practical, following lowering-in, to minimize hazards to wildlife.8. Backfill the clay or subsoil first if salvaged separately from topsoil in shallow muskeg or peaty areas.9. Compact backfill to minimize trench settlement. Take extra care to backfill the trench at banks of watercourse crossings, intermittent drainages and at bell holes.
<i>Trench Compaction (Non-Frozen Conditions)</i>	<ol style="list-style-type: none">10. Backfill trench material in lifts and compact after each lift.11. Return all excavated material back into the trench minus the displacement of the pipe and other pipeline materials, such as weights.
<i>Winter Construction</i>	<ol style="list-style-type: none">12. Do not mix snow with spoil during backfilling.13. Where construction occurs under frozen conditions, replace backfill material, but do not attempt to compact trench material until the backfill material has completely thawed.14. Leave openings in the trench crown and all windrows at appropriate locations to allow for temporary and permanent cross right-of-way drainage.

8.7 Pressure Testing

Introduction

Hydrostatic testing is the use of water to pressure test sections of pipeline. Water is typically withdrawn from nearby dugouts, lakes, watercourses, or municipal sources in accordance with applicable permits for withdrawal of water.

Objective

The objectives of these mitigation measures are to:

- ensure pressure testing activities are conducted in accordance with all approval conditions, permits, and landowner commitments; and
- reduce effects to watercourses, wetlands and contamination of agricultural soils.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Permits and Approvals</i>	<ol style="list-style-type: none"> 1. Conduct all hydrostatic testing activities in accordance with the provincial regulations, as well as the latest version of CSA Z662. 2. The Company must authorize the water withdrawal sources for testing purposes (<i>i.e.</i>, must have sufficient quantity and quality of water) as well as the Contractor's test plan, including discharge locations, no less than 30 days prior to testing. 3. Submit notification under both the <i>Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines</i>, and the <i>Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines</i>. If withdrawal amounts exceed 30,000 m³, obtain a separate water diversion license. If the volume of water to be released is greater than 1,000 m³, obtain a registration number from the AER for the release of the hydrostatic test water. 4. Abide by applicable provincial or federal approval conditions.
<i>Withdrawal</i>	<ol style="list-style-type: none"> 5. Restrict water withdrawal for hydrostatic testing to less than 10% of the stream flow of a watercourse at the time of withdrawal, or as otherwise specified by the appropriate regulatory agency.
<i>Water Trucks</i>	<ol style="list-style-type: none"> 6. Ensure water hauling trucks for test water, if used, are clean and inspected prior to use.
<i>Isolate Pumps</i>	<ol style="list-style-type: none"> 7. Ensure pumps, generators and light towers used at water intake locations have secondary containment that can hold 125% of the fuel tank. 8. Ensure any leaks in the fill and discharge lines are controlled to prevent erosion.
<i>Screen Intake</i>	<ol style="list-style-type: none"> 9. Screen all water intakes in accordance with the <i>Freshwater Intake End-of-Pipe Fish Screen Guideline</i> published by DFO. Maintain screens so they are clear of debris. 10. Ensure water and pump intakes reduce or avoid disturbance of the streambed and are screened with a maximum mesh size of 2.54 mm and approach velocity of 0.038 m/s. To accomplish this, where pumps larger than 15 cm diameter are used, place the intakes in a mesh cage (2.54 mm) to reduce the approach velocity that fish are exposed to and prevent them from being impinged on the intakes. Maintain the screens free of debris.
<i>Dewatering</i>	<ol style="list-style-type: none"> 11. Shunt test water ahead from test section to test section to the extent possible to minimize water hauling, water usage and number of dewatering points.

Activity/Concern	Mitigation Measures
<i>Dewatering (cont'd)</i>	<ol style="list-style-type: none">12. Prior to discharge of hydrostatic test water, ensure that the appropriate testing and treatment measures are implemented in accordance with local regulatory requirements.13. Discharge hydrostatic test water into the same drainage basin from which it was withdrawn, unless otherwise approved by the appropriate authority.14. Discharge water into a well-vegetated area. Provide scour protection or an energy diffuser at the discharge site as directed by the Company.15. Preserve water quality, including preventing the introduction of foreign material (debris, sediment, etc.) into the receiving waterbody/watercourse.16. Monitor the discharge area for erosion.

8.8 Clean-up and Reclamation

Introduction

Clean-up and reclamation are important steps in returning construction sites to a condition similar to preconstruction.

Objective

The objectives of these mitigation measures are to:

- effectively use reclamation techniques that prevent topsoil/surface material loss from wind and water erosion;
- establish a vegetative cover compatible with surrounding vegetation and land uses;
- comply with approval conditions, including permits and landowner commitments;
- re-establish the right-of-way or Project Site in a stable condition acceptable for operational requirements; and
- maintain equivalent land capability, ensuring the ability of the land to support various land uses similar to the uses that existed before construction, but not necessarily identical.

Specific Measures

Activity/Concern	Mitigation Measures
<i>Scheduling</i>	<ol style="list-style-type: none"> 1. Clean-up activities will follow completion of backfill operations as closely as possible. 2. Schedule final clean-up to occur under non-frozen conditions, when soil moisture conditions permit. 3. Where construction occurs under frozen conditions, delay final clean-up (<i>i.e.</i>, proper trench compaction and soil feathering, grade touch-ups, final contouring and topsoil replacement) until the following summer. 4. If reclamation is postponed, contact the relevant regulatory agencies and landowners before the initiation of the reclamation activities and notify upon completion, as required.
<i>Level of Clean-up</i>	<ol style="list-style-type: none"> 5. The level of clean-up on all agricultural lands will ensure the land is returned to as close to preconstruction conditions as possible to allow for continued agricultural operations and equivalent land capability.
<i>Staking</i>	<ol style="list-style-type: none"> 6. Remove all flagging from the Project area and dispose of it at an approved facility at the completion of construction.
<i>Matting</i>	<ol style="list-style-type: none"> 7. Remove all matting and non-biodegradable geotextile from all locations on the right-of-way.
<i>Wet Soils</i>	<ol style="list-style-type: none"> 8. If saturated conditions exist at the time of clean-up on agricultural lands refer to the Wet Soils Contingency Plan (Appendix 1E). If necessary, suspend final clean-up activity until soil conditions are appropriate.
<i>Secondary Stripping</i>	<ol style="list-style-type: none"> 9. On agricultural areas, where construction occurred during frozen ground conditions, and where reduced width topsoil stripping was conducted, final clean-up will require stripping of a wider area (secondary stripping) to maintain land capability.

Activity/Concern	Mitigation Measures
<i>Secondary Stripping (cont'd)</i>	<p>10. Strip back topsoil on both sides of the ditchline to ensure sufficient space is available for ditch compaction, feathering excess soil, and subsoil preparation.</p> <p>11. Once subsoil preparation is complete, replace topsoil uniformly over the stripped area.</p>
<i>Grade Replacement</i>	<p>12. Replace grade material to preconstruction contours, except if otherwise authorized by the Environmental Inspector(s) or designate.</p> <p>13. Re-establish surface drainage patterns; install drainage and erosion control measures, and complete the installation of sedimentation control measures at all watercourse crossings.</p>
<i>Grade Replacement – Frozen Conditions</i>	<p>14. Where construction occurs under frozen conditions, replace grades. Some regrading under non-frozen conditions may be required to touch up areas and to ensure predisturbance contours are maintained.</p>
<i>Compacted Subsoils</i>	<p>15. Environmental Inspector(s) will determine the locations where subsoil compaction is an issue. Prior to topsoil replacement, rip compacted subsoils on the construction right-of-way to the depth of compaction. If soils are moist, postpone ripping of subsoils until soils dry to ensure that the soils fracture when ripped.</p> <p>16. In areas where the topsoil is in place, use special equipment such as a paratiller to relieve compaction with reduced potential for admixing at the discretion of the Environmental Inspector(s) in consultation with the Construction Manager.</p>
<i>Subsoil Preparation</i>	<p>17. Re-grade areas with vehicle ruts or erosion gullies.</p> <p>18. Smooth and level the ripped subsoil surface to prevent admixing of subsoil and topsoil when the topsoil is replaced.</p>
<i>Trench Compaction</i>	<p>19. Where trenching has been conducted under frozen ground conditions, delay final trench compaction until the subsoil has completely thawed.</p> <p>20. Backfill trench material in lifts and compact after each lift.</p> <p>21. Return all excavated material back into the trench minus the displacement of the pipe and other pipeline materials, such as weights.</p>
<i>Root and Rock Picking</i>	<p>22. On agricultural land, pick rocks and roots to an equivalent size and distribution of that on adjacent land, or to 10cm wide or less.</p> <p>23. Dispose of all rock material collected at an appropriate off right-of-way location, as directed by the Environmental Inspector(s).</p>
<i>Topsoil Replacement</i>	<p>24. Replace topsoil to a uniform depth, on all portions of the right-of-way that were stripped. Match topsoil depth to the unstripped edges of the right-of-way.</p> <p>25. If construction occurs under frozen ground conditions, delay topsoil replacement until the topsoil pile and trench spoil has completely thawed.</p> <p>26. Postpone replacement of topsoil during wet weather or high winds to prevent erosion and/or damaging soil structure.</p>
<i>Cultivation</i>	<p>27. On cultivated land, disc or cultivate the areas on which topsoil has been replaced to restore soil tilth, unless otherwise approved by the Environmental Inspector(s). Discing and cultivation depth will not exceed the topsoil depth.</p> <p>28. Under extremely dry soil conditions use a cultivator, rather than a disc.</p>

Activity/Concern	Mitigation Measures
<i>Fencing</i>	<p>29. All fences will be replaced and will match the number of wires in the connecting fence line.</p> <p>30. New posts and bracing will be installed to match the connecting fence.</p>
<i>Access Removal</i>	<p>31. Remove bar ditch ramps and reclaim all temporary access trails and shoo-flies to stable conditions. Recontour to preconstruction conditions and seed accordingly.</p> <p>32. Remove all mats and ramps used so that they do not impede the restoration of natural drainage patterns.</p> <p>33. Remove all temporary vehicle crossing structures. Ensure that removal of access does not disturb the bed or banks at the crossing.</p>
<i>Access Removal – Frozen Conditions</i>	<p>34. Remove all temporary vehicle crossing structures, prior to spring break-up. Remove or breach snow or ice bridges to ensure they do not impede flow.</p>
<i>Cover Crop</i>	<p>35. Use a cover crop to assist in weed and erosion control where warranted, or where requested by the landowner. Apply cover crops to the approach slopes of all water crossings where there is a risk of wind and water erosion.</p>
<i>Seeding and Revegetation</i>	<p>36. Use only Certified No. 1 seed, unless Certified No. 1 is not available for select reclamation seed species (<i>i.e.</i>, native species). Seed mixes will be selected in consultation with the county Agricultural Fieldman.</p> <p>37. Acquire Certificates of Analysis for all seed mixes.</p> <p>38. Seeding will follow as close as possible to final clean-up and topsoil/surface material replacement pending seasonal or weather conditions.</p> <p>39. On privately-owned lands such as pasture and hay land, base the final seed mix on input from landowners and the availability of seed at the time of reclamation.</p> <p>40. Landowners are responsible for seeding cultivated lands.</p> <p>41. On forested Crown land allow for natural regeneration, or seed as directed by the appropriate Land Administrator.</p> <p>42. Apply seed to all disturbed surfaces (except cultivated fields and wetlands), unless otherwise specified on the Environmental Alignment Sheets.</p> <p>43. Seed riparian areas with an approved native cover crop and seed mix as soon as feasible after construction, prior to spring freshet wherever possible.</p> <p>44. Use natural recovery in wetlands unless invasive species or noxious/restricted weeds are a concern, unless otherwise specified by the Company.</p> <p>45. Restrict vehicle access over newly seeded areas.</p>
<i>Seed Mix Application</i>	<p>46. Seed will be applied using a rangeland drill or equivalent. Use broadcast application on steep terrain, fence lines, road ditches, watercourse banks, etc.</p> <p>47. Apply seed at a rate of 10 kg/ha for drill seeding and 15 kg/ha for broadcast seeding. Drill seeding is the primary method of seed application, unless otherwise specified by the Environmental Inspector(s) or designate.</p>
<i>Sedimentation/ Erosion Control</i>	<p>48. Remove unnecessary silt fence or other temporary erosion control measures not required, as specified by the Environmental Inspector(s) or designate.</p>

Activity/Concern	Mitigation Measures
<i>Sedimentation/ Erosion Control (cont'd)</i>	<p>49. Install permanent sedimentation and erosion control measures, where required, in accordance with Dwgs. STDS-03-ML-05-001, STDS-03-ML-05-132, STDS-03-ML-05-603, STDS-03-ML-05-604, STDS-03-ML-05-606 and STDS-03-ML-05-608 in Appendix 1D, unless otherwise approved by the Environmental Inspector(s) or designate to adjust for site conditions and suitability.</p> <p>50. The Environmental Inspector(s) or designate will determine the location of sedimentation and erosion control measures.</p> <p>51. Install cross ditches and berms on moderately steep and steep slopes on pasture, bush and forested lands in order to prevent runoff along the right-of-way and subsequent erosion. Install berms immediately downslope of all trench breakers (Dwg. STDS-03-ML-12-221).</p>
<i>Straw Crimping</i>	<p>52. Straw crimping may be used to prevent wind erosion and reduce evapotranspiration on pasture and erosion prone soils as specified by the Environmental Inspector.</p> <p>53. To prevent the introduction or spread of noxious or restricted weeds, inspect all potential source locations for noxious or restricted weeds before procurement of the straw.</p>
<i>Rollback</i>	<p>54. Install rollback as specified by the Environmental Inspector(s) or designate and approved by the applicable regulatory agency or the landowner.</p> <p>55. Rollback slash and small diameter, nonmerchantable timber on erosion prone slopes. Walk down erosion control rollback with a dozer. (Refer to Appendix 1D, Dwg. STDS-03-ML-05-313).</p>
<i>Tackifiers</i>	<p>56. The Environmental Inspector(s) or designate will determine locations where tackifier will be used.</p> <p>57. Review areas where tackifier has been applied and other potential erosion areas to ensure soils stabilization is effective where topsoil piles/windrows are left in place through winter and spring thaw. Follow-up monitoring and applications will be conducted as required.</p>
<i>Fencing</i>	<p>58. Install fencing to exclude livestock where required. Discuss fencing options with landowners and occupants.</p>
<i>Weed Control</i>	<p>59. Post-construction monitoring and treatment of weed infestation on the right-of-way will be implemented as needed.</p>

9.0 POST-CONSTRUCTION MONITORING AND ASSESSMENT

Objective

The objectives of post-construction monitoring and assessment are to:

- assess the success of mitigation measures implemented during construction; and
- review the success of re-establishing equivalent land capability.

Activity/Concern	Mitigation Measures
<i>Post-Construction Reclamation Assessment and Report</i>	<ol style="list-style-type: none"> 1. Develop and implement a Post-Construction Reclamation Assessment to assess the effectiveness of mitigation and reclamation measures on soils, vegetation, watercourses and wetlands disturbed during construction of the pipeline. 2. Prepare a Post-Construction Reclamation Assessment (PCRA) Report that documents the findings of the PCRA. The report will also document whether specific reclamation issues have been successfully resolved or if they remain unresolved. Proposed mitigation and remediation techniques to address unresolved issues will be documented in the PCRA Report. Provide copies to the AER Regional Compliance Inspector or the AER Land Use Officer prior to the calendar year end of the first growing season following final clean-up and reclamation of the right-of-way.
<i>Soil Assessment</i>	<ol style="list-style-type: none"> 3. Conduct soil assessments during non-frozen soil conditions after one full growing season following clean-up. Soil parameters to be assessed include, but are not limited to: subsoil compaction; topsoil depth; topsoil and subsoil texture; degree of topsoil/subsoil admixing; stoniness; contour restoration; and erosion potential. Where issues are identified through this assessment, implement remedial measures as soon as feasible. 4. Note that the number of, and distance between, soil assessment locations along the right-of-way will be determined by the Company's Environmental Inspector or Reclamation Specialist conducting the tests. Criteria to be considered in determining locations and frequency of soil assessments will include, but not be limited to, the following: visual indications of potential issues; landscape variation; changes in construction procedures; changes in soil moisture; changes in land use; changes in land ownership; and changes in tract or quarter-section boundary. It is anticipated that the assessment sites will be more frequent in complex landscapes and less frequent in homogeneous landscapes.
<i>Vegetation Monitoring</i>	<ol style="list-style-type: none"> 5. Conduct vegetation monitoring prior to harvest when vegetation is mature enough for accurate identification and evaluation during mid to late summer after the first full growing season following construction. Monitor for vegetation issues such as weed infestations, poor vegetation establishment or reduced crop growth along the right-of-way. Conduct additional soils monitoring, if warranted, to identify the cause of vegetation issues, if any. Where issues are identified through this assessment, implement remedial measures as soon as feasible. 6. Vegetation monitoring will pay particular attention to areas with extensive surface disturbance such as moderate and steep slopes, watercourse crossings and areas of potential terrain instability that may be prone to erosion. 7. Monitor weed cleaning stations and manage weeds, as warranted. The design style of weed cleaning stations and weed cleaning methods will be decided in consultation with the Environmental Inspector, the Company, and the landowner.

Activity/Concern	Mitigation Measures
<i>Watercourse Monitoring</i>	8. Monitor erosion and sediment control structures adjacent to watercourses as well as bank protection and fish habitat enhancements at watercourses. Apply remedial measures if these structures are not performing as designed.
<i>Wetland Monitoring</i>	9. Monitor wetlands for hydrological function and implement remedial measures if there are indications of impeded wetland function. 10. Monitor approaches of roads (from other roads and the pipeline right-of-way) to identify areas where movement of mineral soil/debris might be eroding and depositing within the wetland edges. Implement remedial measures (e.g., install silt fence or equivalent structure) should monitoring identify areas where sediment/debris is being deposited along wetland edges.
<i>Long-Term Monitoring</i>	11. Monitor the right-of-way on a routine basis for the life of the pipeline. Issues related to trench subsidence, slope or bank erosion or wind and water erosion will be reported to the Company's Environmental Staff. Where warranted, apply remedial measures on a timely basis.
<i>ESRD R&R/03-2</i>	12. Conduct long-term monitoring, prepare maintenance plans and quality assurance/control programs to address any potential adverse environmental impacts in "environmentally sensitive areas" in accordance with ESRD R&R/03-2 (AENV 2003).

APPENDIX 1A

EMERGENCY CONTACTS

Contact	Location	Phone Number
RCMP	Athabasca	911 or 780-675-4252
	Boyle	911 or 780-689-3622
	Redwater	911 or 780-942-3600
	Fort Saskatchewan	911 or 780-992-6100
	Sherwood Park	911 or 780-449-0170
Edmonton Police Service	Edmonton	911 or 780-423-4567
Ambulance	Athabasca	911
	Boyle	911
	Redwater	911
	Fort Saskatchewan	911
	Sherwood Park	911
	Edmonton	911
Hospital	Athabasca	780-675-6000
	Boyle	780-689-3731
	Redwater	780-942-3932
	Fort Saskatchewan	780-998-2256
	Edmonton	780-735-4111
Fire	Athabasca	911 or 780-675-2063
	Boyle	911 or 780-689-3611
	Redwater	911 or 780-939-0600
	Fort Saskatchewan	911 or 780-998-4858
	Sherwood Park	911 or 780-467-5216
	Edmonton	911
AENV Compliance Branch	Alberta	780-422-4505
AENV Emergency / Complaint Hotline (24 hours)	Alberta	1-800-222-6514(24 hr) or 7378 (Telus mobile)

Contact	Location	Phone Number
Alberta Forest Fire Reporting	Alberta	310-3473
STARS Emergency Link Centre	Alberta	1-888-888-4567 or *4567 (cell phone)
Alberta Fisheries Contact	Alberta	1-855-852-8320 FisheriesProtection@dfo-mpo.gc.ca
Transport Safety Board Emergency / Incident Line (Pipelines)	Calgary	1-819-997-7887

APPENDIX 1B

CONTACTS

Tom Raptis
TransCanada Pipelines Limited
450 - 1st Street S.W.
Calgary, Alberta T2P 5H1
Phone: 403-920-8135
Email: jeff_perry@transcanada.com

(Grand Rapids Pipeline GP Ltd. Project
Manager)

Tammy Ramanat
TransCanada Pipelines Limited
450 - 1st Street S.W.
Calgary, Alberta T2P 5H1
Phone: 403-930-7378
Email: tammy_ramanat@transcanada.com

(Grand Rapids Pipeline GP Ltd.
Environmental Contact)

Leona Gibb
TERA, a CH2M HILL Company
1100, 815 8th Avenue S.W.
Calgary, Alberta T2P 3P2
Phone: 403-265-2885 Fax:403-266-6471
Email: leona.gibb@ch2m.com

(TERA Project Manager Contact)

Wanda Lewis
Heritage Resource Management Specialist
TERA, a CH2M HILL Company
1100, 815 8th Avenue SW,
Calgary, Alberta T2P 3P2
Phone: 403-265-2885 (ext.8816)
Fax:403-266-6471
Email: wanda.lewis@ch2m.com

(TERA Heritage Resource Contact)

Environment Canada – Alberta Office
4999-98 Avenue, Room 200
Edmonton, Alberta T6B 2X3
Phone: 780-951-8600
Fax: 780-495-2615
Email: enviroinfo@ec.gc.ca

(General Environment Canada Contact)

Dean Wetzel
Land Use Planner
Archaeological Survey Section
Alberta Culture
8820 - 112 Street
Edmonton, Alberta T6G 2P8
Phone: 780-431-2332
Fax: 780 422-3106
Email: dean.wetzel@gov.ab.ca

(In Case of Discovery of Archaeological,
Palaeontological or Historical Site)

Wildlife Biologist
Alberta Environment and Sustainable Resource
Development
Athabasca Office – Fish and Wildlife
1st floor Provincial Building, 4901- 50 Street
Athabasca, Alberta, T9S 1E2
Phone: 780-675-8229
Fax: 780-675-8165
Email:

(Fish and Wildlife Representative - Alberta)

Barb Maile
Senior Wildlife Biologist
Alberta Environment and Sustainable Resource
Development
5025- 49 Avenue
St. Paul Alberta, T0A 3A4
Phone: 780-645-6335
Fax: 780 645-6267
Email: barb.maile@gov.ab.ca

(Fish and Wildlife Representative - Alberta)

Delaney Anderson
Wildlife Biologist
Alberta Environment and Sustainable Resource
Development
1st floor Twin Atria Building
4999 – 98th Avenue
Edmonton, Alberta, T6B 2X3
Phone: 780-415-1328
Fax: 780-422-0528
Email: delaney.anderson@gov.ab.ca

(Fish and Wildlife Representative - Alberta)

Ron Jackson
Agricultural Fieldman – County of Athabasca
Agricultural Service Board
3602 - 48 Avenue
Athabasca, Alberta, T9S 1M8
Phone: 780-675-2273
Fax: 780-675-5512
Email: rjackson@athabascacounty.com

(In the event of weed or disease concerns –
County of Athabasca)

Clarence Dowhan
Agricultural Fieldman – County of Thorhild
Agricultural Service Board
Box 10
Thorhild, Alberta, T0A 3J0
Phone: 780-393-3741
Fax: 780-398-3748
Email: clarence@thorhildcounty.com

(In the event of weed or disease concerns –
County of Thorhild)

Angela Veenstra
Agricultural Fieldman – Sturgeon County
9613 - 100th Street
Morinville, Alberta T8R 1T3
Phone: (780) 939-8325
Email: aveenstra@sturgeoncounty.ab.ca

(In the event of weed or disease concerns –
Sturgeon County)

Terry Elenaik
Agricultural Fieldman – Director– Northeast Region
Agricultural Service Board
Box 150
Lamont, Alberta, T0B 2R0
Phone: 780-895-2585
Fax: 780-895-2892
Email: terry.e@lamontcounty.ca

(In the event of weed or disease concerns –
Lamont County)

Joel Gould
Agricultural Fieldman – Strathcona County
Agriculture Service Board
2001 Sherwood Drive
Sherwood Park, Alberta, T8A 3W7
Phone: 780-417-7133 Fax: 780-417-7109
Email: joel.gould@strathcona.ca

(In the event of weed or disease concerns –
Strathcona County)

Alberta Energy Regulator
St. Albert Field Centre
Main Floor
30 Sir Winston Churchill Avenue
St. Albert, Alberta T8N 3A3
Phone: (780) 460-3800 (24-Hour)
Email: stalbert.fieldcentre@aer.ca

(In the Event of an Unrefined Product
Release)

District Approvals Manager
Alberta Environment and Sustainable Resource
Development
Regulatory Approval Centre
Main Floor, Oxbridge Place
9820 - 106th Street N.W.
Edmonton, Alberta T5K 2J6
Phone: (780) 427-6311
Fax: (780) 422-0154
Northern area email:
AENV.NorthWaterApprovals@gov.ab.ca

(Provide COP Notification 14 Days Prior to
Watercourse and Wetland Crossing
Construction and within 24 Hours if a
Contravention of the COP Occurs)

Oil Spill Co-operative
Zone 3, Area "I/J" Regional Custodian
Dick Fairclough
Dick's Welding & Contracting
Phone: (780) 962-1503
24-Hour: (780) 914-0928

(In the Event of a Spill)

Oil Spill Co-operative
Zone 5, Area "VR-1" Regional Custodian
Dave Watt
Husky Pipeline Yard
Phone: (780) 205-2222
24-Hour: (780) 871-6621

(In the Event of a Spill)

Alberta Environmental Hotline
Phone: 1-800-222-6514

(In the Event of a Spill)

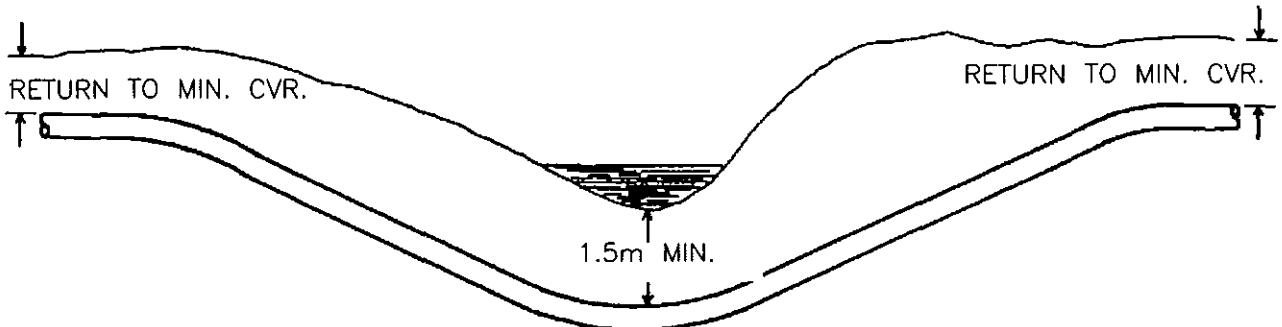
APPENDIX 1C

APPROVALS/PERMITS REQUIRED FOR PIPELINE DEVELOPMENT

Legislation	Regulatory Requirement	Regulatory Authority
Schedule 3 of the Alberta Energy Regulator (AER) Directive 056: Energy Development Applications and Schedules.	Pipeline Licence Application is required to construct/operate.	ERCB
<i>Public Lands Act</i>	Land disposition applications supported by Environmental Field Reports (EFRs) required for: Pipeline Agreements (PLAs), Pipeline Installation Leases (PILs); Miscellaneous Leases (MLLs) and Temporary Field Authorizations (TFAs) for disturbance outside of the project footprint (e.g., additional TWS, release of water following hydrostatic testing), A Caribou Protection Plan (CPP) is required for geophysical programs, construction and operations within Caribou Zones	AER
<i>Environmental Protection and Enhancement Act (EPEA)</i>	A C&R Report is required for Class I pipelines in the White Area	AER
<i>EPEA</i>	An Industrial Approvals Application (IAA) (for Tank Terminals) under the <i>Approvals and Registrations Procedure Regulation</i> is required for bulk petroleum facilities greater than 10,000 m ³	AER
<i>EPEA</i>	Registration of Pump Stations is required as defined under the <i>Activities Designation Regulation</i> (276/2003) of Alberta EPEA. Pumping stations must be constructed, registered and operated in accordance with the <i>Environmental Code of Practice for Compressor and Pumping Stations and Sweet Gas Processing Plants</i> .	AER
<i>Fisheries Act</i>	An application for Authorization under the <i>Fisheries Act</i> is required for: pipeline and vehicle watercourse crossings which do not meet the conditions of <i>Measures to Avoid Causing Harm to Fish and Fish Habitat</i> (DFO 2013); removal of beaver dams that cannot be conducted in accordance with the <i>Measures to Avoid Causing Harm to Fish and Fish Habitat</i> (DFO 2013).	DFO
<i>Navigation Protection Act (NPA)</i>	Navigable Waters Applications are required for NPA Approval. Approval will be required for pipeline installation across rivers listed in the Schedule of Navigable Waters, whether or not a trenchless technique is utilized. Approval required for installation of vehicle crossings on navigable waters during non-frozen conditions.	Transport Canada (TC)
<i>Water Act and EPEA</i>	Notification or Registration under the <i>Code of Practice for Withdrawal of Water for Hydrostatic Testing</i> and <i>Code of Practice for the Release of Water Following Hydrostatic Testing</i> is required for approval of acceptable water sources under Alberta EPEA The notification is required for up to 30,000 m ³ water diversion and < 1,000 m ³ release. A registration number is required for release. A Temporary Diversion License (TDL) is required for diversions of >30,000 m ³	AER
<i>Water Act</i>	Notification under the <i>Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body</i> is required for all watercourses and wetlands crossed by the proposed pipeline, identified by a Qualified Aquatic Environmental Specialist Notifications must be submitted with disposition applications.	AER
<i>Water Act</i>	Notifications under the <i>Code of Practice for Watercourse Crossings</i> are required for all vehicle crossings of all watercourses and wetlands in the White Area.	AER
<i>Water Act</i>	Approval is required for temporary diversion of water (i.e., for ice/snow bridge construction, drilling make-up water, water for camps, etc.)	AER
Fish Research License	A license is required for fish salvage for isolated watercourse crossings	ESRD
<i>Historical Resources Act</i>	An application for clearance is required prior to construction under the <i>Historical Resources Act</i> . <i>An Archaeological Research Permit is required to conduct HRIA fieldwork.</i>	Alberta Culture and Tourism
<i>Forest and Prairie Protection Act</i>	A burning permit is required for burning timber from construction clearing	ESRD
<i>Wildlife Act</i>	Wildlife Damage Control License is required for beaver dam or lodge removal.	ESRD

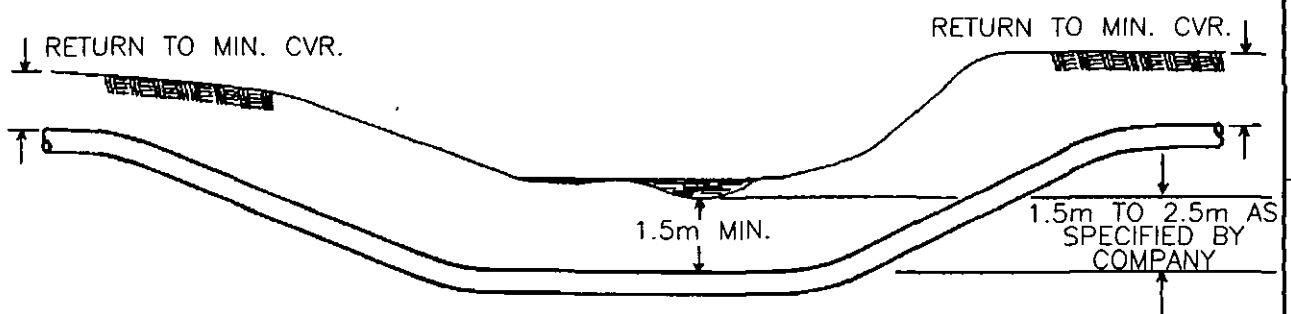
APPENDIX 1D
TYPICAL DRAWINGS

<u>Drawing Number</u>	<u>Title</u>
STDS-03-ML-03-101	Typical Ditch, Creek and Minor River Crossing
STDS-03-ML-05-001	Typical Erosion and Sediment Control Measures
STDS-03-ML-05-101	Temporary Steel Bridge Crossings
STDS-03-ML-05-102	Temporary Log Bridge Crossings
STDS-03-ML-05-104	Temporary Ice Bridge Crossings
STDS-03-ML-05-111	Flume Water Course Crossings
STDS-03-ML-05-112	Dam and Pump Water Course Crossings
STDS-03-ML-05-131	Soil Retaining Berm
STDS-03-ML-05-132	Sediment Control - Silt Fence Construction
STDS-03-ML-05-313	Typical Rollback for Erosion Control
STDS-03-ML-05-603	Streambank Reclamation – Log Wall
STDS-03-ML-05-604	Streambank Reclamation - Brush Layer in Cross Cut Slope
STDS-03-ML-05-606	Streambank Reclamation - Vegetated Geotextile Installation
STDS-03-ML-05-608	Water Crossing Bank Erosion Protection
STDS-03-ML-12-221	Typical Diversion Berms
Drawing 1A	Topsoil Salvage, Full Right-of-Way, Year 1
Drawing 1B	Topsoil Salvage, Full Right-of-Way, Year 2
Drawing 2	Topsoil Salvage, Blade Width
Drawing 3	Horizontal Directional Drill



TYPICAL SINGLE SAG CROSSING

N.T.S.



TYPICAL DOUBLE SAG CROSSING

N.T.S.

NOTES:

1. NORMALLY USE SINGLE SAG CROSSING WHERE IT IS POSSIBLE TO MAINTAIN MINIMUM COVER AND WHERE THERE IS NO EVIDENCE OF CAVING BANKS, WASH, SCOUR OR SHIFTING BOTTOM.
2. NORMALLY USE DOUBLE SAG CROSSING WHERE WIDTH PROHIBITS USE OF SINGLE SAG OR WHERE BANKS ARE WASHING AND THE PIPELINE MUST BE CARRIED INTO THE BANKS TO MAINTAIN MINIMUM COVER DURING THE LIFETIME OF THE PIPELINE.
3. AT CERTAIN RIVER CROSSINGS, HEAVY WALL PIPE NECESSARY TRANSITIONS AND CONCRETE WEIGHTS TO PROVIDE NEGATIVE BUOYANCY MAY BE REQUIRED. THESE WILL BE DETAILED ON INDIVIDUAL DRAWINGS.
4. COVER MAY BE REDUCED IN ROCK.
5. CROSSING SHALL BE BACKFILLED AND CONTOURED TO APPROXIMATE ORIGINAL CONDITION



ORIGINATOR:	
<i>B. Watts</i>	02 APR 02
NAME	DATE
<i>B. WATTS</i>	
CHECKED BY:	APPROVED BY:
<i>BW</i>	<i>[Signature]</i>

TITLE

TYPICAL DITCH, CREEK, AND
MINOR RIVER CROSSING

SCALE
N.T.S.

DWG No

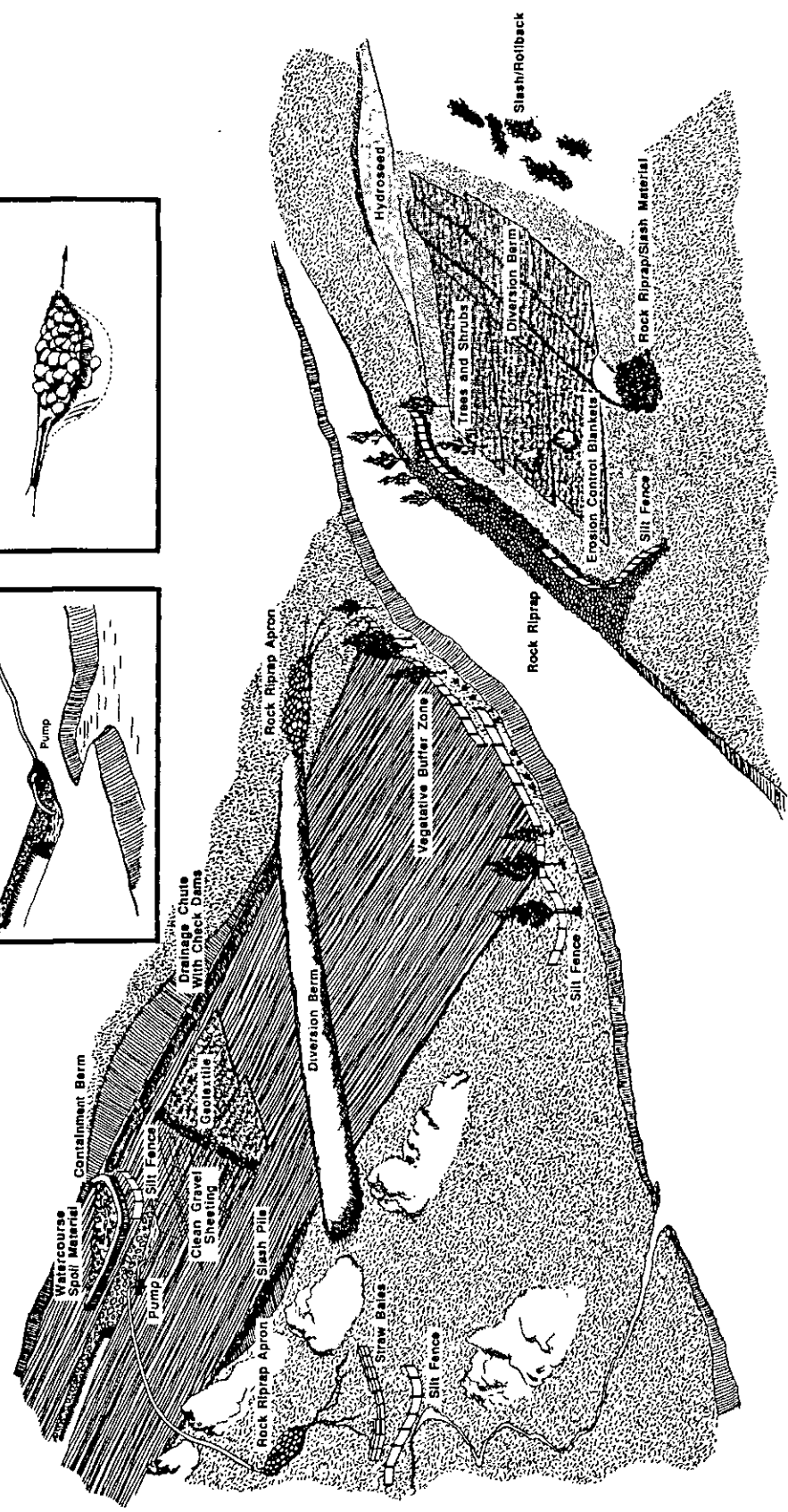
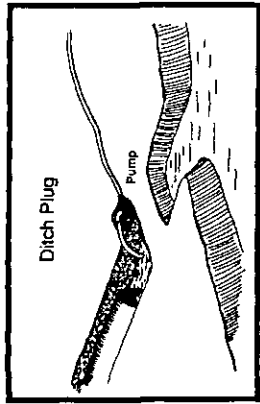
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TCT-1757F/6609

REVISIONS	00	SUPERCEDES AISK-18-398 (APR. 25 /02)
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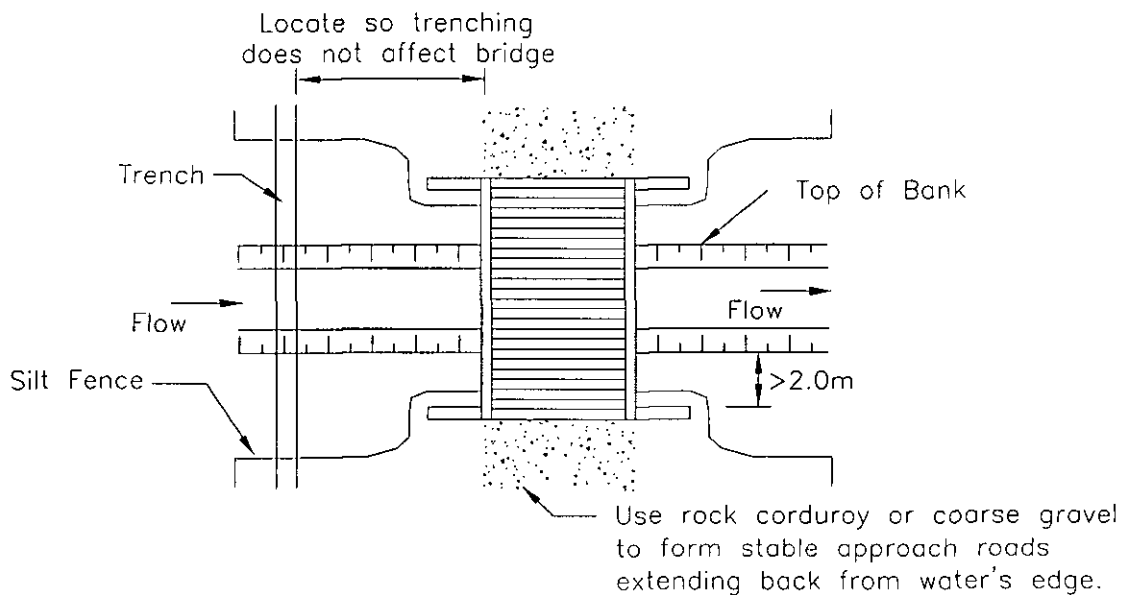
ORIGINATOR:
A. Gallant
NAME: JALBERT DATE: Apr 26/02
CHECKED BY: *Ben* APPROVED BY: *[Signature]*

TITLE: TYPICAL EROSION AND SEDIMENT CONTROL MEASURES
SCALE: N.T.S. DWG No: STDS-03-ML-05-001 REV 00

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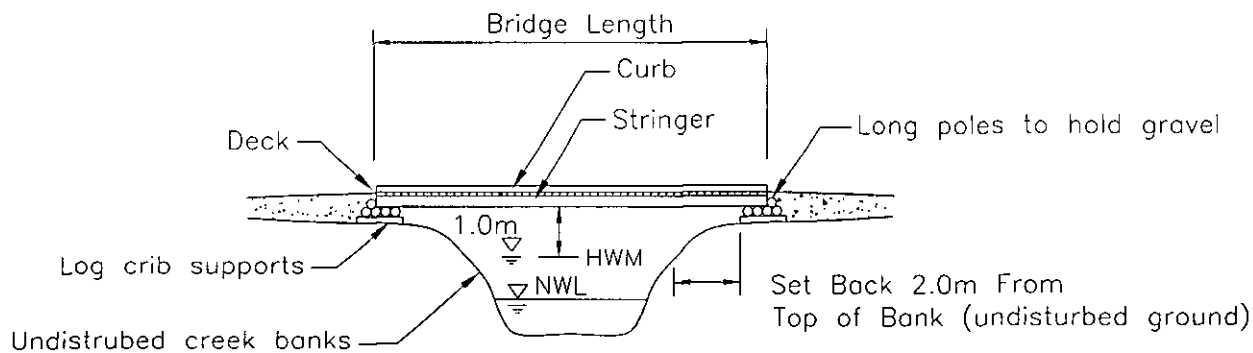
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PLAN

SCALE : N.T.S.



BRIDGE PROFILE

SCALE : N.T.S.

TCT-1750C/6588

DRAWING SUPERSEDES
AL-18-18-415
AL-18-18-415

REVISIONS
0

TransCanada
In business to deliver™

ORIGINATOR:

A. JALBERT
NAME DATE

CHECKED BY:

APPROVED BY:

TITLE

TEMPORARY STEEL BRIDGE CROSSINGS

SCALE
N.T.S.

DWG No

STDS-03-ML-05-101 (1/3)

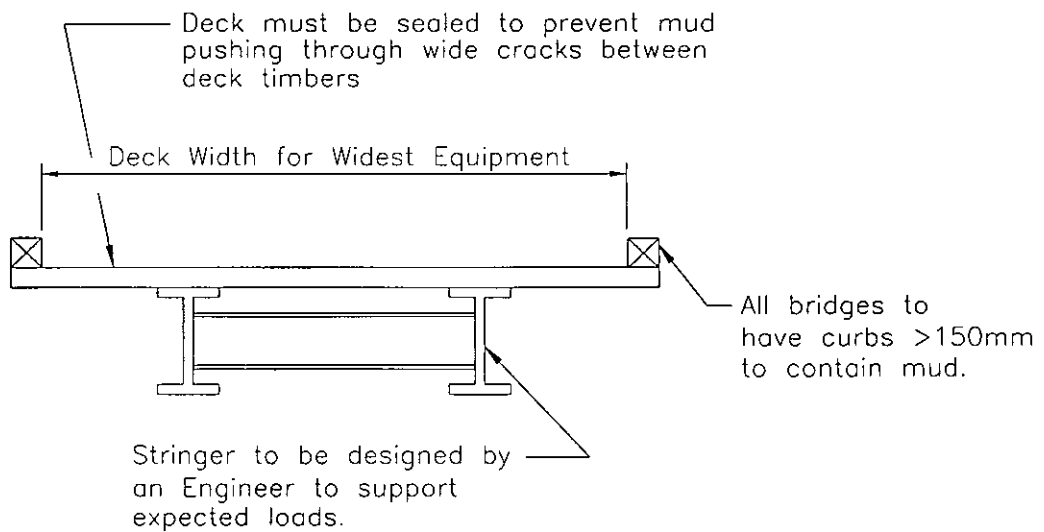
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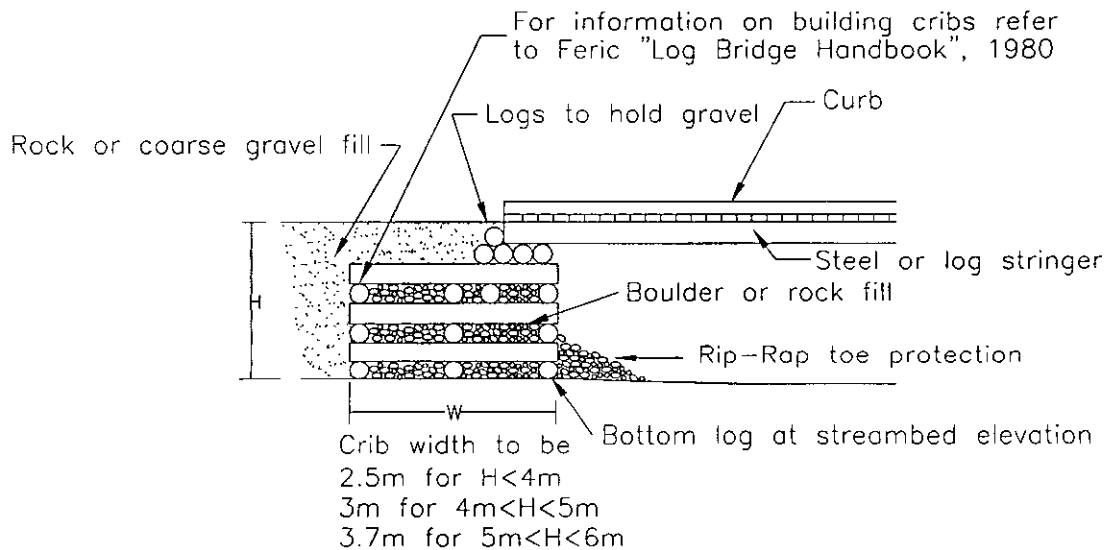
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TYPICAL STEEL BRIDGE SECTION

SCALE : N.T.S.



TYPICAL TEMPORARY CRIB ABUTMENT

SCALE : N.T.S.

TCT-1750C/6588

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DRAWING SUPERSEDES
A2-SK-18-A3
A2-SK-18-A25

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ORIGINATOR:
A. Walbert
NAME: A. WALBERT
DATE: Mar 28/02
CHECKED BY: *BW*
APPROVED BY: *[Signature]*

TITLE
TEMPORARY STEEL BRIDGE CROSSINGS

SCALE: N.T.S. DWG No: STDS-03-ML-05-101 (2/3) REV 00

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DETAILED CONSTRUCTION SEQUENCE - TEMPORARY BRIDGES

In general terms, the following sequence of construction and mitigation measure will be followed at all temporary bridges:

1. Measure up the approximate bridge length required and follow either method a) or b) for determining the opening size. If a) is followed, a minimum 2m setback from top of bank must be preserved as a "no disturbance area." Daylight must be visible between the ground and underside of stringers in the "no disturbance area". If abutments or piers in the streambed are required, method b) is to be followed. Install the bridge in a manner that will minimize disturbance to streambank and vegetation. Stringers must be engineered to support the loads expected on the bridge. Curbs at least 150mm high must be installed along the edge of the deck to contain mud on the bridge. Fasteners connecting components must be strong enough to hold them in position during the life of the bridge. Cribs are to be filled with rock or cobble. Rip rap erosion protection is to be placed around the cribs and on the fill slopes projecting into the water.
An impermeable membrane such as plastic sheeting or plywood shall be required
3. to prevent dirt and debris from entering into the water body.
Road approaches leading to bridge and flume vehicle crossings must be raised
4. and stable so equipment loads are supported a sufficient distance back from the water to reduce mud entering the stream from equipment tracks. This may require using materials such as gravel, rock or corduroy. If cuts are needed to obtain a satisfactory grade, they are to be dug with side ditches and stable slopes. Erosion and sediment control measures are to be installed to keep sediment on land (e.g., check dams, filter cloth, rip rap, seed and mulch, sediment traps, etc.)
While the bridge is in use, any buildup of mud on the bridge deck or approaches
5. that is affecting water quality is to be scraped off and disposed of more than 30m from the water.
Temporary crossings shall be removed as quickly as possible when no longer
6. required. Removal shall not occur outside the construction windows. Surplus gravel is to be spread on the right-of-way as gravel sheeting, if gradation is suitable, or moved more than 30m from water for disposal. Bridge materials are to be removed from the crossing area. The creek bed and banks are to be restored to a stable angle and protected with erosion resistant material compatible with flow velocity

SIZING OF WATER OPENING

It is important that the size of the water opening be selected so the structure can safely pass flood flows that can reasonably be expected to occur during the life of the crossing. Either of the following methods can be followed:

- (a) Install a bridge that clear spans the creek from top of bank to top of bank (as shown) and with a clearance of at least 1m above the annual high water mark.
- (b) Conduct a hydrology analysis to determine theoretical opening size. The design flow will be the two year flood (Q2), unless the bridge is to be left in place through the spring freshet, in which case the theoretical opening size will be based on the five year flood (Q5). If a bridge is selected with cribs or pier in the water, the opening must provide end area to pass the design flow, plus 1m vertical clearance.

GENERAL

1. Contractor is responsible for the design of the portable bridge or other structure consistent with regulatory conditions.

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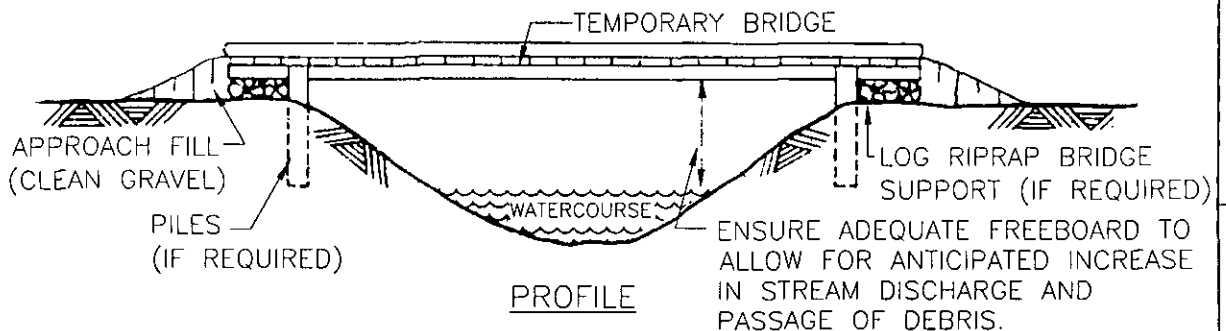
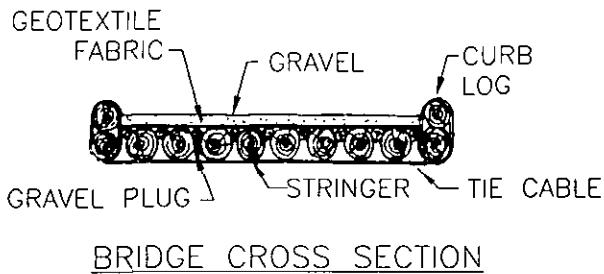
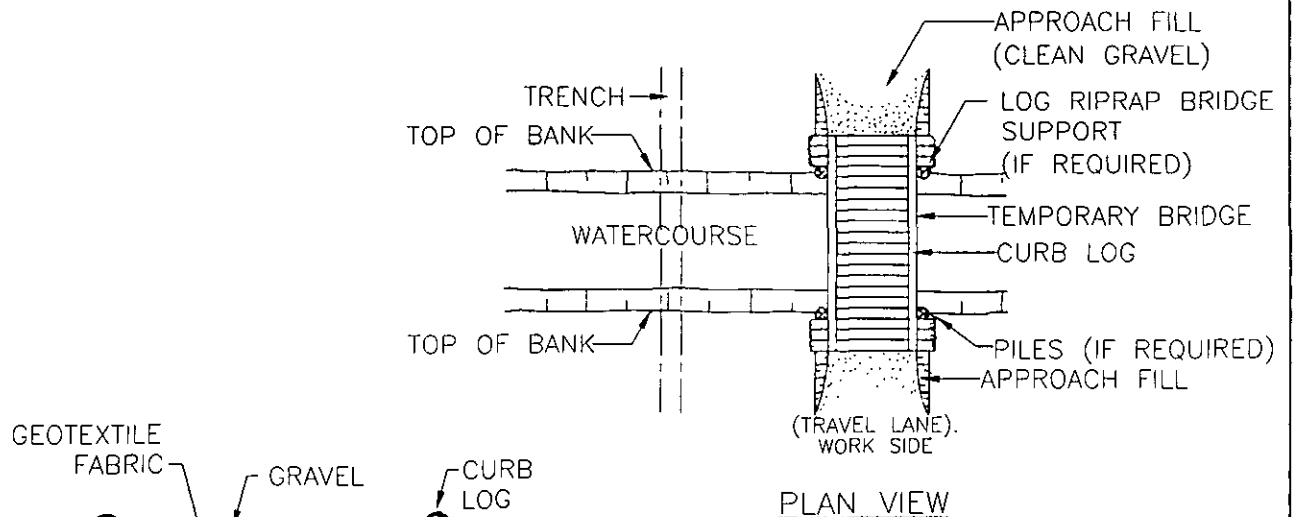
ORIGINATOR:	<i>A. Jalbert</i>	TITLE
NAME	A. JALBERT	DATE
CHECKED BY:	<i>[Signature]</i>	APPROVED BY:

TEMPORARY STEEL BRIDGE CROSSINGS

SCALE
N.T.S.

DWG No
STDS-03-ML-05-101 (3/3)

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NOTES:

1. INSTALL A TEMPORARY BRIDGE TO ALLOW VEHICLES TO CROSS A WATERCOURSE THAT HAS UNSTABLE BED AND BANKS. BRIDGES ARE ALSO USED WHERE WATERCOURSES ARE TOO DEEP, WIDE OR FAST TO PERMIT AN ALTERNATE CROSSING STRUCTURE. THIS METHOD MINIMIZES SEDIMENTATION OF THE WATERCOURSE AND STREAM BANK AND BED RESTORATION WORK. IT IS GENERALLY LIMITED TO WATERCOURSES LESS THAN 3m IN WIDTH AND A BRIDGE SPAN OF 6 m.
2. UTILIZE APPROACH FILLS OF CLEAN GRANULAR MATERIAL RATHER THAN CUTS IN STREAM BANKS TO MINIMIZE EROSION POTENTIAL. DO NOT CONSTRICT FLOW WITH APPROACH FILL OR SUPPORT STRUCTURES. ENSURE ADEQUATE FREE BOARD TO HANDLE ANTICIPATED STREAM FLOWS.
3. BRIDGE TO BE PLACED ACROSS WATERCOURSE AT BEGINNING OF PROJECT TO PROVIDE ACCESS AND WILL REMAIN IN PLACE UNTIL WORK IS COMPLETED.
4. ON COMPLETION OF WORK, BRIDGE TO BE REMOVED ALONG WITH ALL SUPPORT STRUCTURES AND APPROACH FILLS. BANKS ARE TO BE RESTORED AND STABILIZED.
5. INSTALL APRON OF LOGS OR PLYWOOD TO ENSURE THAT FILL MATERIAL DOES NOT SPILL INTO THE WATERCOURSE WHERE REQUIRED.
6. GEOTEXTILE FABRIC TO BE INSTALLED ON BRIDGE DECK TO MINIMIZE THE AMOUNT OF MATERIAL THAT MAY ENTER THE WATER COURSE.
7. WHERE POSSIBLE, RIPARIAN VEGETATION TO BE MAINTAINED.

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NAME
A. JALBERT
DATE
May 28/02
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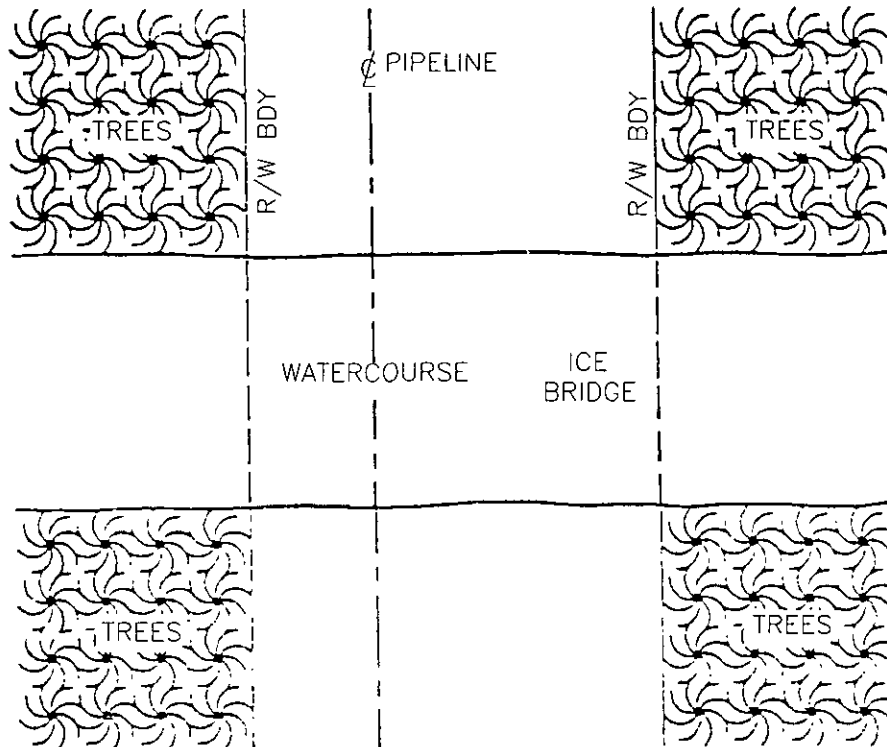
TITLE
TEMPORARY LOG BRIDGE
CROSSINGS

SCALE
N.T.S.

DWG No

STDS-03-ML-05-102

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PLAN VIEW

NOTES:

1. INSTALL ICE BRIDGES ON WINTER PROJECTS WHEN A SAFE ICE THICKNESS CAN BE MAINTAINED
2. LOCATE ICE BRIDGES AT SITES WITH GENTLY SLOPING BANKS TO MINIMIZE CUTS IN WATERCOURSE BANKS. USE SNOW AND ICE TO SLOPE APPROACHES, RATHER THAN CUT BANKS.
3. FLOOD ICE SURFACE WITH WATER AND COVER WITH SNOW TO INCREASE LOAD BEARING CAPACITY. LOGS MAY BE USED AS A BASE TO STRENGTHEN THE BRIDGE. REMOVE LOGS AND BREACH ICE BRIDGE BY PHYSICAL MEANS PRIOR TO SPRING BREAK-UP.
4. ICE BRIDGES SHOULD NOT INTERFERE OR IMPEDE WITH FLOW OF WATERCOURSE
5. MAINTAIN ICE REGULARLY AND REMOVE ALL DEBRIS FROM ICE SURFACE.
6. RESTORE AND STABILIZE BANKS AND APPROACHES PRIOR TO SPRING RUN-OFF.

TCT-1750C/5588

REVISIONS 00 DRAWING SUPERSEDES ASK-18-388

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ORIGINATOR: *A. J. Albert* *Mar 28/02*
NAME: A. J. ALBERT DATE: *Mar 28/02*
CHECKED BY: *BW* APPROVED BY: *[Signature]*

TITLE

TEMPORARY ICE BRIDGE
CROSSINGS

SCALE
N.T.S.

DWG No

STDS-03-ML-05-104

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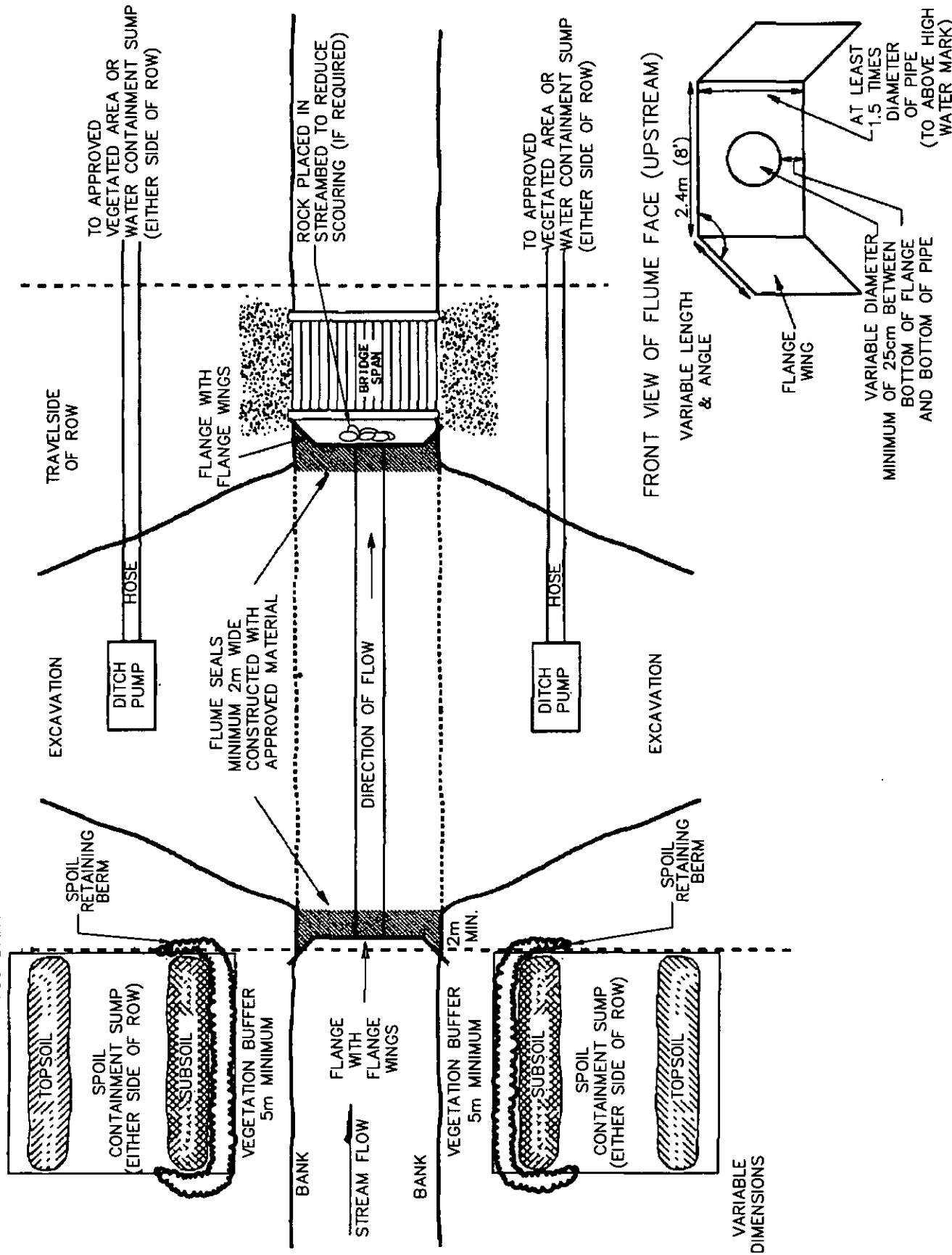
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NORMAL ROW
BOUNDARY

ROW
BOUNDARY



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ORIGINATOR:
J. Jalbert *Apr 5/02*
NAME DATE
JALBERT
CHECKED BY: *SCW* APPROVED BY: *[Signature]*

TITLE
FLUME WATER
COURSE CROSSINGS
SCALE N.T.S. DWG No STDS-03-ML-05-111 (1/3) REV 00

---TIME---
---DESIGNFILE---

APPLICATION:

FLUME OPERATIONS WILL BE REQUIRED ON STREAMS WHERE FLOW MUST BE MAINTAINED AND SILTATION MUST BE MINIMIZED TO PREVENT IMPACT ON FISH POPULATIONS AND DOWNSTREAM USERS. FLUME INSTALLATIONS WILL ALSO BE CONSIDERED WHERE MAINTENANCE OF FLOW IS THE ONLY REQUIREMENT.

THE FOLLOWING SPECIFICATION AND PROCEDURES ARE GENERAL REQUIREMENTS FOR INSTALLATION OF FLUMED WATER COURSE CROSSINGS WHICH ARE TO BE APPLIED UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

SPECIFICATIONS:

- 1) FLUMING OPERATIONS WILL BE COMBINED WITH A BRIDGED VEHICLE CROSSING. CULVERT AND GRADE INSTALLATIONS WILL BE CONSIDERED FOR STREAMS HAVING A LOWER SENSITIVITY.
 - 2) FLUME LENGTH WILL SPAN FROM THE SPOIL SIDE EDGE OF THE ROW TO THE SPOIL SIDE EDGE OF THE VEHICLE CROSSING, OR TO THE WORK SIDE EDGE OF THE ROW IN THE CASE OF A GRADE MATERIAL VEHICLE CROSSING.
 - 3) FLUME CAPACITY WILL BE SPECIFIED BY THE CONTRACTOR FOR DIAMETER AND NUMBER OF PIPES REQUIRED. THE REQUIREMENTS MAY BE ADJUSTED BY THE COMPANY IN THE FIELD TO ACCOUNT FOR CONDITIONS, IN CONSULTATION WITH THE CONTRACTOR AND AUTHORITIES.
 - 4) FLANGES WILL BE REQUIRED ON BOTH ENDS OF THE FLUME. THE FLANGES WILL BE CONSTRUCTED OUT OF 1/4" STEEL AND MUST BE A MINIMUM OF 4' HIGH BY 8' WIDE. REQUIREMENTS FOR LARGER FLANGES OR FLANGE WINGS WILL BE PRE-SPECIFIED OR DETERMINED BY THE COMPANY IN THE FIELD DURING CONSTRUCTION. CONTRACTOR MUST BE PREPARED TO CONSTRUCT THE FLUME ON SITE.
 - 5) FLUMES MUST BE CONSTRUCTED OF STEEL PIPELINE TYPE PIPE OR OTHER MATERIAL APPROVED BY THE COMPANY. CORRUGATED CULVERT IS UNACCEPTABLE.
 - 6) BOTH ENDS OF THE FLUME WILL BE SEALED USING COMBINATIONS OF INSTREAM MATERIAL, CLEAN GRADE MATERIAL, WASHED ROCK, PLASTIC SHEETING, FILTER CLOTH, AND SANDBAGS. IF LOOSE MATERIALS ARE USED TO CREATE THE SEALS, THE DAMS MUST BE A MINIMUM OF 2 METERS THICK AND EXTEND FROM BANK TOP TO BANK TOP, OR A MINIMUM OF 1 METER ABOVE WATER LEVEL. IF SANDBAGS ARE USED TO CREATE THE SEALS, THE DAMS MUST BE A MINIMUM OF 1 METER THICK AND EXTEND FROM BANK TOP TO BANK TOP. IF PLASTIC SHEETING OR FILTER CLOTH ARE SPECIFIED THEY MUST BE LAID OVER BOTH SIDES OF BOTH DAMS.
 - 7) THE CONCEPT IS TO PREVENT CLEAN SURFACE WATER FROM ENTERING THE EXCAVATION AND TO PREVENT SILTED WATER FROM LEAVING THE EXCAVATION.
 - 8) CONTRACTOR SHALL CONSTRUCT SUMPS WHEN DIRECTED BY THE COMPANY TO CONTAIN EXCAVATED MATERIAL AND/OR SILTLADEN WATER PUMPED FROM THE TRENCH. TOPSOIL OR ORGANICS SHALL BE REMOVED AND CONSERVED PRIOR TO EXCAVATION OF OF SUMPS. SUMPS SHALL BE SIZED TO CONTAIN ALL EXCAVATED MATERIAL, AND ALLOW PUMPING OF THE TRENCH WITHOUT ANY DOWNSTREAM SILTATION.
 - 9) THE CONTRACTOR MUST HAVE PUMPS OF SUFFICIENT SIZE TO PREVENT THE DOWNSTREAM FLOW OF SILTED WATER ON SITE TO PUMP THE EXCAVATION AS REQUIRED. BACKUP PUMPS MUST BE SUPPLIED BY THE CONTRACTOR. CONTRACTOR MUST HAVE ON SITE SUFFICIENT LEAK FREE HOSE TO PUMP THE EXCAVATION WATER TO ANY LOCATION IN PROXIMITY TO THE FLOODPLAIN OF THE CROSSING SPECIFIED BY THE COMPANY. THIS IS TO FACILITATE SETTLEMENT AND FILTRATION OF THE SILTED WATER BEFORE IT RE-ENTERS THE STREAM. FLOW DISSIPATORS WILL BE REQUIRED AT THE DISCHARGE END OF ALL HOSES TO PREVENT FURTHER SILTATION AND EROSION.
- CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLY AND DELIVERY OF ALL MATERIALS TO THE SITE.

TCT-1757F/6609

AND AL-SK-18-423/426/432
STANDARD ISSUE, SUPERCEDES SK-1396 (2)
ADD A-SK-18-252

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ORIGINATOR:

JALBERT *Apr 5/02*
NAME DATE

CHECKED BY:

BW

APPROVED BY:

J

TITLE

FLUME WATER
COURSE CROSSINGS

SCALE
N.T.S.

OWG No

STDS-03-ML-05-111 (2/3)

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PROCEDURE:

- 1) INSTALL THE VEHICLE CROSSING ON THE WORK SIDE EDGE OF THE ROW TO ALLOW FOR A WIDE EXCAVATION.
- 2) GRADE THE BANKS OF THE WATER CROSSING AND PREPARE THE SPOIL CONTAINMENT AREAS.
- 3) CONSTRUCT THE FLUME WITH CORRECT FLANGES AND FLANGE WINGS, AS PER THE SPECIFICATIONS.
- 4) STOCKPILE ALL REQUIRED MATERIALS PRIOR TO BEGINNING INSTREAM WORK.
- 5) COMPLETE CONSTRUCTION OF PIPE SECTION.
- 6) INSTALL THE FLUME IN THE STREAM CHANNEL USING SEALING TECHNIQUES. DEWATER THE AREA BETWEEN THE FLANGE WINGS.
- 7) BEGINNING IN THE EARLY MORNING, EXCAVATE THE TRENCH AS QUICKLY AS POSSIBLE PLACING SPOIL OUT OF THE STREAM CHANNEL. CREATE SPOIL CONTAINMENT SUMPS IF NECESSARY TO KEEP SPOIL FROM FLOWING BACK INTO THE STREAM CHANNEL.
- 8) PUMP EXCAVATION AS REQUIRED TO PREVENT DOWNSTREAM FLOW OF SILTED WATER. DIRECT THE PUMPED WATER INTO VEGETATED AREAS WELL BACK FROM THE WATER COURSE. CONSTRUCT WATER CONTAINMENT SUMPS.
- 9) INSTALL PIPE.
- 10) BACKFILL THE STREAM CHANNEL FIRST, SQUEEZING THE SILTED WATER INTO THE BANK EXCAVATIONS. PUMP OR DRAIN THE BANK EXCAVATIONS WHILE PROGRESSIVELY BACKFILLING FROM THE STREAM CHANNEL OUTWARD.
- 11) COMPLETE BACKFILL.
- 12) RE-ESTABLISH THE BED AND BANKS OF THE STREAM CHANNEL.
- 13) REMOVE THE DOWNSTREAM SEAL MATERIALS.
- 14) REMOVE UPSTREAM SEAL MATERIALS.
- 15) REMOVE THE FLUME.

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AND A-SK-18-252

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NAME DATE
JALBERT

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TITLE

FLUME WATER
COURSE CROSSINGS

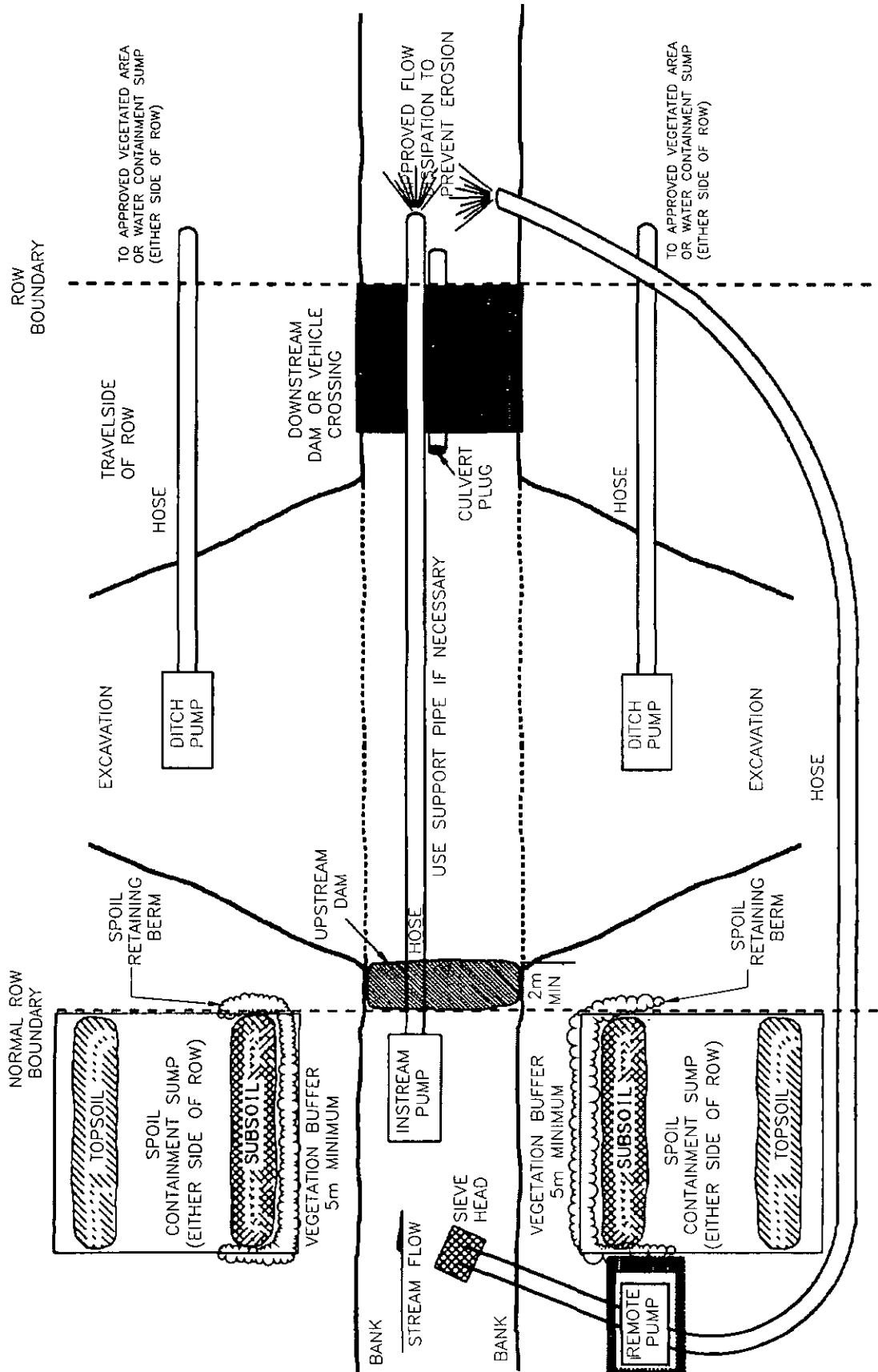
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ORIGINATOR:
NAME: *C. Jalbert* DATE: *Apr 3/02*
CHECKED BY: *[Signature]* APPROVED BY: *[Signature]*

TITLE
DAM AND PUMP
WATER COURSE CROSSINGS

SCALE
N.T.S.

DWG No
STDS-03-ML-05-112 (1/3)

REV
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APPLICATION:

DAM AND BYPASS PUMPING OPERATIONS WILL BE APPLIED ON STREAMS HAVING A LOW FLOW RATE. THE PRIME CONSIDERATION WILL BE MAINTENANCE OF DOWNSTREAM FLOW. DAM AND PUMP INSTALLATIONS MAY ALSO BE CONSIDERED FOR ANY STREAM WHERE FLUMES ARE PREVENTED BY PIPE BEND AND TIE IN CONSTRAINTS. THE FOLLOWING SPECIFICATION AND PROCEDURES ARE GENERAL REQUIREMENTS FOR DAM AND PUMP INSTALLATIONS WHICH ARE TO BE APPLIED UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

SPECIFICATIONS:

- 1) DAM AND BYPASS OPERATIONS WILL BE COMBINED WITH CULVERT AND GRADE VEHICLE CROSSINGS. BRIDGES MAY BE USED IN PLACE OF CULVERT AND GRADE ON STREAMS HAVING GREATER SENSITIVITY.
- 2) BYPASS PUMPING UNIT MUST BE CAPABLE OF HANDLING 150% OF MAXIMUM SPECIFIED STREAM FLOW DURING THE PERIOD OF INSTALLATION. A BACKUP UNIT OF EQUAL CAPACITY MUST BE ON SITE IN CASE OF MAIN PUMP FAILURE.
- 3) PUMPS MUST BE MANNED CONTINUOUSLY UNTIL OPERATION IS COMPLETE.
- 4) PUMPS AND THEIR FUEL SUPPLY MUST BE PLACED IN A PLASTIC LINED BERMED AREA TO CONTAIN ACCIDENTAL SPILLS.
- 5) BYPASS PUMP INTAKE MUST BE SCREENED BY 1cm SIEVE TO PROTECT FISHERIES RESOURCES.
- 6) DAMS WILL BE CONSTRUCTED USING COMBINATIONS OF INSTREAM MATERIAL, CLEAN GRADE MATERIAL, WASHED ROCK, PLASTIC SHEETING, FILTER CLOTH, AND SANDBAGS. IF LOOSE MATERIALS ARE USED TO CREATE THE DAMS, THE DAM MUST BE A MINIMUM OF 2 METERS THICK AND EXTEND FROM BANK TOP TO BANK TOP. IF SANDBAGS ARE USED TO CREATE THE DAMS, THE DAMS MUST BE A MINIMUM OF 1 METER THICK AND EXTEND FROM BANK TOP TO BANK TOP. IF PLASTIC SHEETING OR FILTER CLOTH ARE SPECIFIED THEY MUST BE LAID OVER BOTH SIDES OF BOTH DAMS. THE CONCEPT IS TO PREVENT CLEAN SURFACE WATER FROM ENTERING THE EXCAVATION AND TO PREVENT SILTED WATER FROM LEAVING THE EXCAVATION. THE LEVEL OF EXISTING SILTATION WILL BE CONSIDERED AT THE TIME OF CONSTRUCTION.
- 7) CONTRACTOR MUST HAVE SUFFICIENT LEAK FREE HOSE ON SITE TO BYPASS PUMP AROUND THE EXCAVATION OR THROUGH THE EXCAVATION.
- 8) THE BYPASS PUMP DISCHARGE HOSE MUST BE EQUIPPED WITH FLOW DISSIPATORS AND PLACED IN SUCH A MANNER THAT PREVENTS FURTHER EROSION AND SILTATION.
- 9) THE CONTRACTOR MUST HAVE AT LEAST TWO PUMPS ON SITE OF SUFFICIENT SIZE TO PUMP THE EXCAVATION TO PREVENT DOWNSTREAM FLOW OF SILTED WATER. BACKUP PUMPS MUST BE SUPPLIED BY THE CONTRACTOR. SUFFICIENT LEAK FREE HOSE MUST BE ON SITE TO PUMP THE EXCAVATION WATER TO ANY LOCATION IN PROXIMITY TO THE FLOODPLAIN OF THE CROSSING. THIS IS TO FACILITATE SETTLEMENT AND FILTRATION OF THE SILTED WATER BEFORE IT RE-ENTERS THE STREAM. CONTRACTOR MUST ALSO BE PREPARED TO CREATE SUMPS FOR THIS PURPOSE. FLOW DISSIPATORS WILL BE REQUIRED AT THE DISCHARGE END OF ALL HOSES TO PREVENT FURTHER SILTATION AND EROSION.
- 10) CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLY AND DELIVERY OF ALL MATERIALS TO THE SITE.

TCT-1757F/6609

STANDARD ISSUE, SUPERCEDES SK-1551 (2)
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A2-SK-18-433

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ORIGINATOR <i>A. J. Albert</i> <i>Apr 3/02</i> NAME DATE JALBERT	
CHECKED BY: <i>[Signature]</i>	APPROVED BY: <i>[Signature]</i>

TITLE DAM AND PUMP WATER COURSE CROSSINGS	
SCALE N.T.S.	DWG No STDS-03-ML-05-112 (2/3)
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PROCEDURE:

- 1) INSTALL THE VEHICLE CROSSING ON THE WORK SIDE EDGE OF THE ROW TO ALLOW FOR A WIDE EXCAVATION.
- 2) STOCKPILE ALL REQUIRED MATERIALS AND EQUIPMENT ON THE SITE PRIOR TO BEGINNING INSTREAM WORK.
- 3) PERFORM THE BANK GRADE AND PREPARE SPOIL CONTAINMENT SUMPS AS CIRCUMSTANCES DICTATE.
- 4) COMPLETE WELDING, COATING, AND WEIGHTING OF THE RIVER PIPE SECTION.
- 5) BEGIN THE OPERATION IN THE EARLY MORNING TO ALLOW FOR SAME DAY INSTALLATION IF POSSIBLE.
- 6) INSTALL PUMPS AND CHECK OPERATION TO EQUALIZE FLOW.
- 7) CONSTRUCT THE SPOIL SIDE DAM USING SPECIFIED DAMMING TECHNIQUES. DAM SHOULD BE CONSTRUCTED ON THE SPOIL SIDE EDGE OF THE ROW TO ALLOW FOR A WIDE EXCAVATION.
- 8) PLUG THE VEHICLE CROSSING CULVERT OR CONSTRUCT THE DOWNSTREAM DAM USING SPECIFIED DAMMING TECHNIQUES. WHERE A BRIDGE IS USED THE DAM SHOULD BE CONSTRUCTED AS CLOSE TO THE SPOIL SIDE OF THE BRIDGE AS POSSIBLE TO ALLOW FOR A WIDE EXCAVATION.
- 9) EXCAVATE TRENCH AS RAPIDLY AS POSSIBLE.
- 10) INSTALL PIPE.
- 11) BACKFILL THE STREAM CHANNEL FIRST PUSHING THE SILTED WATER BACK INTO THE BANK EXCAVATIONS. PUMP OR DRAIN THE BANK EXCAVATIONS WHILE PROGRESSIVELY BACKFILLING FROM THE STREAM CHANNEL OUTWARD. CONSTRUCT WATER CONTAINMENT SUMPS IF NECESSARY.
- 12) RESTORE BED AND BANKS OF THE STREAM CHANNEL.
- 13) REMOVE THE DOWNSTREAM DAM OR VEHICLE CROSSING PLUG.
- 14) REMOVE UPSTREAM DAM OR VEHICLE CROSSING PLUG.
- 15) REMOVE BYPASS PUMPS.

STANDARD ISSUE, SUPERCEDES 84-159 (3)
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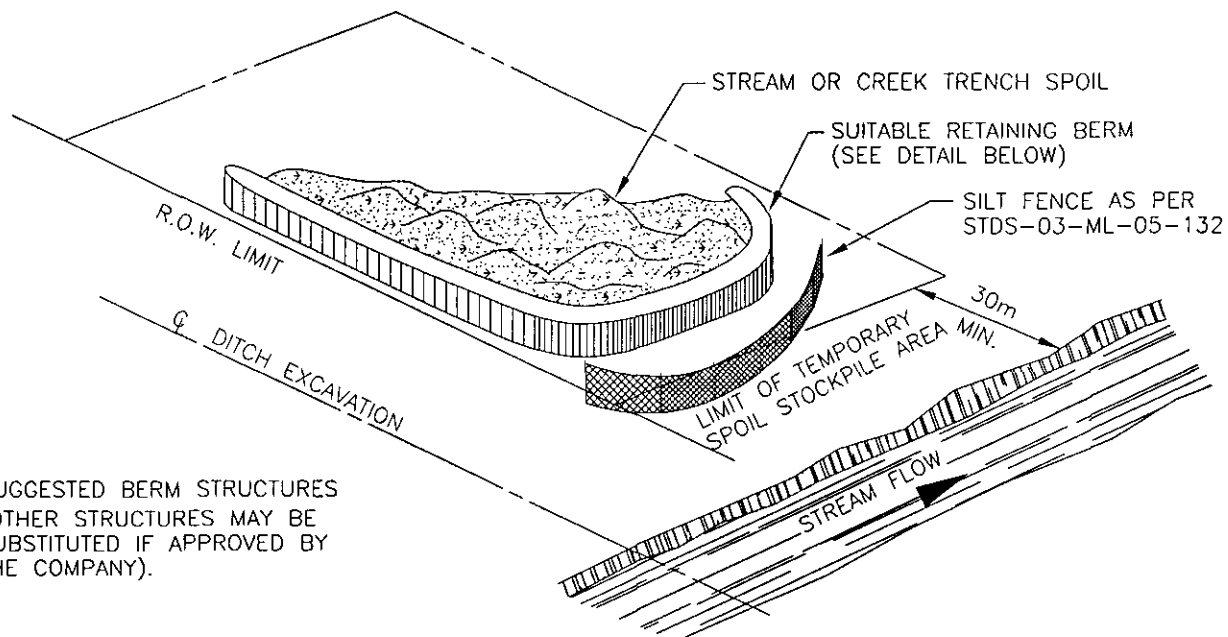
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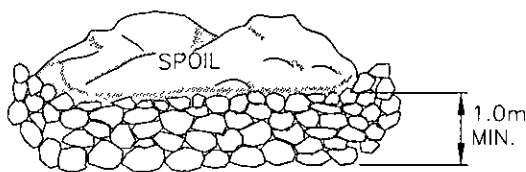


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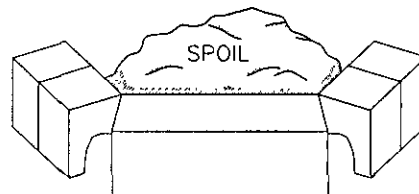
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DAM AND PUMP WATER COURSE CROSSINGS	
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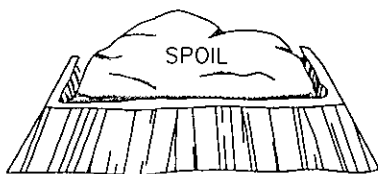
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(OTHER STRUCTURES MAY BE
SUBSTITUTED IF APPROVED BY
THE COMPANY).



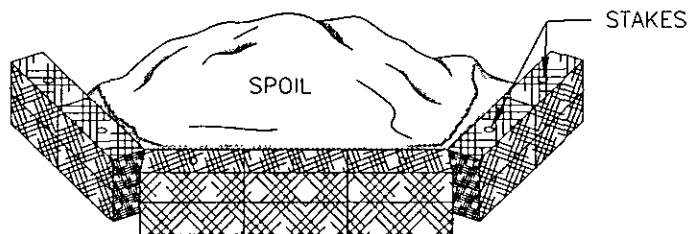
1. WINDROW BOULDERS/SHOT ROCK



2. SADDLE WEIGHTS



3. DIRT BERM



4. STAW BALES (STAKED)

NOTES:

1. CONTAINMENT BERMS ARE TO BE USED WHERE STREAM OR CREEK SPOIL COULD REENTER THE WATERCOURSE DIRECTLY OR INDIRECTLY.
2. TRENCH SPOIL WHICH IS SLURRIED MUCK OR DEBRIS, SHALL BE HAULED AWAY AND NOT STOCKPILED FOR BACKFILLING.
3. MATERIAL USED FOR THE CONTAINMENT BERM SHALL BE A MINIMUM OF 5m FROM THE WATER EDGE. IT SHALL BE KEPT TO A HEIGHT WHICH REMAINS STABLE DURING THE CONSTRUCTION PERIOD.
4. CARE SHALL BE TAKEN THAT THE SPOIL PILE DOES NOT OVERTOP THE CONTAINMENT BERM.
5. THE CONTAINMENT BERM SHALL BE DISMANTLED AND THE SITE RESTORED TO THE ORIGINAL CONDITION UPON COMPLETION OF THE WATER CROSSING.
6. WHERE POSSIBLE, RIPARIAN VEGETATION TO BE MAINTAINED.
7. STAGED MOVEMENT OF SOIL MAY BE REQUIRED IF QUANTITIES ARE EXCESSIVE.
8. CARE AND ATTENTION MUST BE TAKEN TO ENSURE BERMS ARE MAINTAINED.

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ORIGINATOR:
A. Julliet *Apr 5/02*
NAME DATE
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APPROVED BY: *[Signature]*

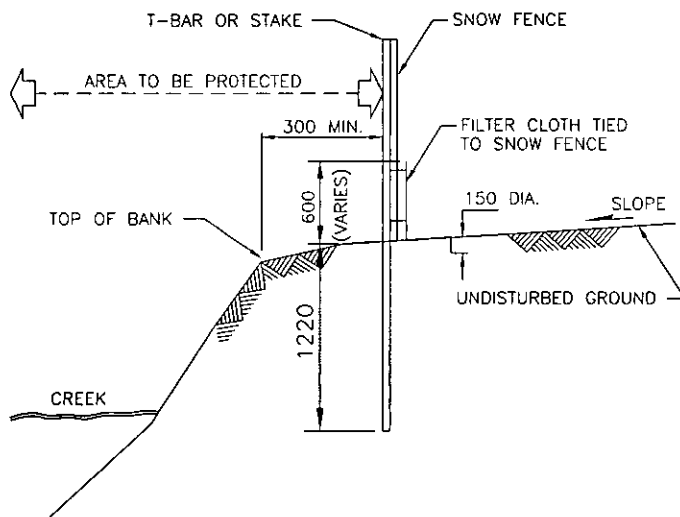
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SCALE

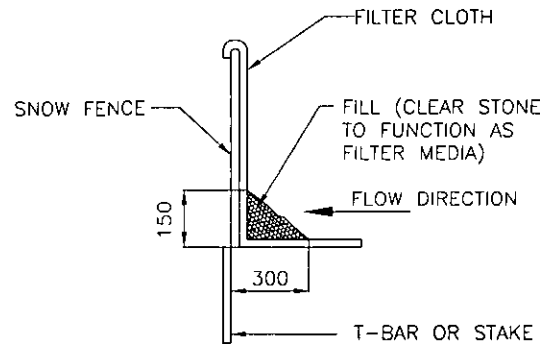
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PLACEMENT IN
SUMMER CONDITIONS



PLACEMENT IN
FROZEN CONDITIONS

SIDE VIEW OF SILT FENCE

NOTES:

1. SILT FENCES ARE TO BE USED IN AREAS WHERE SHEET FLOW OR RELATIVELY SMALL VOLUMES OF WATER CAN BE EXPECTED TO OCCUR. FOR LARGER VOLUMES WITHIN A DEFINED CHANNEL, A CHECK DAM WILL BE REQUIRED.
2. T-BAR STAKES ARE TO BE PLACED EVERY 3m OR CLOSER AS CONDITIONS REQUIRE.
3. SNOW FENCES AND FILTER CLOTH ARE TO BE ATTACHED AT EACH T-BAR POST AT A MINIMUM OF 3 LOCATIONS.
4. THE FILTER FABRIC IS TO BE TOED INTO THE GROUND MATERIAL WITH A LAYER OF SANDBAGS OR OTHER MATERIAL TO PREVENT UNDERMINING.
5. WHERE POSSIBLE, RIPARAN VEGETATION IS TO BE LEFT UNDISTURBED.
6. SILT FENCES ARE TO BE CHECKED AND MAINTAINED ON A REGULAR BASIS, TRAPPED SEDIMENT TO BE REMOVED.
7. MATERIAL TO BE EITHER A WOVEN GEOTEXTILE FABRIC SUCH AS MIRAFI 600X OR 700X OR TERRAFIX 400W, OR NON WOVEN GEOTEXTILE FABRIC SUCH AS MIRAFI P250 OR TERRAFIX 300R.

TCT-1757F/6609

STANDARD ISSUE, SUPERCEDES A-SK-18-391

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TITLE
SEDIMENT CONTROL-
SILT FENCE CONSTRUCTION

SCALE

DWG No

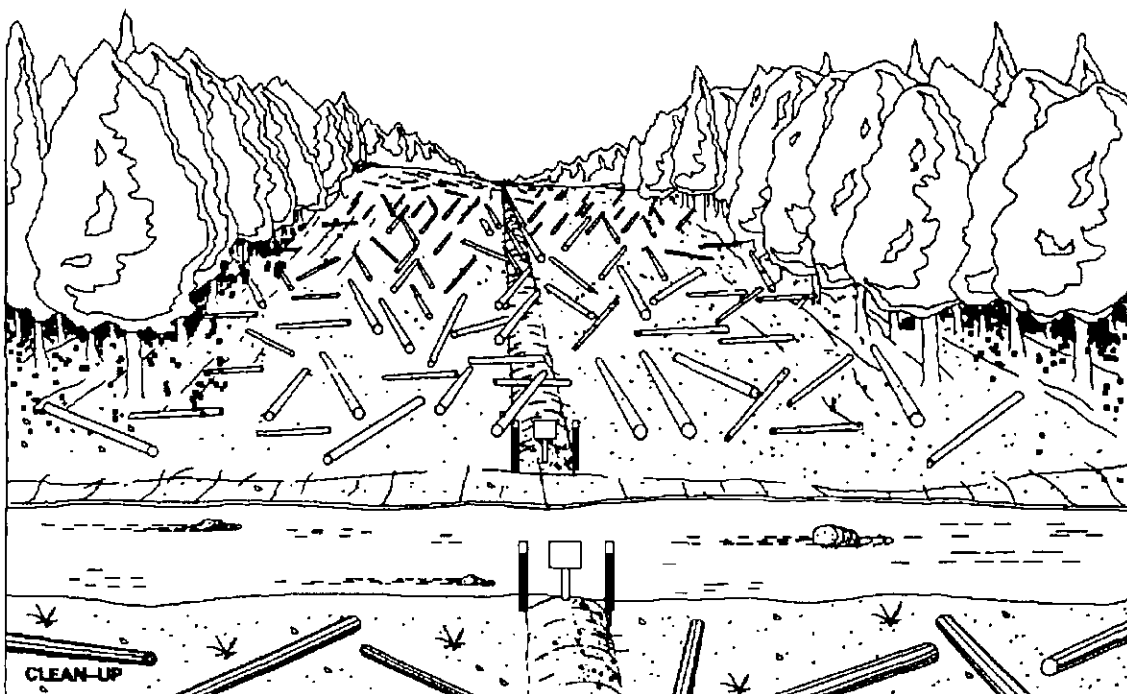
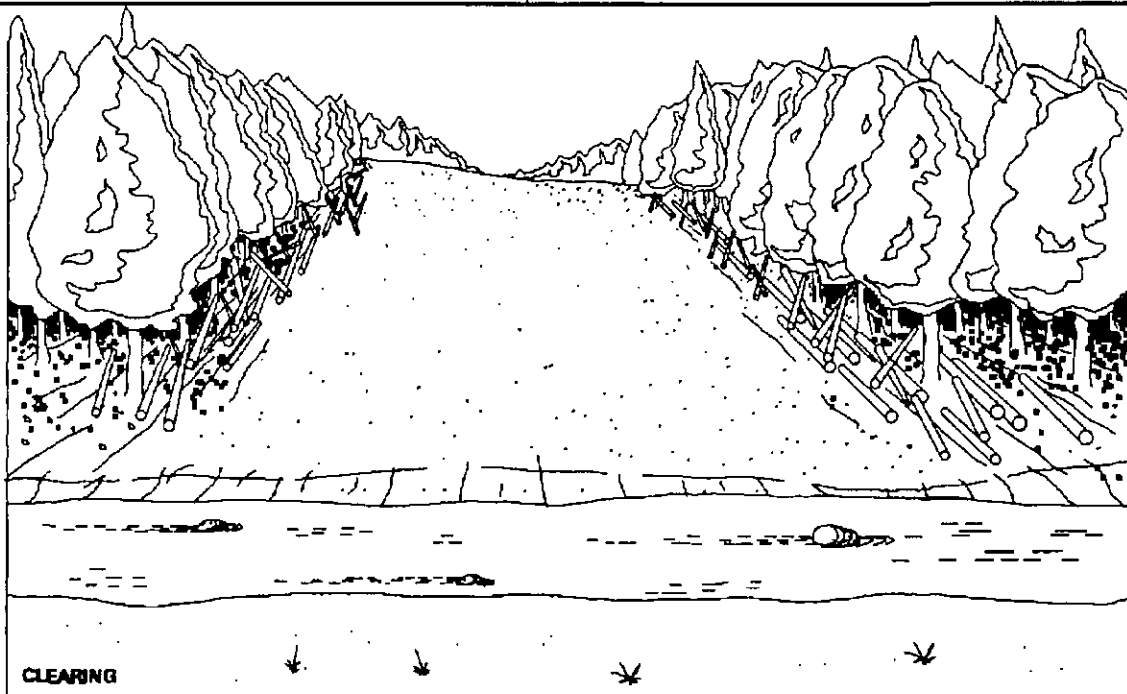
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1. WINDROW SLASH AGAINST STANDING TIMBER ON BOTH SIDES OF R.O.W.
2. PORTION OF TREES 20cm IN DIAMETER OR GREATER ARE NOT SUITABLE FOR EROSION CONTROL AND WILL BE SALVAGED OR BURNED AS REQUIRED.
3. TEMPORARY WORKSPACE OFF R.O.W. FOR STORAGE OF ROLLBACK WILL REQUIRE APPROVAL FROM AUTHORITIES.
4. MAINTAIN EXISTING ACCESS RIGHTS-OF-WAY THROUGH ROLLBACK (i.e. TRAILS, SEISMIC LINES).
5. ROLLBACK SHOULD BE EVENLY DISTRIBUTED OVER R.O.W. AND COMPACTED WITH A DOZER. AVOID OVERLAP OF ROLLBACK.

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ORIGINATOR
A. JALBERT Mar. 28/02
NAME DATE
A. JALBERT
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TITLE

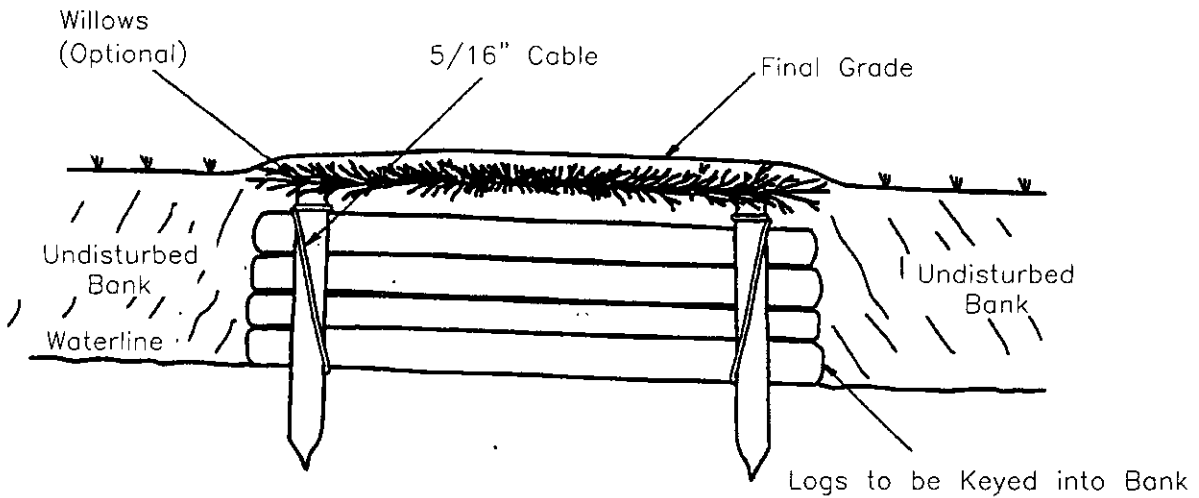
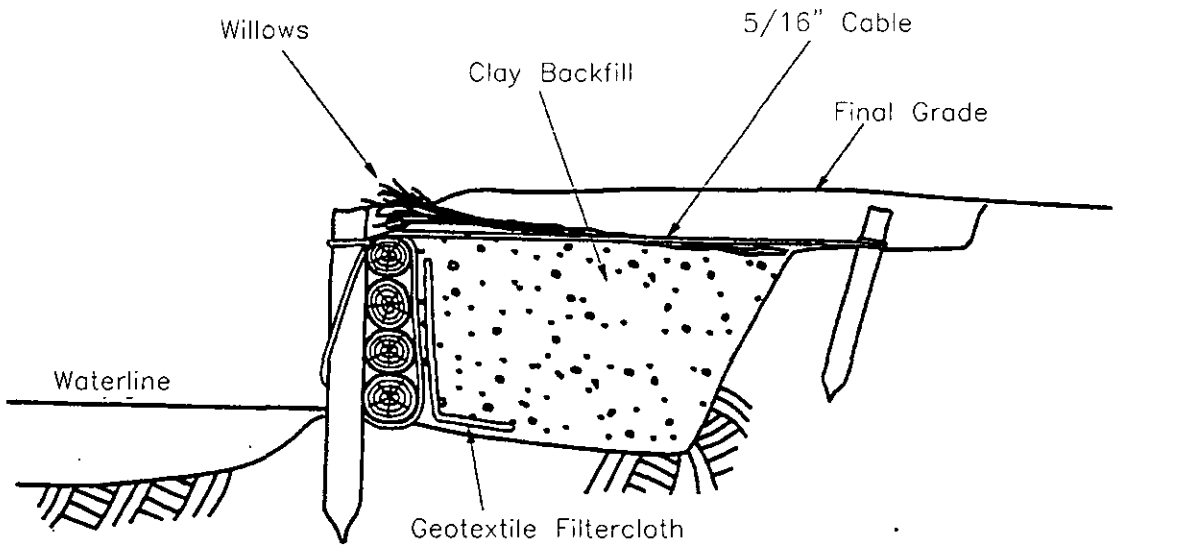
TYPICAL ROLLBACK
FOR EROSION CONTROL

SCALE
N.T.S.

DWG No

STDS-03-ML-05-313

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Note:

1. Log walls to be constructed using coniferous material
2. Unfrozen backfill or loose grade material should be used as fill material
3. Anchor pilings or deadman anchors to be used to secure cable in bank
4. Non-woven filter cloth (Nylex C34 or equivalent) to be used to line log wall

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R. J. Albert 9/29/02
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JALBERT
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TITLE

STREAMBANK RECLAMATION -
LOG WALL

SCALE
N.T.S.

DWG No

STDS-03-ML-05-603

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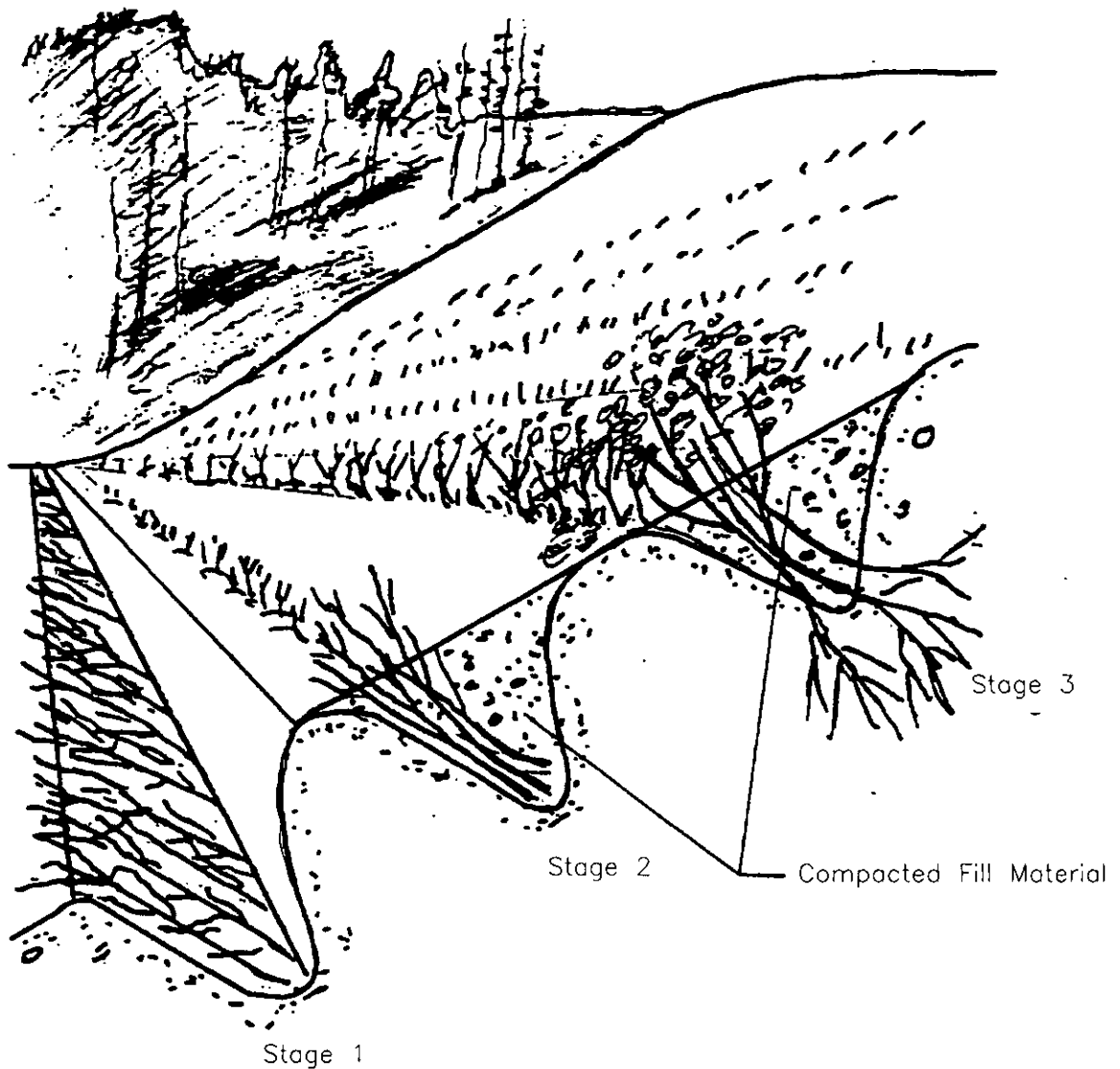
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SUPERSEDES RB0004.PPL 2002/04/24

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- Stage 1. Cut trench across slope. Fill with dormant woody plant material.
- Stage 2. Fill is placed on top of branch layer and compacted.
- Stage 3. Potential growth after 2 - 3 growing seasons.



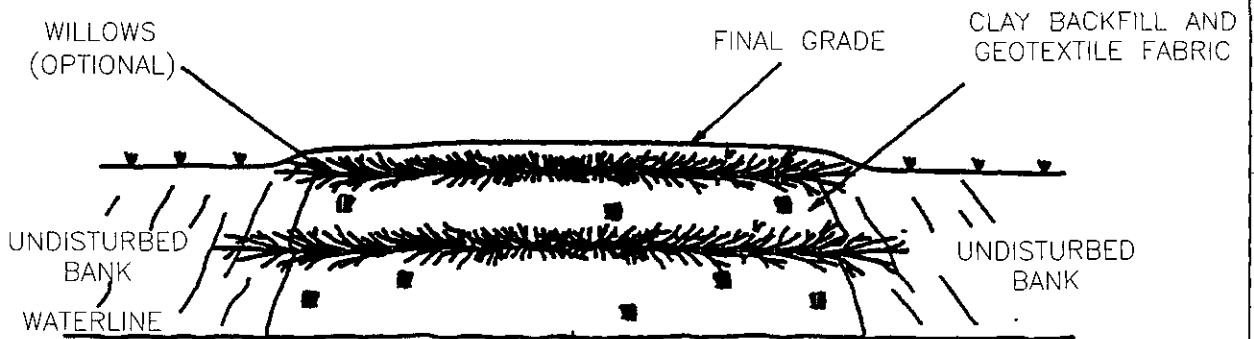
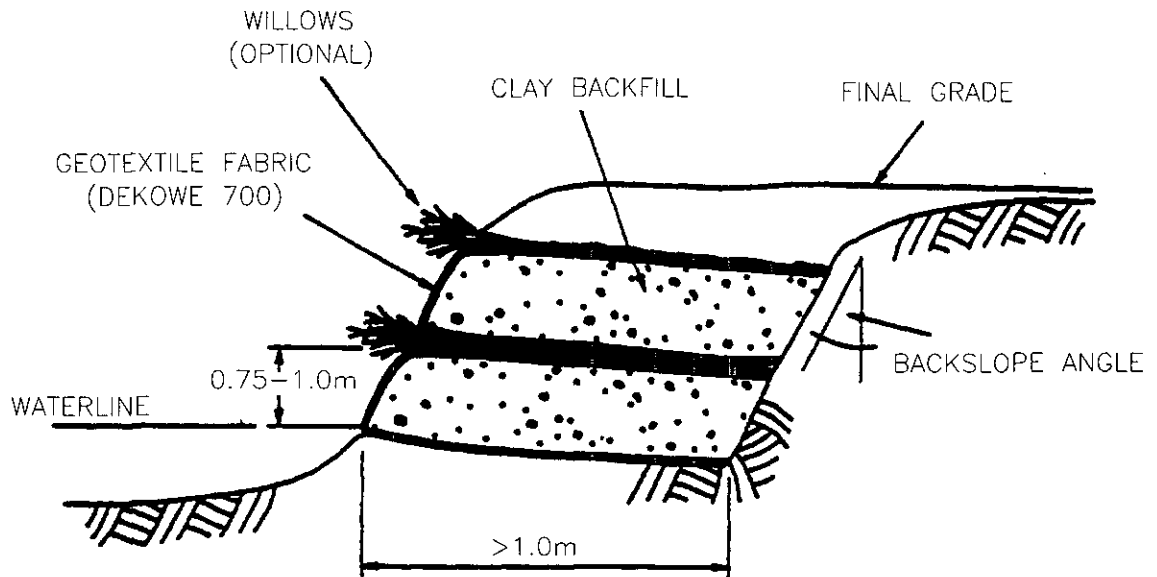
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<i>A. J. J. J.</i>	<i>Apr 29/02</i>
NAME	DATE
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CHECKED BY:	APPROVED BY:
<i>[Signature]</i>	<i>[Signature]</i>

TITLE	
STREAMBANK RECLAMATION - BRUSH LAYER IN CROSS CUT SLOPE	
SCALE	DWG No
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NOTE:

1. DURING WINTER CONSTRUCTION, VEGETATED GEOGRIDS SHOULD BE INSTALLED IN CONJUNCTION WITH DITCH BACKFILLING AND BANK RECONSTRUCTION.
2. UNFROZEN BACKFILL (OR LOOSE GRADE MATERIAL) SHOULD BE USED TO MINIMIZE AIR SPACES. THIS ALLOWS PROPER SOIL FABRIC CONTACT, WHICH MINIMIZES STEELING AND SCOURING DURING RUNOFF AND ENSURES SURVIVAL OF THE WILLOW CUTTINGS.
3. PLYWOOD FORMS (8x2 FEET) MAY BE REQUIRED TO HELP RECONSTRUCT STEEP OR VERTICAL BANKS.
4. GRID LAYERS SHOULD NOT EXCEED 1.0m IN HEIGHT (0.75m OPTIONAL) WITH A MINIMUM OF 1.0m SET IN BANK.
5. WILLOWS SHOULD BE HARVESTED AS CLOSE TO INSTALLATION AS POSSIBLE, PREFERABLY THE PREVIOUS DAY BUT NO MORE THAN 2 DAYS EARLY.
6. WILLOWS SHOULD BE 1.5 TO 2.5cm IN DIAMETER AND 2-3.0m LONG WITH NO MORE THAN 25cm LEFT EXPOSED.
7. PLANTING RATE SHOULD BE APPROXIMATELY 1 STEM PER 15cm.

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JALBOET
NAME
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TITLE

STREAMBANK RECLAMATION-
VEGETATED GEOTEXTILE
INSTALLATION

SCALE
NTS

DWG No

STDS-03-ML-05-606

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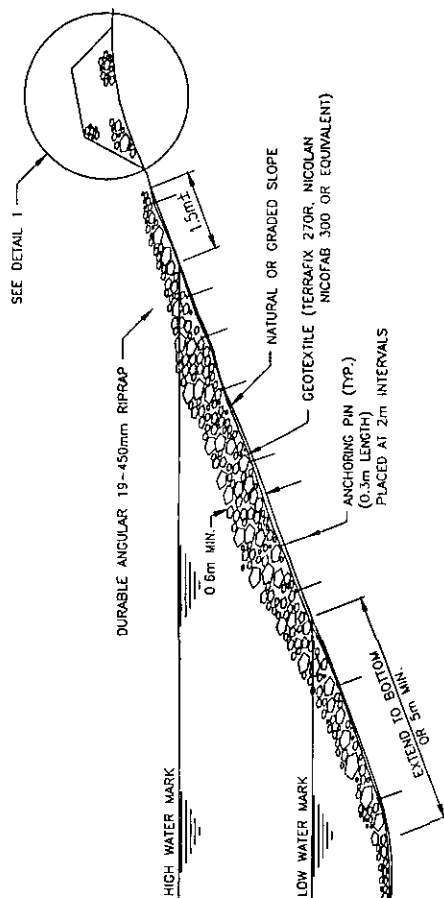
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WATERCROSSING BANK
EROSION PROTECTION

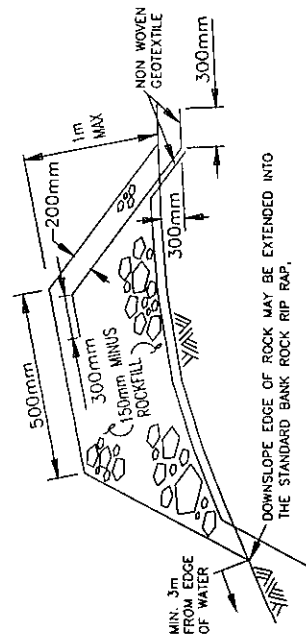
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DETAIL 1 FILTER BERM



NOTES:

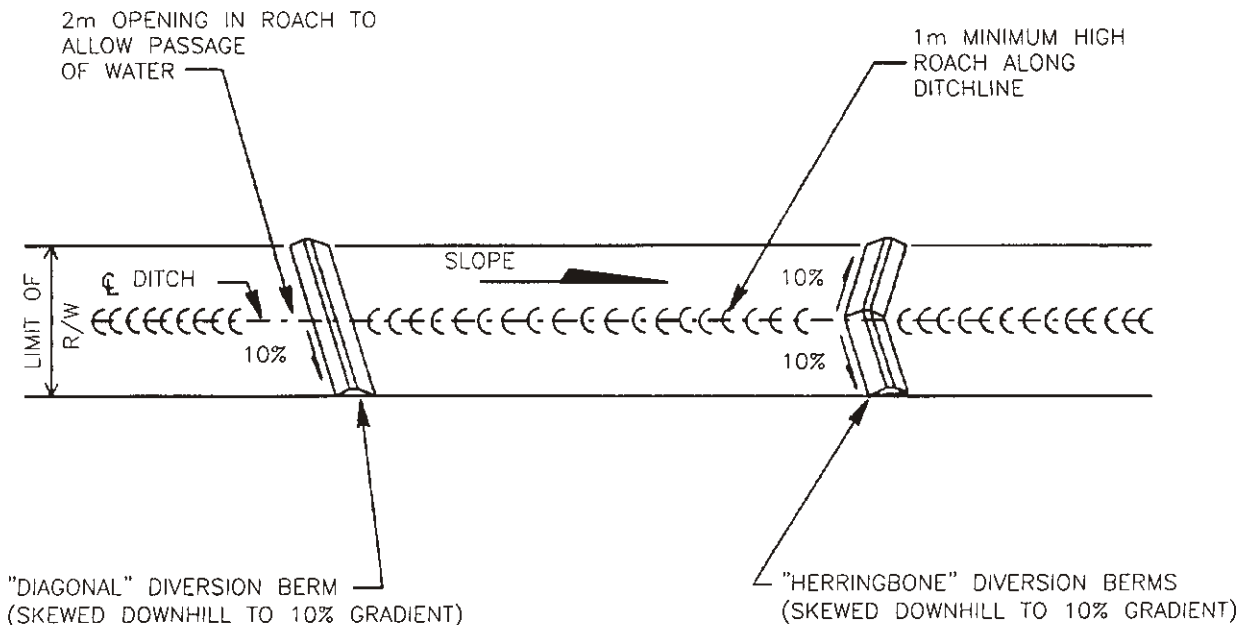
1. GEOTEXTILE TO BE A NON WOVEN FABRIC SUCH AS MIRAFIX P250 OR TERRAFIX 300R.
2. FILTER BERM TO BE CONSTRUCTED ON STABLE SLOPE SURFACES ONLY.
3. GEOTEXTILE FOR FILTER BERM TO BE INDEPENDENT OF GEOTEXTILE REQUIRED FOR THE EMBANKMENT.
4. MINIMUM 300mm OVERLAP OF GEOTEXTILE

NOTES:

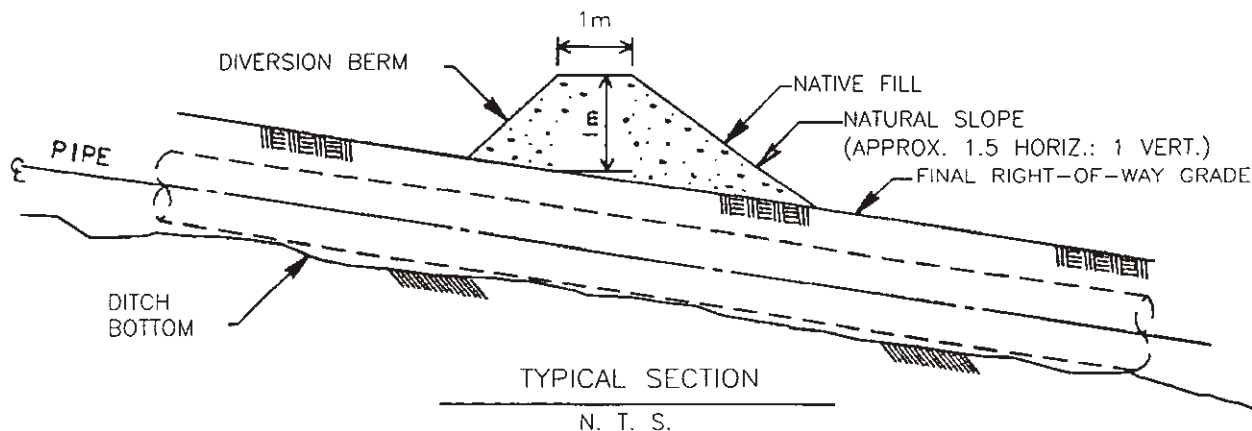
1. REMOVE ALL STUMPS, ORGANIC MATERIAL AND PREPARE BANKS TO A MAXIMUM SLOPE OF 2 : 1 IF PRACTICAL.
2. INSTALL FILTER CLOTH (GEOTEXTILE) UNDER ROCK RIPRAP AS DIRECTED BY THE COMPANY.
3. SIZE OF RIPRAP IS DEPENDENT ON SLOPE OF BANK AND WATER VELOCITY.
4. INSTALL RIPRAP TO A DEPTH OF APPROXIMATELY 1.5 TO 2 TIMES THE MAXIMUM EQUIVALENT DIAMETER OF THE RIPRAP.
5. KEY IN EDGES OF RIPRAP & FILTER CLOTH TO NATURAL GROUND CONTOURS SO THAT UNDERMINING DOES NOT OCCUR.
6. RIPRAP IS TO BE INSTALLED TO 0.5m ABOVE HIGH WATER MARK OR 1.5m± ALONG THE SLOPE, WHICHEVER IS LESS.
7. FILTER BERM TO BE CONSTRUCTED ON AN AS REQUESTED BASIS BY THE COMPANY REPRESENTATIVE.

101-1/5/1/6609

REVISIONS 00 STANDARD ISSUE, SUPERCEDES SK-1390 (1/2)



PLAN
N. T. S.



ORIGINATOR:	
<i>B. Watts</i>	3 APR 2002
NAME	DATE
B. WATTS	
CHECKED BY:	APPROVED BY:
<i>gm</i>	<i>JS</i>

TITLE

TYPICAL DIVERSION BERMS

SCALE
N.T.S.

DWG No

STDs-03-ML-12-221 (1/2)

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NOTES:

- 1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
- 2) "DIAGONAL" DIVERSION BERMS ARE USED:
-WHERE THE EXISTING TOPOGRAPHY AND SLOPE DRAINAGE SUGGEST A PREFERRED DIRECTION OF SURFACE WATER MOVEMENT.
- 3) "HERRINGBONE" DIVERSION BERMS ARE TO BE USED:
-WHERE THERE IS NO APPARENT PREFERRED DIRECTION OF SURFACE WATER MOVEMENT OR WHERE THE BERM IS LOCATED ACROSS A SLOPE WITH SIDE CUTS ON BOTH SIDES OF THE RIGHT-OF-WAY.
- 4) ALL BERMS SHALL BE CONSTRUCTED OF NATIVE MINERAL SOIL NOMINALLY COMPACTED IN LIFTS. NO ORGANICS, SNOW, ICE OR OTHER DELETERIOUS MATERIAL SHALL BE INCORPORATED IN THE BERM FILL.
- 5) THE LENGTH OF THE BERMS SHALL EXTEND ACROSS THE FULL WIDTH OF THE DISTURBED RIGHT-OF-WAY OR TO THE TOE OF THE CUT SLOPE.
- 6) THE FINAL LOCATION, SPACING, AND DIRECTION OF THE BERMS ARE TO BE DETERMINED DURING CONSTRUCTION BY THE FIELD INSPECTOR BASED ON LOCAL TOPOGRAPHY AND DRAINAGE PATTERNS.

TYPICAL DIVERSION BERM SPACING

SLOPE	SOIL EROSION POTENTIAL		
	HIGH (FINE SANDS AND SILTS)	MODERATE (CLAYS AND COARSE SANDS)	LOW (GRAVEL AND EXPOSED BEDROCK)
GENTLE (UNDER 5%)	45m	60m	NO WATERWAYS NECESSARY
MODERATE (5%-10%)	30m	45m	60m
STEEP (OVER 10%)	$\frac{305}{\% \text{ GRADE}} = \text{---m}$	$\frac{305 \times 1.5}{\% \text{ GRADE}} = \text{---m}$	$\frac{305 \times 2}{\% \text{ GRADE}} = \text{---m}$

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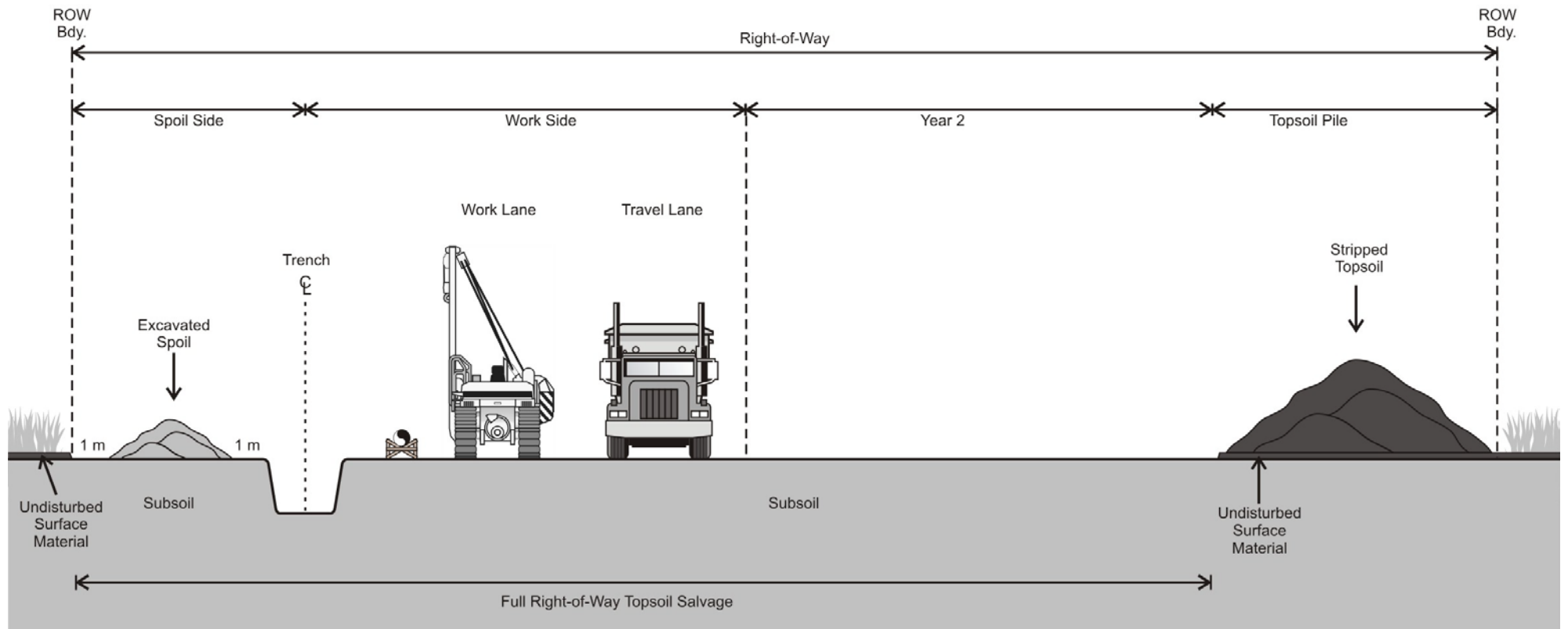
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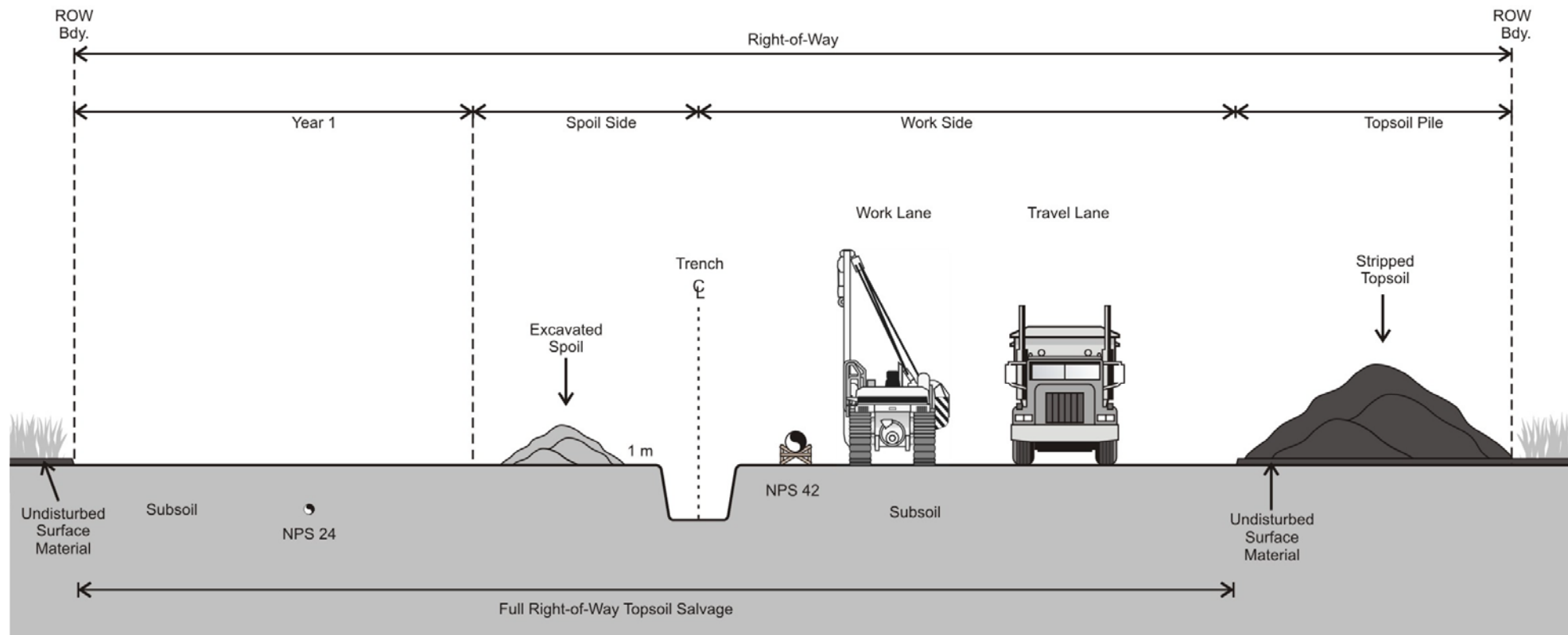


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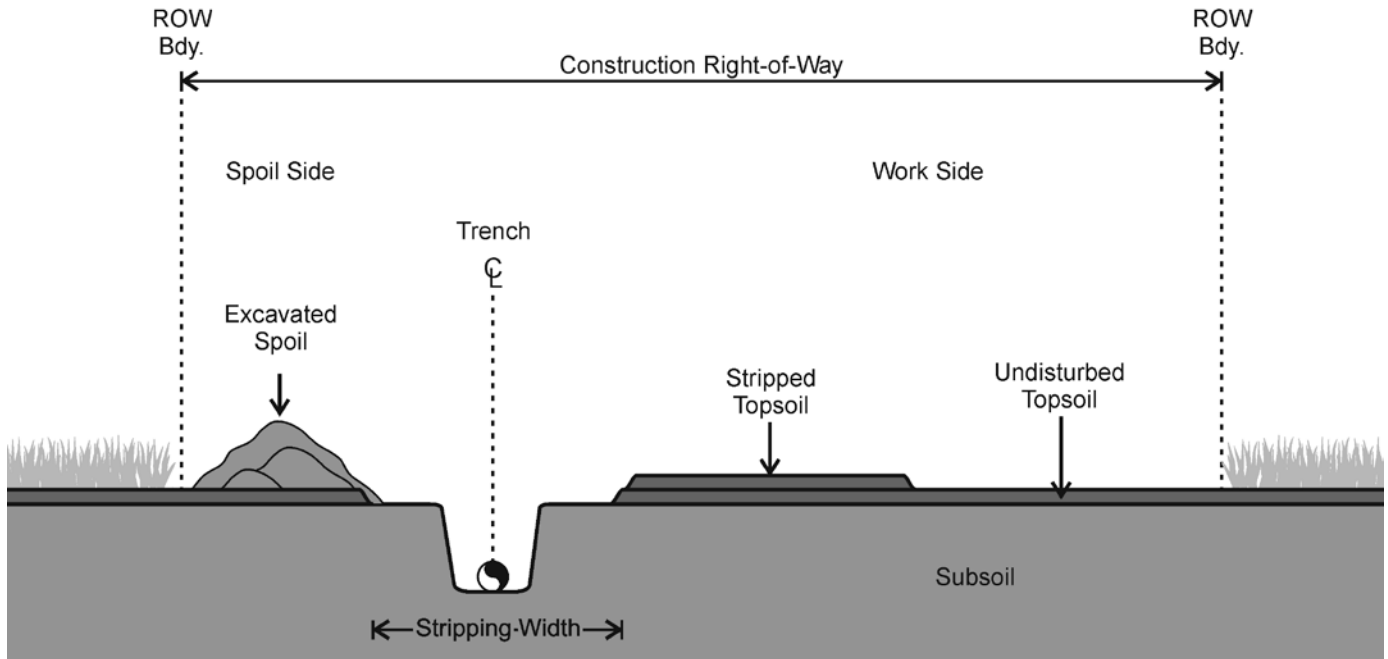
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Profile
(Not to Scale)



Profile
(Not to Scale)



Activity:

1. Strip and Stockpile Topsoil:

Notes:

- Blade width topsoil stripping is to be conducted on well-sodded hay land and improved pasture.
- Salvage topsoil from a 3-4 m (approx.) wide area centred over the trench line. Area stripped should be sufficiently wide to accommodate the track of the ditcher.
- Increase topsoil stripping width at locations where trench sloughing may occur; stockpile topsoil a greater distance from the trench at these sites.
- Stockpile topsoil on work side and flatten to allow set-up of pipe.
- Topsoil stripping requires accurate depth control of a road grader or equivalent machine to ensure that subsoils and topsoils are accurately separated. Multiple passes are preferred to a single pass. Strip topsoil to colour change. Employ an inspector to follow the equipment on the ground, guiding the operator as to the depth of the soil, if required.
- Suspend stripping during periods of high winds if soil drifting begins to occur or during excessively wet conditions.
- Leave breaks in the topsoil windrow at obvious drainage courses.
- Place spoil on the spoil side of the trench.

2. Excavate Trench and Stockpile:

3. Backfill Trench:

- Backfill and compact trench. Crown the trench, as warranted, to allow for settlement.
- Avoid mixing subsoil with topsoil. Also avoid scalping sod layer.
- Pick stones and debris equivalent to the surrounding subsoil.

4. Replace Topsoil and Clean-up:

- Evenly replace topsoil with grader or equivalent machine. Avoid scalping sod layer.
- Suspend replacement activities during periods of high winds if soil drifting begins to occur or during excessively wet conditions.
- Cultivate disturbed part of the right-of-way.
- Pick stones equivalent to the surrounding topsoil.



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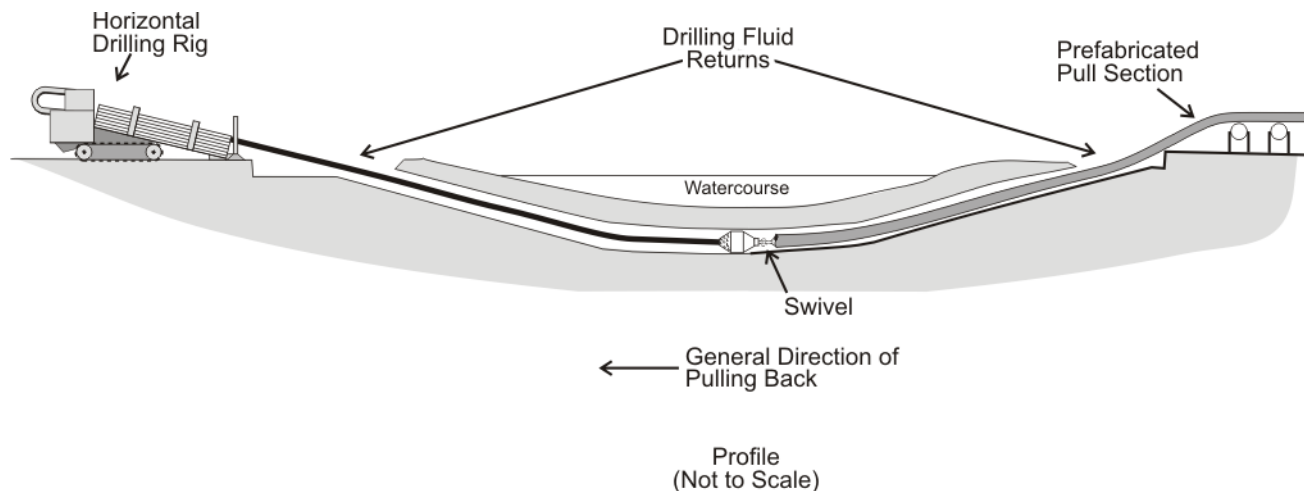
GRAND RAPIDS PIPELINE PROJECT – WHITE AREA

TOPSOIL SALVAGE – BLADE WIDTH

8395

October 2014

Dwg. 2



Notes:

1. Obtain geotechnical data prior to initiating drilling. Drilling may not be feasible in some materials such as unconsolidated gravels.
2. Ensure temporary workspace rights have been obtained to conduct monitoring and that access is available for monitoring activities.
3. Set up drilling equipment back from the edge of the watercourse; do not clear or grade within the vegetated buffer zone, except along the work side, if temporary vehicle crossing is utilized.
4. Employ full time inspectors to observe for an inadvertent mud release into the watercourse.
5. Ensure that only bentonite based drilling mud is used. Do not allow the use of any additives to the drilling mud without the approval of appropriate regulatory authorities.
6. Install suitable drilling mud tanks or sumps to prevent contamination of watercourse.
7. Install sumps downslope from the drill entry and anticipated exit points to contain any release of drilling mud.
8. Dispose of drilling mud in accordance with the appropriate regulatory authority requirements.
9. Prepare a drilling mud release contingency plan.

Adapted from CAPP *et al.* (2005)



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GRAND RAPIDS PIPELINE PROJECT

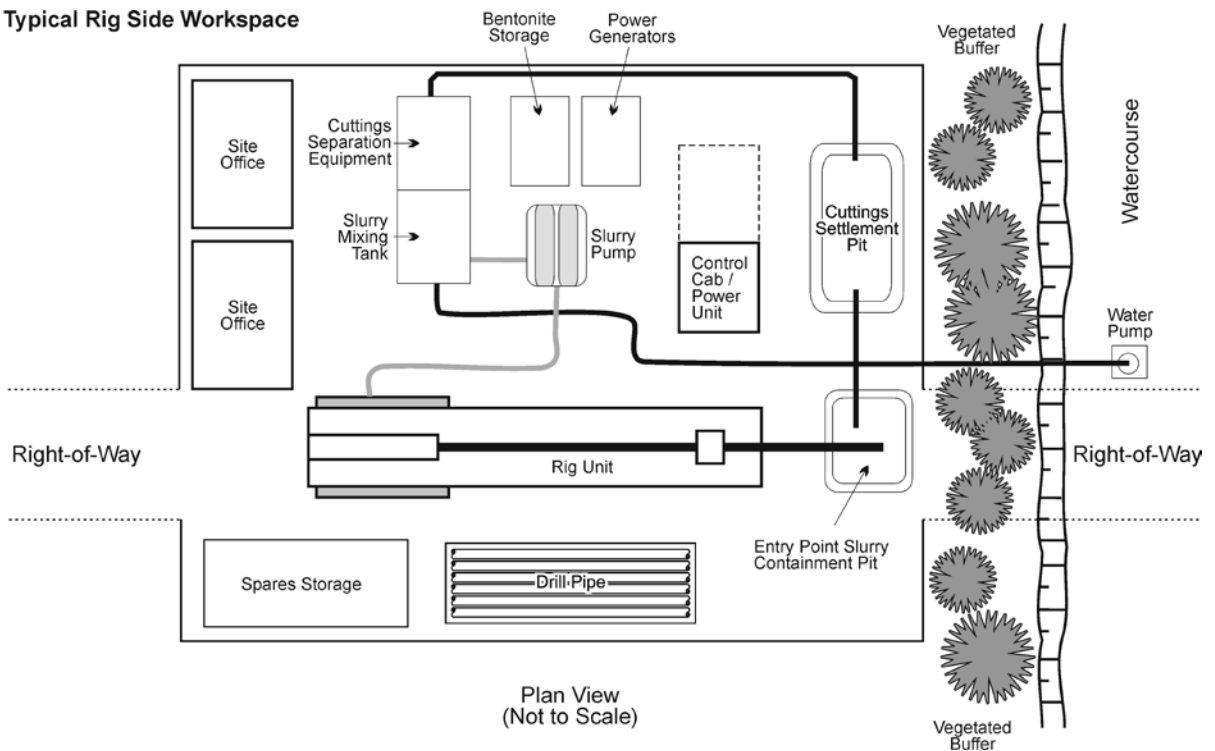
WATERCOURSE CROSSING – LARGE DIRECTIONAL DRILL

8395

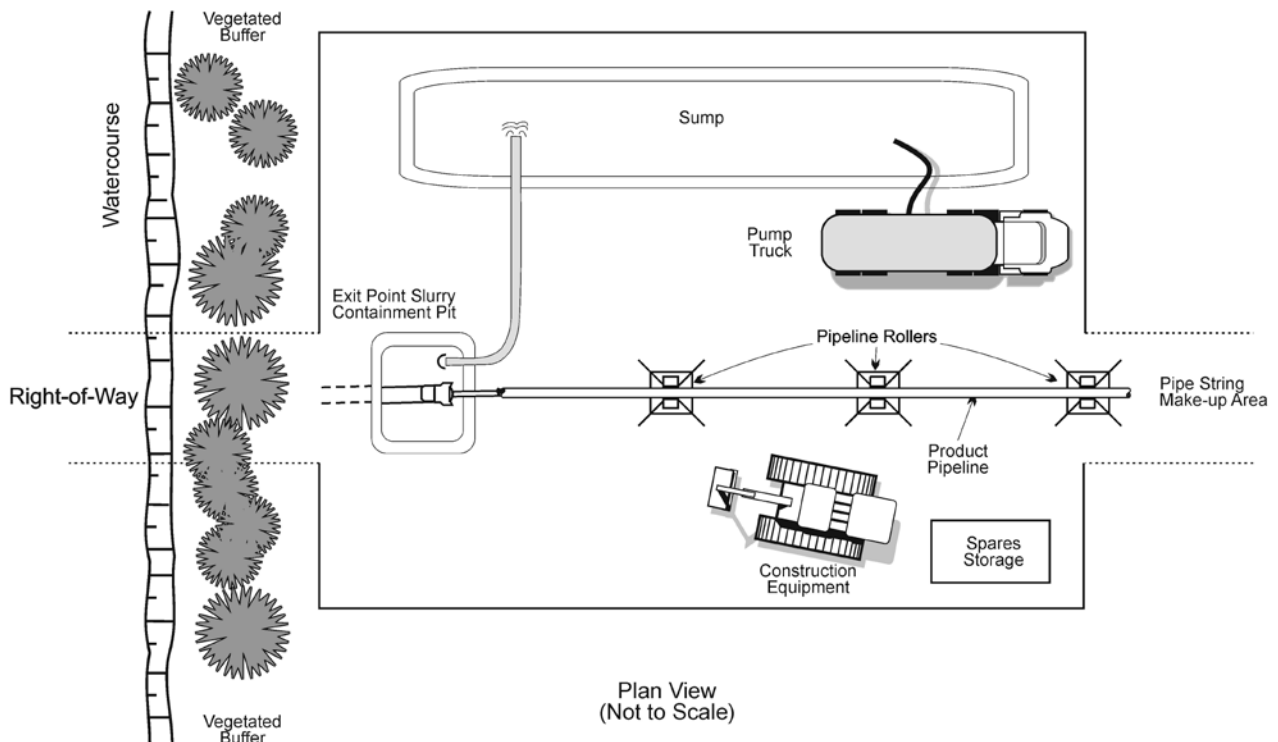
October 2014

Dwg. 3A

(A) Typical Rig Side Workspace



(B) Typical Pipe Side Layout



Adapted from CAPP *et al.* (2005)



A CH2M HILL Company

GRAND RAPIDS PIPELINE PROJECT

WATERCOURSE CROSSING – LARGE DIRECTIONAL DRILL

8395

October 2014

Dwg. 3B

APPENDIX 1E

CONTINGENCY PLANS

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1.0 SPILL CONTINGENCY PLAN

Introduction

Depending upon the location, substance and quantity of the release, the incident may be reportable to applicable federal and/or provincial authorities. It will be the responsibility of the Environmental Inspector(s) to determine if an incident is externally reportable and follow the appropriate regulatory reporting requirements. Therefore, it is the policy of the Company that all releases are reported internally to the Environmental Inspector(s), regardless of the location, quantity or substance released.

The Construction Manager and/or Environmental Inspector(s) will immediately notify the appropriate regulatory agency when a reportable event occurs. If this is not possible, notification will be made as soon as practical upon detection of the spill. If a Contractor specific Spill Response Plan is in place, the plan will be reviewed to ensure that the Contractor Spill Response Plan meets the criteria contained in the Company's Spill Contingency Plan. Where inconsistencies exist, the more stringent requirement will apply.

General Measures

The following are standard measures to be adhered to during construction.

1. Appropriate spill equipment will be maintained at all work sites, in accordance with the Waste Management Plan (Appendix 1F). The risk for site-specific spills will be used to determine the appropriate type of response equipment and suitable location for storage.
2. Specific instructions regarding applicable contacts and appropriate response actions to be taken in the event of a spill will be posted at the field construction offices.

Initial Response

The following actions will be taken upon detection of a spill.

1. In the event of a spill of hazardous material, the first person on the scene will follow the actions presented in the Contractor's Spill Response Procedures and/or the Spill Scene Checklist.
2. When notified of a spill, the Contractor will immediately ensure that:
 - action is taken to control danger to human life including the appointment of an Onsite Safety Supervisor;
 - the necessary equipment is mobilized and measures are being implemented to control and contain the spill; and
 - all resources are available to contain and clean-up a spill.
3. When notified of a spill, the Environmental Inspector(s) will immediately ensure that:
 - the appropriate regulatory agencies are notified (e.g., AESRD). Other notifications include the Project Engineer, the Company Environmental Advisor and if required, the RCMP.

General Spill Containment Procedures

The successful containment of a spill on land or water depends on a variety of factors including: ground cover, topography, hydrogeology, solubility of the material, viscosity of the liquid, water currents, soil permeability and climatic conditions.

The following general guidelines will be followed for containment of spilled materials.

- The first person on the scene will follow the actions listed in the Contractor's Spill Response Procedures and/or the Spill Scene Checklist.
- Assess the safety hazards of the situation.
- Remove sources of ignition, if safe to do so.
- Identify the product, stop source, and physically contain spill as soon as safe to do so.
- Avoid use of water or fire extinguishing chemicals on nonpetroleum product spills unless it is necessary to control a fire or prevent an explosion, since many chemicals react violently with water and chemical extinguishing agents may release toxic fumes. In addition, chemicals may be soluble in water and dispersal makes containment and clean-up more difficult.
- Minimize traffic on contaminated soils.
- Use natural depressions or berms constructed with materials and equipment in proximity to the site to physically contain a spill on land. Deployment of booms may be necessary on water.

Clean-up guidelines for specific accidents are outlined below.

Transportation by Truck

At a minimum, the following general guidelines will be followed for containment and clean-up of most hazardous materials if spilled from a truck.

- Contain spilled product
 - Pump the source of the leak dry, if applicable.
 - Remove source from site.
 - Recover spilled product.
 - Clean-up contaminated area.
1. Dispose of sorbent pads, heavily contaminated soil and vegetation at an approved facility. On lightly contaminated soil areas where remediation is feasible, add amendments, repeat as required, sample soil and seed as appropriate.

Spills Adjacent to or into a Waterbody

At a minimum, the following general guidelines will be followed for containment and clean-up of most hazardous materials if spilled adjacent to, or into, a waterbody.

1. Construct berms, sumps and/or trenches to contain and/or prevent spilled product from entering a waterbody.
2. Deploy booms, skimmers, sorbents, etc., if feasible, to contain and recover spilled material from waterbody.
3. Recover spilled product.
 - Clean-up contaminated areas.
4. Dispose of heavily contaminated soil and vegetation at an approved facility. On lightly contaminated soil areas where *in situ* restoration is feasible, the site will be reclaimed in a suitable manner, as determined by the Environmental Inspector(s).

Spot Spills

Since effects from small spot spills can generally be minimized if appropriate actions are implemented, all small spills of fuels or noxious materials must be reported immediately to the Environmental Inspector(s).

At a minimum, the following general guidelines will be followed while cleaning up spot spills of fuel or other hazardous materials.

1. Modify construction activity in the immediate vicinity of the spot spill such that the impacted area is not disturbed
2. The Environmental Inspector(s) will determine appropriate methods to remove contaminated soil or vegetation to an approved facility or restore contaminated soils and vegetation in a suitable manner.

SPILL REPORTING AUTHORITIES	
Regulatory Agency	Notes
Alberta Environment 24 Hour Spill Line 1-800-222-6514	Any spill, release, or emergency that might cause, is causing, or has caused an adverse effect to the environment.

SPILL SCENE CHECKLIST

The following activities should be taken by the first person on the scene of a hazardous material spill or release.

- (a) If possible without further assistance, assess the safety hazards of the situation, control danger to human life and identify the composition (see Spill Report Form - next page) of the spilled material. _____
- (b) If feasible and safe to do so, remove any sources of ignition, cut off the source of the spill and initiate a release response plan (*i.e.*, control, contain and clean-up). _____
- (c) Once the source has been cut off, attempt to contain the spilled area. _____
- (d) Notify the Construction Manager and Environmental Inspector(s). _____
- (e) Take notice of dangers to the environment (*e.g.*, proximity of watercourses) and clean-up actions that might be necessary. _____
- (f) If any of the above tasks are beyond the capabilities at hand, ask for qualified assistance. _____

Note: The Construction Manager and/or Environmental Inspector(s) is responsible for contacting regulatory agencies. The Company Environmental Advisor is responsible for follow-up reporting that may be required by regulations/guidelines.

SPILL REPORT FORM

Type of Material Spilled:

Gasoline _____
Diesel _____
Lube Oil _____
Hydraulic Fluid _____
Vehicle Antifreeze _____
Other (specify) _____

Date and Time of Spill or Discovery: _____

Source of Spill: _____

Area of Spill (m²): _____

Depth of Spill (cm): _____

Volume of Spill (L): _____

Estimated Release Rate: _____

Duration of Release: _____

Location (land, water, land and water): _____

Soil Type (e.g., sandy, clay, etc.): _____

Location: Easting _____; Northing _____ UTM Zone ____; KP _____

Land Use: _____

Environmentally sensitive areas potentially affected: _____

Weather conditions at time of discovery: _____

Procedures taken to minimize, control or stop the release: _____

Remediation plan and schedule of implementation, if required: _____

Current status of the remediation program: _____

(dd/mm/yy) (hr:min): _____

Form Completed by:

Name: _____ (printed) _____ (signed)

Date: _____

2.0 ADVERSE WEATHER CONTINGENCY PLAN

The Environmental Inspector(s) is responsible for monitoring and implementing all procedures and will liaise with the appropriate regulatory agencies, when required. If necessary, a meeting will be held in the field to ensure that all involved parties mutually understand concerns.

Where adverse weather conditions and activities have the potential to cause adverse environmental effects, the Environmental Inspector(s) will suspend that phase of the operation until weather conditions abate or effective mitigation procedures have been implemented. The following represents mitigative measures that may be applied. Specific environmental mitigation is subjective and dependent upon specific right-of-way conditions and the Project schedule.

The following table outlines mitigative measures that allow for the continuation of activities and reduce potential adverse environmental effects.

WIND EROSION	
Mitigation Options to Consider	
1	Uniformly apply mulch or tackifier to topsoil/strippings piles and/or other areas affected by wind erosion.
2	Water identified areas when activities or sufficient winds have created the potential for topsoil/strippings erosion.
3	Apply straw to topsoil/strippings and/or other areas where winds have created the potential for soil erosion. Straw sources are subject to landowner or regulatory approval, and must be approved by the Environmental Inspector(s). When clean straw is unavailable, seeding a clean, unpalatable annual crop at half the normal rate is acceptable.
WATER EROSION	
Temporary Berms/Silt Fence	
1	Temporary berms, silt fence and/or other appropriate mitigative measures (e.g., wattles, erosion control matting) will be implemented along the trench crown, surface material piles, and/or other areas where the potential for water erosion has been identified.
2	To prevent ponding and/or erosion, cross right-of-way drainage will be maintained. Appropriate measures (e.g., sumps, pumping excess water) to prevent deleterious material from entering a watercourse will be implemented, when and where required.
Right-of-Way Maintenance/Stabilization	
1	During adverse weather conditions, the Company will direct the Contractor to reduce unnecessary traffic and the number of vehicles on the right-of-way. Better planning of activities will be required by the Contractor to either tighten up, or spread out the work crews as warranted (e.g., close proximity of ditching, lower in, and backfill operations). To reduce effects, a one trip in, one trip out philosophy will be implemented for all right-of-way access.
2	Traffic will be restricted to the right-of-way. The appropriate regulatory agency will need to approve any off right-of-way activities.
3	The traffic pattern on the right-of-way will be changed to avoid repeated driving in the same areas.
4	Under adverse weather conditions, the Contractor will be required to back-blade the right-of-way during and at the end of the day. Back-blading of the right-of-way fills in tire tracks, thereby assisting in the prevention of water erosion and re-establishing a firm working right-of-way surface.
5	Under adverse weather conditions, topsoil/surface material and/or subsoil may be stripped and placed at the edge of the right-of-way if approved by the Environmental Inspector(s). Topsoil, surface material and/or subsoil will be redistributed evenly across the right-of-way during clean-up.
6	Under spring thaw condition and/or where identified by the Company, and in consultation with the appropriate Regulatory Representatives, vehicle watercourse crossing techniques may be modified and/or replaced with other appropriate crossing techniques.
7	When available and practical, tracked equipment may be required for specific activities.
8	Work in highly sensitive areas may be stopped and shifted to less sensitive areas.
9	If all mitigation fails, Project activities may be suspended until adverse weather conditions abate, thereby incurring a schedule delay. Project shut-down will be based upon discussions between the Construction Manager, Contractor, Environmental Advisor and the appropriate regulatory agencies. Recommencement of work must be authorized by the Construction Manager, in consultation with the Environmental Inspector(s) prior to restart.

3.0 FLOOD AND EXCESSIVE FLOW CONTINGENCY PLAN

The weather conditions will be monitored by the Environmental Inspector(s) on a daily basis. If a major storm is predicted or occurs, qualified personnel will inspect all watercourse crossings where construction is in progress or has been completed, to determine whether any corrective actions need to be implemented.

The appropriate regulatory agencies will be notified when required, as soon as practical, by the Environmental Inspector(s) or Construction Manager, that contingency measures have been implemented (see Appendix 1B of this EPP).

At watercourses where an isolated crossing method is recommended, the proposed isolation crossing techniques may not be feasible during periods of excessive flow or unusually wet seasons.

The following contingency measures will be implemented progressively or individually, as warranted, if excessive flow or flood conditions are anticipated prior to commencing watercourse crossing construction.

1. Assess the capability to handle the expected flow rate with the proposed crossing method. If use of the proposed crossing method is determined to be feasible by the Company, the crossing will proceed.
2. Defer water crossing construction to a later time when flows have subsided, if it is determined by the Company that the proposed crossing method is not feasible.
3. Alternatively, where the expected flow rates and window limitations combine to preclude the proposed crossing method, request approval from the appropriate regulatory agencies to use an alternate crossing method.

The following contingency measures will be implemented progressively or individually, as warranted, if excessive flow or flood conditions should occur during watercourse crossing construction.

1. Assess the capability to handle the anticipated flow rate with the proposed crossing method. If use of the proposed crossing method is determined to be feasible by the Company, the crossing will proceed.
2. Increase the quantity of materials required to perform the crossing. Reinforce or replace the isolation and/or bypass structure(s) if necessary.
3. Withdraw all equipment or tanks containing fuel, oil or other hazardous materials from potential flood areas.
4. Remove all stationary and mobile equipment deployed at the crossing site to a safe area above the anticipated high water level.
5. Remove any instream flume or dam equipment that may impede streamflow, as safe work conditions allow.
6. Relocate all topsoil/strippings piles at the direction of the Environmental Inspector(s).
7. Relocate spoil piles, to the extent feasible, to a position above the anticipated high water level.
8. Evaluate vehicle crossing structure to determine whether adequate free-board is present on bridges and adequate capacity is available in culverts. Take corrective measures as appropriate to avoid flooding of adjacent lands.
9. Import sandbags and place strategically to help stabilize and add height to banks to prevent flooding of nearby areas, especially where vegetation has been removed.

4.0 WET SOILS CONTINGENCY PLAN

The Company will assign Environmental Inspectors with sufficient training and soils-related experience to be able to identify soils that are too wet for a particular activity and when the soils are sufficiently dry or frozen to allow the activity to resume. The decision to continue or suspend particular pipeline construction activities on lands with excessively wet soils will be made by the Construction Manager in consultation with the Environmental Inspector(s).

Soils are considered to be excessively wet when the planned activity could cause unacceptable damage to soils either due to rutting by traffic through the surface layer into the subsoil; soil structure damage during soil handling; or compaction and associated pulverization of surface material due to heavy traffic.

In order to minimize terrain disturbance and soil structure damage through rutting or compaction due to wet soil conditions, construction alternatives will be employed, as necessary, in the event of excessively wet soils. The contingency measures listed below will be implemented individually or in combination, as necessary, based on site-specific conditions.

Wet Soil Contingency Measures

1. Restrict construction traffic, where feasible, to equipment with low-ground-pressure tires or wide pad tracks.
2. Postpone construction until evening or early morning when the ground is frozen.
3. Install biodegradable geotextile, swamp mats, rig mats, access mats, or corduroy if approved by the applicable regulatory agency, or equivalent, in problem areas.
4. Under frozen conditions, employ frost inducement measures such as snow packing or plowing to increase the load-bearing capacity of thawed ground.
5. Suspend timber skidding operations or implement other measures (e.g., use tarps or plastic sheeting) if the potential exists for salvageable timber to be damaged through contact with wet soils.
6. Suspend construction until soils dry out or freeze.

5.0 FIRE SUPPRESSION CONTINGENCY PLAN

Prior to commencement of construction, the Contractor will designate one of his staff as Fire Boss. The Fire Boss will be familiar with fire-fighting techniques and equipment. A Fire Boss should have some degree of fire line certification and fire experience, or knowledge of fire weather and fire behavior.

Fire Suppression Supplies

Necessary firefighting equipment will be on site in accordance with the Alberta Forest and Prairie Protection Regulations. In addition, all motorized equipment must carry a fully charged fire extinguisher. The Fire Boss will ensure that fire extinguishers are present and fully charged and all fireline equipment is present and in working order. The fire equipment and water supply on site should be increased as the fire hazard increases.

In the Event of a Fire

The following mitigative measures will be implemented in the event of a fire.

1. Commence fire suppression measures immediately upon detection of fire provided that fire conditions allow personnel to safely proceed under the direction of the Fire Boss.
2. Personnel working on the Project must report the location of fire as well as size of fire and wind direction, to Fire Boss immediately.
3. Fire Boss or the Company designate, will report wild fires and relevant information to the Company's Environmental Advisor, Construction Manager, AESRD's Public Lands and Forest Divisions, municipal By-Law officers and applicable local fire departments. Reporting to provincial authorities must be completed immediately. Refer to the Fire Report Form for guidance when reporting fires to regulatory agencies.
4. Fire Boss will deploy fire-fighting equipment and crew to clear fire breaks or extinguish the fire directly if possible. All equipment and personnel shall be made available to control the fire. Effort of fire control will be limited, if warranted, due to safety issues and will take into consideration fire conditions, safety, fitness of personnel and equipment availability.
5. Fire Boss will inspect the fire site as soon as possible and take charge of directing suppression measures until relieved of this duty by the applicable provincial authority or until conditions become unsafe.
6. Fire Boss will deploy additional crew and machinery as needed and the Company will request assistance of AESRD's Public Lands and Forest Divisions, local fire department and applicable municipal government if Contractor resources are inadequate (see contact list and phone numbers below). Fire suppression measures shall continue until the fire is extinguished or until otherwise notified by applicable regulatory agency.
7. Moveable material, particularly explosive or flammable materials, vehicles, etc. will be promptly moved to a safe location whenever there is a possibility of being endangered by fire.
8. Fire Boss will ensure that all burning embers are extinguished and will monitor burn area for smouldering material. Employ infrared scanning equipment to detect any hot spots.

24-hour Emergency Line (Alberta)
Regional Wildfire Management Office

310-3473
780-623-5386

FIRE REPORT FORM

General

Date and Time of Fire or Discovery: _____

Source (if known): _____

Location of Fire

LSD _____ of section _____ Township _____ Range _____ W _____ Mer.

Easting _____; Northing _____ UTM Zone _____; KP _____

Other description of location:

Site Information

Fire is burning in the:

ground _____

bush (timber type) _____

agricultural land _____

Other _____

Rate of spread is:

not moving _____

moderate (less than a normal walk?) _____

fast (more than a normal walk?) _____

Any people at the fire? Yes _____ No _____ Don't know _____

Is property threatened? Yes _____ No _____ Don't know _____

Is road access available? Yes _____ No _____ Don't know _____

Is water readily available? Yes _____ No _____ Don't know _____

Any other observations? _____

(e.g., lightning, recreation, vehicles)

Smoke Information

When unable to see fire, only smoke visible:

Colour:	light grey _____	Column:	intermittent _____
	medium grey _____		scattered _____
	dark grey _____		light _____
	black _____		heavy _____

6.0 SOIL EROSION CONTINGENCY PLAN

If wind or water erosion is evident during the construction phase of the Project, all necessary Contractor equipment and personnel will be made available to control the erosion. During the construction phase, the Environmental Inspector(s) in consultation with the Company's Environmental Advisor will determine appropriate procedures to be implemented to control soil erosion and other soil handling problems encountered.

This table provides a list of control options to be implemented as appropriate. Similar procedures should be followed during the operational phase.

Concern	Mitigative Options
<i>Water Erosion</i>	<ol style="list-style-type: none"> Implement one or a combination of the following mitigative techniques: <ul style="list-style-type: none"> install silt fences near the base of slopes; regrade furrows and gullies; construct cross ditches and berms decreasing the spacing on steeper slopes or on more erodible soils; construct temporary berms of subsoil, sandbags, wattles, bio-degradable geotextiles or geo-ridge during construction activities; armour the upslope face of berms with geotextile, rock, logs or sandbags; import small diameter slash then roll back and walk down; reseed an annual cover crop as soon as feasible after construction; transplant native shrubs, plant willow stakes or use other bioengineering techniques; install slope indicators at locations where the risk of slope failure, or creep exists; consult a geotechnical engineer; and/or shut down construction until the risk of erosion has been reduced or the conditions improve.
<i>Erosion of or Failure of Streambanks</i>	<ol style="list-style-type: none"> Implement one or a combination of the following mitigative techniques: <ul style="list-style-type: none"> install vegetated geogrid; install coir logs; install log cribwall bank protection; install biodegradable erosion control matting; plant willow stakes in the spring; transplant willow clumps, install willow wattles, or brush layering; install tree revetments; and/or install rock gabions or line the banks with riprap (subject to DFO approval).

7.0 DIRECTIONAL DRILLING PROCEDURES AND INSTREAM DRILLING MUD RELEASE CONTINGENCY PLAN

During an HDD, an accidental release of drilling mud adjacent to or into a watercourse could adversely affect the environment. The following contingency plan has been developed to ensure that appropriate measures are in place to minimize the risk of adverse effects during directional drilling.

Both the Contractor and the Company must be diligent during all aspects of directional drilling to ensure that the potential for an instream drilling mud release is minimized; or if it does occur, that environmental effects are minimized.

Should the Contractor have an instream drilling mud release contingency plan in place, both plans will be reviewed by the Company with the Contractor to ensure that the most stringent conditions of both plans apply.

7.1 General Measures

1. Ensure that supervisory personnel are aware of this contingency plan prior to commencement of drilling activity.
2. Arrange for access beyond the boundaries of the pipeline Project's surface rights agreement along the drill path to monitor, contain and clean-up potential frac-out releases.
3. Install surface casing at the entry point to a depth that extends beyond the coarsest material, if warranted.
4. Ensure that drilling mud composition is limited to bentonite mud drilling systems, fresh water and, if warranted, other inert additives. No toxic additives will be allowed. Provide Material Safety Data Sheets (MSDS) to the Company upon request.
5. Construct a sump at the entry point and a subsoil berm downslope of the proposed exit point with a capacity adequate to capture anticipated volumes of drilling mud that could be released during pullback and other drilling operations. Construct a sump with the above-noted capacity, at the exit point after the pilot hole has been completed (see Dwg. STDS-03-ML-05-131 in Appendix 1D of this EPP).
6. Install surface casing at the exit point if coarse-textured near surface deposits could interfere with drilling mud circulation.
7. Develop a clean-up plan, prior to drilling. The plan will be prepared by the drilling contractor in consultation with the Company inspection staff. Acquire the appropriate approvals to access the release area if off right-of-way and for mud pump-off.
8. Reclaim entry and exit sumps that contained drilling mud immediately after completion of drilling and remediate to meet the applicable requirements of ERCB Directive 050 *Drilling Waste Management*.

7.2 Emergency Response Equipment

1. Maintain the following equipment onsite in sufficient quantities during drilling operation to contain any inadvertent drilling mud releases:
 - sandbags;
 - filter cloth (e.g., silt fence);
 - T-bar posts;
 - post pounders;
 - light towers, flashlights or headlamps;
 - shovels;
 - 6 mil polyethylene; and
 - 2-trash pumps c/w sufficient lengths of leak-free hose and suction heads.
2. Maintain vacuum truck(s) onsite during pullback operations.

3. Maintain the appropriate water quality sampling equipment onsite during drilling operation to ensure that accurate water quality samples can be taken. Onsite equipment to be provided by the Company or their Contractor may include:
 - turbidity meter;
 - sampling pole;
 - chest waders;
 - water sample bottles (approximately 30 - 500 ml bottles);
 - boat; and
 - coolers.
4. Ensure that the water quality sampling program, if implemented, is in place prior to drilling and includes the following information:
 - sample locations (both an upstream control site as well as appropriate downstream sites);
 - frequency of sampling; and
 - sampling procedures.

The program will be amended if warranted by conditions.
5. Ensure that a minimum of three sets of walkie-talkies with spare batteries are onsite and available for use during monitoring operations.

7.3 Monitoring

1. Implement water quality monitoring plans to monitor for sediment events during drilling activities. Water quality monitoring will be used to avoid exceedance of the Canadian Council of Ministers of the Environment (CCME) (2001) guidelines and provincial limits for total suspended solids (TSS) and as early warning signs to potential problems during construction.
2. Supervisory personnel will be onsite at all times during drilling, reaming and pullback operations to ensure that emergency response measures will be implemented immediately and effectively. the Company will also assign inspection personnel to the site during all phases of drilling of the watercourse.
3. Monitor and record annular pressures throughout drilling.
4. Monitor and record the amount of fluid return to the mud tank/pit and the amount of make up drilling fluid required in the mixing tanks during drilling of the pilot hole and hole opening (reaming). Maintain a detailed log of all drilling activities in order to correlate drilling status with potential frac-out events.
5. Monitor both onshore and instream portions of the drill path and surrounding area (*i.e.*, within 400 m minimum) for signs of drilling mud release. The size of the area to be monitored will be determined by evaluating geotechnical conditions (*i.e.*, amount of fracturing, type and depth of substrate) and drilling conditions (*i.e.*, depth of drill path, distance between watercourse and entry and exit points). Monitoring will be on a continuous basis during drilling operations and will continue for at least eight hours after shut-down. Personnel equipped with walkie-talkies shall be positioned at the most advantageous locations to observe any sign of a release of drilling mud to the surface or in the watercourse.
6. Ensure that contact is maintained at all times between monitoring and drilling personnel.
7. Establish monitoring stations at the following locations and obtain water samples for visual inspection or turbidity measurement at the noted intervals if pressurized drilling fluids or water are used.

Downstream Monitoring Sample Sites	Sampling Interval (approx.)
25 m (approx.)	2 hours
100 m (approx.)	2 hours
200 m (approx.)	4 hours
400 m (approx.)	4 hours

Increase the sampling frequency if monitoring of drilling mud returns indicates that a release may have occurred.

8. On watercourses with ice cover, onsite conditions may allow visual monitoring of water quality by observing open reaches or, if safe, by augering and maintaining an open hole in the ice for sampling. Supply monitors with practical safety gear (e.g., ropes, ladders, inflatable boat, flotation coveralls) for traversing ice. Continue to evaluate ice conditions throughout the monitoring program.
9. If monitoring reveals sediment values are approaching threshold values, the Environmental Monitors will alert the Environmental Inspector(s) and work with them to develop corrective actions. If corrective actions are not successful, construction activities will be temporarily suspended until effective solutions are identified.
10. If the watercourse is frozen to the bottom, onsite conditions will not allow visual monitoring of water quality by observing open reaches or by augering and maintaining an open hole in the ice for sampling. Continue to visually monitor areas where early detection of a frac-out would most likely occur.

7.4 Emergency Response

The loss of drilling mud into seams of coarse material, fissures, etc. routinely occurs during drilling operations. Since drilling fluid does not always flow to the surface, a loss does not necessarily indicate that the drilling mud has been released onto near shore areas or into the watercourse. Nevertheless, a release of drilling mud into a watercourse can adversely affect fish and fish habitat.

1. Suspend drilling operations immediately if excessive loss of drilling mud or change in annulus pressure is noted and conduct a detailed examination of the drill path and surrounding area for evidence of a release to the surface.
2. Immediately notify the Construction Manager and the Environmental Inspector(s) if a drilling mud release is observed.
3. If the amount of mud released is not great enough to allow practical collection, the mud release will be allowed to dry and dissipate naturally.
4. If the drilling mud release enters a watercourse, the Construction Manager will immediately notify the Company's engineering staff as well as the Environmental Inspector(s). The Environmental Inspector(s) or Environmental Advisor will immediately notify the applicable provincial and DFO fisheries biologists, and the appropriate land authority (*i.e.*, AESRD). Any drilling mud release that enters waters or that may cause or is causing an adverse effect is reportable to AESRD.

DFO Fisheries Biologist	(780) 495-4220
AESRD 24 hour Emergency Line	1-800-222-6514
Provincial Fisheries Biologist (Edmonton)	780 422-0528
Transportation Safety Board	1-819-997-7887

5. Contain and further prevent drilling mud from entering the watercourse from near shore areas by installing a berm of subsoil, sandbags or other material approved by the Environmental Inspector(s).
6. Conduct water quality sampling as directed by the Environmental Inspector(s). Instream and near shore containment/clean-up objectives include the following:

Instream

- Divert streamflow around the mud release to the extent practical.
- Install silt fencing around the exit point(s), if feasible.
- Remove mud from the watercourse by pumping, shovels or with a hoe.
- Dispose of mud in accordance with provincial requirements.

Consider the following options for diverting streamflow from the mud release area.

- Construct a dam and pump set-up on smaller watercourses.

- Install a flume to divert water past the release area.
- Install coffer dams made of sandbags or sheet metal.
- Attempt to contain the release point within an area isolated with aquadams or sheet metal, etc.
- If access is possible, consider covering the mud at the source point on stream bottom with a layer of poly and sand bags to prevent scouring of mud.

Consider the following options for removal of mud from instream.

- Use trash pumps or hydrovac truck. If trash pumps are used, ensure that the pump-off area does not drain directly into watercourse or construct a holding area. If a hydrovac truck is used, ensure that all activities comply with the guidelines in Alberta's Oil and Gas Waste Regulations.
- In consultation with provincial and DFO fisheries biologists, leave mud in place if current streamflow levels inhibit removal operations or removal will result in unacceptable terrain or instream damage.

Onshore

- Contain the mud release immediately to limit the area affected and prevent the mud from entering the watercourse.
- Dispose of mud.

For onshore mud release, consider the following options for immediate containment.

- If accessible by heavy equipment, immediately construct berms or excavate a sump for containment.
 - If not accessible by heavy equipment, construct weirs using logs, silt fence, rolls of matting, shovel trenches, and/or filter cloth and a containment area where appropriate.
7. Before allowing filtered water to enter the watercourse, ensure that the TSS level is within 10 mg/L of the background TSS levels.
 8. The Company's inspection staff will prepare a report summarizing the events leading up to the release as well as measures taken following the release to minimize effects on the environment. The report will be submitted to the Director of Regional Water Management within seven days of the mud release. Report the details of the spill to the AESRD's 24 hour emergency line at 1-800-222-6514. The regional office with jurisdiction will review the report and request additional information accordingly.

Plans for Potential Continuance of Drilling

Drilling will only be allowed to resume if the potential for significant adverse effects on the environment is low, as determined by project management, inspection staff, aquatic specialists, drilling or geotechnical consultant (if warranted) and the drilling contractor, and as approved by the DFO fisheries biologist.

1. Implement measures to prevent the further release of drilling mud into the watercourse. Appropriate measures will vary depending on the lessons learned during the previous drill attempt.
2. Progressively implement the following measures to prevent the further release of drilling mud into the watercourse.
 - Ensure that appropriate structures, materials, equipment and personnel are in place and available in the event of a subsequent release of drilling mud.
 - Reduce drilling mud pressures if practical.
 - Plug fissures/fracture with nontoxic sealers or plugging agents pumped into the drill hole and left undisturbed for an appropriate period of time whereupon drilling will be resumed. If the sealing agents are not successful, drilling will be suspended and the plan reviewed and revised.
 - Employ downhole cementing to either seal off the problem zone for redrilling or seal off a large portion of the existing drill hole to a point where a new drill path (generally at a lower elevation)

can be attempted. If these measures are unsuccessful, then drilling will be suspended and the plan reviewed and revised.

- Move the drill and attempt to redrill from a new location employing the same protection measures implemented on the initial drill if conditions indicate that a second drill will be successful. Prior to commencing the redrill, the proposed drill path will be reviewed and revised accordingly.

Alternate Crossing Method

Prior to construction, a detailed watercourse crossing and contingency plan for each proposed HDD installation site will be prepared to address the possibility that the HDD installations are unsuccessful. The plan will identify methods, measures and activity schedules to:

- minimize effects on fish and fish habitat;
- limit the risk of soil erosion and promote revegetation with suitable plant species;
- minimize the disturbance of native vegetation (in particular rare plants and ecological communities) and wildlife and their habitats;
- minimize disturbance of archaeological resources; and
- avoid navigational risks and minimize disruption to boaters.

The plans will be prepared by the project team with input from several environmental specialists (wildlife, vegetation, fish and fish habitat, historical resource and reclamation specialists), engineering and construction personnel, contractors, and the results of consultation with the applicable regulatory agencies.

The following information will be considered within the plans:

- a summary of issues requiring mitigation;
- schedules for the river crossing and onshore construction, and reclamation;
- access routes and traffic control measures;
- equipment and temporary work space requirements;
- site-specific plans to avoid, salvage or minimize effects on local features;
- a grade plan that identifies workspace requirements;
- temporary and permanent erosion control measures including the identification of specific materials such as silt fencing, erosion control matting, etc.;
- revegetation procedures and seed mixes;
- other information requested by regulatory agencies;
- detailed drawings to support the above-noted information; and
- inspection and monitoring plans.

8.0 PLANT SPECIES AND ECOLOGICAL COMMUNITIES OF CONCERN DISCOVERY CONTINGENCY PLAN

In the event that rare plants or ecological communities are discovered during future vegetation studies, the plant or ecological community will be assessed and appropriate mitigative measures will be determined prior to construction of the pipeline. The appropriate site-specific mitigative measures will be determined following an assessment by a vegetation specialist, which will consider the following:

- the location of the plant or ecological community on the right-of-way;
- the relative rarity of the plant or ecological community (regionally, nationally, etc.);
- the local abundance of the plant or ecological community;
- the growth habit and propagation strategy of the plant or ecological community; and
- the habitat preferences of the plant or ecological community.

The suite of mitigative options that may be implemented includes the following:

- narrow down the proposed area of disturbance and protect the site using snow fencing and signage;
- inform all users of access restrictions in the vicinity of fenced sites;
- temporarily cover the site with snow (given the season), geotextile pads, flex net, swamp mats, or equivalent;
- extend road or watercourse bores to avoid or minimize effects on the site;
- realign the route to avoid the site; or
- propagate rare plants or specific portions of sensitive ecological communities, via vegetative or reproductive means (e.g., harvesting of seed from the right-of-way or adjacent area, salvaging and transplanting portions of sod and surrounding vegetation or collecting of cuttings).

The Rare Plant Survey will outline appropriate mitigation to be implemented at each site where a rare plant or ecological community is discovered within the Project Footprint. The Preliminary Environmental Alignment Sheets will be amended, if warranted, to incorporate these mitigative measures.

9.0 WILDLIFE SPECIES OF CONCERN DISCOVERY CONTINGENCY PLAN

Wildlife Species of Concern Discovery Prior to Construction

In the event that wildlife species of concern or their site-specific habitat is discovered during future wildlife studies, the discovery will be assessed and appropriate mitigation measures will be determined. The wildlife or habitat will be assessed by wildlife specialists based on the following criteria:

- the location of the wildlife or habitat feature with respect to the proposed area of development;
- the presence of topographic features or vegetation to effectively screen the wildlife or habitat from construction activities;
- the timing of construction versus the critical timing constraints for the species; and
- the potential for an alteration of construction activities to minimize or avoid sensory disturbance.

The suite of mitigative options that may be implemented includes the following:

- abide by seasonal timing constraints within the recommended set back distances;
- abide by daily timing restrictions on construction activities;
- narrow down the proposed area of disturbance and protect the site using snow fencing and signage;
- alter or delay construction activities to avoid sensory disturbance (e.g., no burning);
- extend road or watercourse bores to avoid or minimize effects on the site;
- inform all users of access restrictions in the vicinity of fenced sites;
- realign the route to avoid the site;
- install nest boxes or platforms or otherwise replace or enhance habitat during reclamation or restoration; and
- relocate nests or other habitat features or individuals if practical and monitor post-construction response.

In the event a discovery is made during supplemental wildlife surveys, the appropriate mitigation will be implemented and the Preliminary Environmental Alignment Sheets will be amended to incorporate these measures.

Wildlife Species of Concern Discovery During Pipeline Construction

In the event that wildlife species of concern or their site-specific habitat are discovered during construction of the pipeline, the discovery will be assessed based on the criteria provided above and appropriate mitigation measures will be implemented from the list outlined below.

1. Suspend work immediately in the vicinity of any newly discovered wildlife species of concern. Work at that location may not resume until the measures below are undertaken.
2. Notify the Environmental Inspector(s) who will notify the Construction Manager.
3. The Environmental Inspector(s) will assess the discovery and either allow construction to be resumed or, in the event of a confirmed or potential discovery, proceed by notifying:
 - applicable government agencies (e.g., provincial regulator, Environment Canada) as required (Appendix 1B); and
 - the Company's Wildlife Consultant.
4. The Company's Wildlife Consultant may deem it necessary to visit the site to develop an appropriate mitigation plan in consultation with the Company's Environmental Advisor. The mitigative measures available include those listed above.

10.0 HERITAGE RESOURCE DISCOVERY CONTINGENCY PLAN

Heritage Resource Discovery During Construction

In the event that archaeological, historical or palaeontological resources are discovered during construction of the Project, the sites will be assessed by the Company's Heritage Resource Specialist and appropriate mitigative measures will be determined. The site will be assessed based on the following criteria:

- the significance of the site;
- the location of the site with respect to the Project Footprint;
- the feasibility of alternate routing or siting to avoid the resource; and
- the decision of the appropriate regulatory agency (e.g., AC).

In the event that heritage resources are discovered during construction, follow the measures outlined below.

1. Suspend work immediately in the vicinity of any newly discovered archaeological, palaeontological, historical or traditional land use site. Work at that location may not resume until the measures below are undertaken.
2. Notify the Environmental Inspector(s) who will notify the Construction Manager.
3. The Environmental Inspector(s) will provide an initial review of possible archaeological, palaeontological and historical remains and either allow construction to resume or, in the event of a confirmed or potential discovery, proceed by notifying:
 - The Company's Heritage Resource Specialist; and
 - Applicable regulatory agencies (e.g., AC) (see Appendix 1B of the EPP) as required.
4. The Company's Heritage Resource Specialist may deem it necessary to visit the site and will, regardless of whether a site visit is required, develop an appropriate mitigation plan in consultation with the Company's Environmental Advisor and, if necessary, the appropriate regulatory agency.

11.0 TLU SITES DISCOVERY CONTINGENCY PLAN

11.1 TLU Sites Identified Prior to Construction

In the event that Traditional Land Use (TLU) sites are identified during future studies for the Project, the sites will be assessed and appropriate mitigative measures will be determined. The TLU site will be assessed based on the following criteria:

- the location of the TLU site with respect to the proposed area of development;
- the relative importance of the TLU site to the community; and
- the potential to alter construction activities to minimize or avoid sensory disturbance.

The mitigative measures that may be implemented will be dependent on the type of site identified. On past projects, the forms of accepted mitigation noted in the following subsections have been successful in mitigating effects on Aboriginal TLU sites. As part of the studies, each Aboriginal community will be asked to identify potential TLU sites, including trails, culturally modified trees, habitation sites, plant harvesting locations, hunting, fishing, trapping and gathering places and sacred areas. Alternative site-specific mitigation strategies may also be recommended by communities.

Trails and Travelways

Travel corridors are essential for conducting traditional activities, and effects on actively-used trails should be reduced and mitigated. Trails include well-defined all-terrain vehicle (ATV) and snowmobile corridors, navigable waterways, river portages, and historic foot, dog sled and pack horse pathways.

Successful and proven mitigative measures available to trails transecting the pipeline right-of-way include:

- detailed recording and mapping in the vicinity of the proposed pipeline right-of-way. In partnership with community representatives, a decision is then made about the relative importance of the trail and, if warranted, how to best to maintain and control access; and
- other mitigation options include signage or scheduling construction during periods of least impact.

Culturally Modified Trees

Culturally modified trees (CMTs) are trees showing evidence of intentional modification by Aboriginal people in their utilization of the forest. CMTs include such features as trees where the bark and/or cambium has been stripped for use as a raw material or for food, trees blazed to mark trails and trees carved for spiritual practices. CMTs provide physical evidence of Aboriginal resource use in an area and are often valued by members of the First Nations communities.

Standard and effective mitigative measures available, when and where necessary, vary depending on the function of the CMT. Blazed CMTs marking trails are mitigated as trails, while CMTs which are spiritual in nature are mitigated as sacred areas. Successful and accepted mitigative measures for other CMTs may include:

- detailed recording and mapping;
- flagging, fencing or avoidance, and/or
- sampling of trees for dating, where appropriate, using increment cores or stem cross-sections.

Habitation Sites

Habitation sites are located in prime, resource-rich areas and include traditional campsites, cabins and settlements. Campsites typically have defined hearths (fire rings), de-limbed trees, tent frames and/or miscellaneous cached or discarded camping supplies and equipment. Cabin structures represent a more permanent occupation of the land, and include central log or timber-framed structure, traditional activity areas such as drying racks and smoking tents, and ancillary equipment storage areas. A group of cabins or campsites may signify a long-term or intermittent occupation. A settlement may have been used seasonally or throughout the year, depending on location or necessity. The relative size and nature of habitation sites continuously evolve based on how families and communities grow, and often expand from campsites to cabins and possibly to settlements.

Successful and proven mitigative measures for habitation sites include:

- detailed mapping, photographic recording and avoidance of the location by the proposed development; or
- should avoidance of a site not be feasible, mitigative measures consisting of detailed recording and controlled excavations may be implemented.

Plant Harvesting

Many Aboriginal individuals harvest medicinal, ceremonial and food source plants. Plants are gathered in a variety of environments which include mature forests, along watercourses and in rugged or mountainous areas. Detailed information regarding medicinal plants is passed down from the Elders and is considered proprietary by the communities.

Effective mitigative measures are dependent on the context and relative location of a harvesting area to the proposed development, but may include:

- providing Aboriginal communities with opportunity to harvest prior to construction;
- limiting the use of chemical applications;
- minimizing construction effects or avoidance.

Hunting

Hunting and wildlife sites are areas where large fauna such as elk, moose, deer, caribou and bear are commonly harvested. They are identified both in community discussion, and by observed game ambushes, blinds and hunting stands, dry meat racks and butchered animal remains. Furthermore, locales where game can be expected, such as mineral licks, calving areas and well-used game trails, are typically prized hunting areas.

Successful and accepted mitigation for hunting sites may include:

- minimizing construction impacts;
- adhering to species-specific timing constraints;
- leaving breaks in the windrows and strung pipe to allow animals to cross; and
- limiting the use of chemical applications.

Fishing

Changes to local fishing spots, as well as the broader water system, can impact Aboriginal harvesting. Fishing sites relate to the use of specific reaches of lakes and streams and, generally, this information is gathered by having community representatives identify fishing locales and specify the nature of their use and success rates.

Standard and effective mitigative measures for fishing areas may include:

- recording and mapping of fishing locales; and
- adherence to the regulations, standards and guidelines set by provincial and federal regulatory agencies for watercourse crossings.

Trapping

Trapping and snaring of animals for food and pelts are activities that continue to be engaged in by Aboriginal individuals. These traps and snares may or may not be located within registered trap lines. Concerns expressed by both Aboriginal and non-Aboriginal trappers are generally identified and mitigated individually.

In order to avoid accidental damage where the proposed pipeline route transects a trap line, mitigative measures may include:

- maintaining access to the trap line; and
- moving of trap line equipment by the trapper prior to construction.

Gathering Places

Aboriginal people often met in gathering places to share in ceremonial activities, exchange items of trade, arrange and celebrate marriages, and for other activities. Additionally, indigenous grave sites are sometimes recorded in the general area of large gathering places. Such gathering places have historical, ceremonial, cultural and economic significance to Aboriginal communities.

Potential effects on gathering places may be mitigated through detailed recording, mapping and avoidance; however, the visual impact will be assessed in the field and mitigative measures will be refined and optimized, if warranted.

Sacred Areas

One of the primary concerns of Aboriginal communities with regard to any proposed development project is to ensure that sites sacred to the local communities are protected from adverse effects. These areas include burials, vision quest locations, rock art panels, birth locations and ceremonial places, among others. A particular element is often only a small component of a larger spiritual complex, which can encompass topographic features and may, by its very nature in the context of Aboriginal spirituality, be inestimable and irreplaceable.

Mitigative measures for sacred areas may include detailed recording, mapping and avoidance; however, additional mitigative measures, if warranted, will be refined and optimized in the field and through community discussions.

11.2 Traditional Land Use Sites Discovered During Construction

In the event that a TLU site is discovered during construction of the pipeline, the following measures will be undertaken.

1. Suspend work immediately in the vicinity of any newly discovered sacred sites. Work at that location may not resume until the measures below are undertaken.
2. Notify the Environmental Inspector(s), who will notify the Construction Manager and the Company's Heritage Resource Specialist.
3. The Company's Heritage Resource Specialist will assess the site and develop an appropriate mitigation plan using the information listed above.

APPENDIX 1F

MANAGEMENT PLANS

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1.0 CHEMICAL AND WASTE MANAGEMENT PLAN

1.1 Purpose

The Chemical and Waste Management Plan has been prepared to provide guidelines for dealing with the generation of project waste, and to provide guidelines for dealing with the procurement, storing and handling of hazardous materials required for the Project.

This plan outlines specific measures to be followed by all Company employees and contractors involved with the construction of the Project. The plan is designed to ensure that chemicals and wastes are procured, handled, stored and disposed of in an environmentally responsible manner, thereby maintaining ecological and cultural integrity. This plan will reduce the likelihood of an accidental release of potentially hazardous waste products into the environment during pipeline construction.

This plan applies to all employees, contractors and consultants who conduct work on behalf of the Company during construction of the Project. All employees, contractors and consultants will abide by all federal, provincial and local requirements for the storage, handling, transport, disposal and spill reporting requirements of all products and waste materials that are potentially hazardous to human health and the environment.

The Environmental Inspector is responsible for ensuring compliance with TransCanada's Environmental Guidelines and all applicable codes, regulations and industry standards for waste management and handling chemicals. Where a discrepancy occurs, the most stringent requirements apply. In the event of a spill, the Spill Contingency Plan (see Appendix 1E of this EPP) will be implemented. The Spill Contingency Plan sets forth the lines of communication and procedures to follow in order to facilitate containment and clean-up should a spill occur.

1.2 Applicable Regulations, Guidelines and Codes of Practice

1.2.1 Federal

- Onshore Pipeline Regulations, Section 11.
- *Hazardous Products Act*, Controlled Products Regulation and Ingredients Disclosure List Regulation (Workplace Hazardous Materials Information System [WHMIS] legislation).
- Canada Labour Code, Oil and Gas Occupational Safety and Health Regulation, Part XI Hazardous Substances.
- *Transportation of Dangerous Goods Act* and Regulation.

1.2.2 Provincial

- *Environmental Protection and Enhancement Act*.
- *Energy Resources Conservation Act*.
- *Oil and Gas Conservation Act* and Regulations.
- *Pipeline Act* and Regulation.
- *Occupational Health and Safety Act* and Regulations.
- Occupational Health and Safety Code, Part 29 WHMIS, Sections 395 to 414.
- *Public Health Act*.
- Fire Code.
- ERCB Directive 055 - Storage Requirements for the Upstream Petroleum Industry.
- ERCB Directive 058 - Oilfield Waste Management Requirements for the Upstream Petroleum Industry.

- ERCB Directive 050 – Drilling Waste Management.

1.3 Guiding Principles

The Company is committed to performing its activities in an environmentally responsible manner. The following general guiding principles have been incorporated into this plan:

- reasonable preventative measures will be taken to avoid the release of wastes and hazardous materials into the environment;
- all waste and hazardous material spills will be reported to the Environmental Inspector and to the appropriate authorities, if warranted;
- all waste and hazardous material spills will be cleaned up promptly and thoroughly; and
- waste and hazardous materials will, to the extent feasible, be recycled, disposed of or moved to an approved area as required.

1.3.1 Application

This Chemical and Waste Management Plan applies to the pipeline right-of-way, other construction areas, all staging areas, construction yards and public roadways being used in association with the Project. Awareness of these requirements will be integrated as appropriate into preconstruction training and orientations.

1.3.2 Description of Wastes and Chemicals

Potential Project related wastes have been divided into two categories for discussion of storage, handling and disposal procedures.

Solid Nonhazardous Wastes – include garbage and debris generated through the activities of personnel during pipeline construction and right-of-way reclamation. These wastes are nontoxic in nature and include, but are not necessarily limited to:

- food wastes;
- pipe tape and coating;
- spent welding rods;
- grinder pads;
- styrofoam and plastics;
- wood;
- wire;
- survey stakes/flagging tape;
- used geotextile; and
- metal strapping.

Industrial Wastes - include wastes and products generated or utilised during pipeline construction. These materials may contain quantities of potentially toxic substances in the form of residues and include, but are not necessarily limited to:

- used oils (engine oil, transmission/drive train oil, hydraulic/lube oil, gear oils, lubricating greases);

- used lube filters;
- spent grease cartridges;
- used antifreeze (containers and cans of ethylene glycol, propylene glycol);
- contaminated soil, vegetation and/or absorbents that may contain hydraulic fluid, gasoline, diesel or lube oil;
- used solvents;
- used batteries (automotive/equipment);
- film processing waste liquids; and
- spent cleaning products and associated materials rags.

Potential Project related chemicals that are likely to be found on the construction sites include, but are not necessarily limited to:

- batteries;
- cleaning products;
- fuels (gasoline, diesel, propane);
- lubricants (engine oil, transmission/drive train oil, hydraulic oil, gear oil, lubricating grease);
- coolants (ethylene glycol, propylene glycol);
- paints and solvents;
- film processing chemicals; and
- glues (including epoxy and urethane coating products) and cements.

1.3.3 Mitigative Measures

All employees, contractors and consultants of the Company will be required to comply with applicable regulations for the containment, handling, storage, use and disposal of wastes and chemicals. The following are minimum requirements.

General Measures

1. Construction yards and staging areas that are designated as an industrial waste or chemical storage area will be selected and designed to:
 - avoid wetlands, watercourses, sensitive vegetation, highly permeable soils, steep slopes and water supply wells when feasible;
 - prevent vehicle incidents by providing unobstructed access (for delivery, disposal and emergency vehicles);
 - provide safe storage areas, including secondary containment, for all chemical liquids and hazardous wastes in accordance with applicable regulatory requirements; and
 - provide unobstructed access/egress to/from emergency response materials and equipment.
2. All Project staff with waste management and hazardous materials responsibilities will be educated in accordance with regulatory requirements specific to the Project. All personnel shall understand their responsibilities for proper handling, identification, documentation and storage of wastes and hazardous materials.

3. An appropriate number of portable toilets shall be made available to ensure each crew has ready access to washroom facilities. The facilities will be serviced and cleaned regularly and will be adequately secured. All site personnel are to use portable toilets as provided.
4. The Contractor shall register with the appropriate provincial government department with respect to hazardous materials (to obtain a hazardous waste generator number or equivalent) and shall, at that time, provide detailed manifest information regarding the location of the staging areas, the types of waste that will be produced, and the transport vehicle that will be collecting the waste for disposal.

Prevention of Release into the Environment

1. The Contractors' equipment will be clean and in good operating condition.
2. Contractors will be supplied with a list of required stand-by equipment and required spill response container supplies to respond to large volume spills. The stand-by equipment will be stationed in the field construction yards. Appropriate measures will be taken immediately to limit the spread of the contamination, in accordance with the Spill Contingency Plan (see Appendix 1E of this EPP).
3. Prior to construction kick-off, the Contractor will ensure that all spill response equipment and materials are onsite or readily available.
4. Fuel/service vehicles will carry:
 - fire extinguishers;
 - shovels;
 - an impermeable barrier for placing under vehicles to be serviced; and
 - hydrocarbon spill kits complete with a minimum of 10 kg of sorbent material for clean-up of small spills.
5. Sorbents, barrier materials (e.g., impermeable liners, etc.), shovels, a water boom, and 210 L storage drums will be stockpiled at the contractor yards/staging areas to respond to small spills.

Waste and Chemical Handling

1. Personnel who will be handling waste materials will possess valid WHMIS training.
2. All fuel truck drivers, and drivers transporting waste or chemicals will have current Transportation of Dangerous Goods (TDG) certification.
3. During waste and chemical handling activities, employees and/or contractors will use appropriate personal protective equipment to prevent any contact with material.
4. Procedures for safe loading and unloading of products will be followed
 - service vehicles will be equipped with automatic shut-off valves;
 - brakes will be set;
 - the vehicle will be grounded if the product is flammable;
 - the operator will observe loading and unloading activities at all times; and
 - when complete, the operator will examine all outlets for leakage and take corrective action if warranted.

Waste and Chemical Storage

1. An appropriate number of waste and recycling receptacles will be made available during the Project.
2. Designated industrial waste storage areas at a facility shall be designed to meet all applicable federal and provincial regulations.
3. Hazardous materials will be stored in designated storage area(s). Short term hazardous material storage on the right-of-way may be designated at the discretion of the Environmental Inspector, if required for specific tasks.
4. Hazardous materials and industrial wastes will be stored greater than 100 m from a wetland, watercourse or waterbody, where feasible.

5. Designated storage areas will be clearly identified and secured. Waste stored in any containers must be clearly labelled to comply with TDG Act and WHMIS regulations.
6. Hazardous wastes will be separated by type.
7. Secondary containment may be required depending on the location, type, volume and duration of the waste or chemical being stored. Secondary containment will be in accordance with applicable federal, provincial and municipal requirements.
8. Containment devices will be constructed from suitable metallic or non-metallic materials capable of containing the stored product.
9. Secondary containment areas not protected from the elements will be monitored regularly to ensure that ice, snow, or rainwater have not decreased the volumetric capacity for storage of a spill to be less than 110% of the aggregate storage volume of the containment area. Water accumulated within a secondary containment structure may be removed if authorised by the Environmental Inspector. If there is visible hydrocarbon sheen, the water will be collected for proper storage and disposal.
10. Containers and tanks will be closed when not in use. Drain valves will be locked to prevent accidental or unauthorised releases.
11. Secured non-hazardous materials (*i.e.*, skids, geotextiles, survey stakes etc.) that pose no threat to the surrounding ecosystem will be neatly stockpiled in locations along the right-of-way for disposal. The disposal frequency is dependent upon the type of material stockpiled and will be determined by the Environmental Inspector.
12. The Contractor will visually inspect designated hazardous material storage areas and aboveground tanks on a regular basis as well as when the tank is refilled. The Contractor shall maintain inspection records in accordance with applicable federal, provincial and local requirements. Identified problems or deficiencies shall be corrected in a timely manner.
13. The Contractor will remove all secondary containment structures at the end of the construction phase, and return the impoundment area to its original contours and appearance, including establishing appropriate drainage patterns and vegetation cover.

Waste Disposal

1. All waste materials will be disposed of in accordance with federal and provincial legislation and municipal/regional regulations as required.
2. Each construction site will be equipped with adequate garbage receptacles for solid non-hazardous wastes and debris. These materials will be collected as required and disposed of at approved locations. Food wastes will be stored in animal proof (bear-proof) containers and transported to an appropriate landfill site.
3. Receptacles for industrial wastes generated during construction will be provided in order to keep them segregated from non-hazardous waste. Used oil and oil filters will be placed in sealed containers and delivered for disposal by a qualified service contractor.
4. Receptacles for recycling various products (*e.g.*, paper and tin) will be available at Project construction yards and camps and will be hauled to appropriate recycling depots.
5. Naturally Occurring Radioactive Materials (NORMs) will be transferred to approved locations by a qualified contractor for final disposal.
6. Polychlorinated Biphenyl (PCB) treatment or disposal facilities must be pre-approved by the Company. This includes third party waste brokers, consultants and contractors. PCB concentration must be thoroughly characterised prior to special treatment or disposal.

Documentation and Record Keeping

1. Material Safety Data Sheets (MSDSs) will be available for each product stored at a particular construction yard or staging area.
2. The contractor will maintain a record of the routine inspections performed on the industrial waste storage area(s). The Contractor will furnish the Company construction office with any and all inspection reports monthly.

3. Provincial manifest records will be reviewed by an authorised Company representative with current TDG certification when waste is transferred from a temporary storage facility for transport to a final disposal location.
4. The Environmental Inspector(s) will be provided with copies of waste manifests. Provincial manifest records must be reconciled within six weeks of initial shipment date. Until notification that the waste has been received at its final disposal location, the waste is the responsibility of the Company.
5. Copies of manifest records must be kept in a central location for a minimum of two years after the waste has arrived at its final disposal location.

2.0 TRAFFIC CONTROL MANAGEMENT PLAN

This plan deals with the management and control of pipeline construction traffic along the pipeline route and temporary access routes. It covers activities during preconstruction, construction and post-construction phases of the Project.

2.1 Purpose

The Traffic Control Management Plan provides guidelines for vehicular use on the right-of-way and associated access roads. The intent is to minimise disturbance resulting from pipeline construction on these lands, particularly in riparian areas and in areas of high erosion hazard. All vehicle and equipment operators will adhere to the contingency measures for wet/thawed conditions outlined in the Wet Soils Contingency Plan (see Appendix 1E of this EPP).

The plan objectives will be accomplished by minimising the development of access routes, selecting appropriate access routes that cause the least disturbance, managing traffic on these routes and determining appropriate as-left treatment at the completion of the Project.

2.2 Pre-Construction

The applicable provincial authorities will be notified of all access road upgrading requirements and Grand Rapids Pipeline GP Ltd. will accommodate continued public access during pipeline construction whenever feasible.

Prior to construction activities, the Company will place notices in local and/or regional newspapers to announce the Project initiation and the construction schedule. Information regarding labour, equipment, and activity schedules will be provided to applicable municipal and provincial authorities prior to the commencement of work.

The Project will adhere to the following principles.

- All motorised vehicle traffic, including ATV, Argo and snowmobile traffic, will be confined to the approved route, access roads or trails except where specifically authorised by the appropriate authority.
- ATVs and Argos may be used during preconstruction activities if minimal terrain impact is anticipated. Vehicle travel across wetlands and riparian areas should be reduced to the extent feasible.
- Prior to commencement of construction activities, features of concern flagged during biophysical surveys or indicated on the Environmental Alignment Sheets, Table 1 or Table 2 will be clearly marked. Following clearing, snow fencing will be installed to delineate the sensitive resources.

The development and maintenance of access roads required prior to, or during construction, will adhere to the relevant requirements set out in this EPP.

2.3 Construction

During construction, traffic will adhere to the following guidelines:

- All Project personnel and other visitors to the right-of-way will participate in the Contractor orientation program.
- All access points to the right-of-way will be flagged and signed to discourage public use.
- All vehicular traffic will be restricted to the approved and staked pipeline route, work space and access roads.
- Construction and inspection personnel and visitors to the right-of-way and other work sites will receive instruction on locations suitable for parking vehicles and equipment.
- Snow fencing, and signage will be erected to protect features of concern as specified in this EPP. The boundaries of shoo-flies and trails will be clearly staked.

- The Company, Contractor and all subcontractor personnel will avoid areas that are fenced or staked and abide by any restrictions on in/out privileges that are implemented in areas requiring special protection.
- The Company, Contractor and all subcontractor personnel will limit travel up and down the right-of-way during the course of the work. General touring trips on the right-of-way will be minimised.
- Special measures such as limiting of construction traffic, swamp mats or matting may be warranted in areas with poorly-drained and organic soils (see the Wet Soils Contingency Plan in Appendix 1E of this EPP).
- Construction personnel will be transported between construction yards and the construction site by multi-passenger vehicles to the extent practical, in order to minimise vehicle traffic.
- Control measures may be put in place to ensure traffic adheres to special restrictions that are in effect (e.g., narrowing of work space to limit impact on a species of concern).
- The speed limit on the right-of-way will be designated by the Contractor. Speed limits may be lowered under specific conditions such as areas with poor visibility, steep terrain or areas where specific wildlife concerns have been identified.
- All Project-related vehicles will follow applicable traffic, road-use and safety laws.
- All vehicle traffic will avoid unnecessary wheel spin.
- During nonfrozen conditions, equipment travel, particularly that of heavy and/or tracked equipment, will make use of the stripped and graded areas for travel and passing.
- Vehicles will be limited to travel on the access roads and right-of-way for which they are designed. Most vehicles are able to turn around within the width of the construction right-of-way. Stringing trucks require extra turning radius. Consequently, approaches to the pipeline right-of-way or existing public roads will wider when used for stringing trucks. Where turnarounds are required on the right-of-way, extra space will be required on the travel side of the right-of-way. Previously disturbed areas will be used for this purpose, when feasible. Stringing trucks will be limited to access roads developed for their use. Turn around areas require approval by applicable government agencies.

2.4 Post-Construction

After construction is complete, restoration efforts will be initiated and traffic will adhere to the following principles to ensure there is as little disturbance as practical.

- All temporary construction access roads and shoo-flies will be reclaimed to preconstruction conditions or restored as per this EPP. Newly created access points will be blocked unless otherwise directed by the Company or the appropriate regulatory agency.
- Vehicle traffic will be minimised on newly seeded areas until ground cover is re-established.
- Routine access to the right-of-way for operation, maintenance and monitoring activities will be by way of pre-existing roads and trails wherever feasible. Where travel along the right-of-way in the vicinity of important vegetation is required (e.g., during reclamation monitoring) foot travel will be used whenever feasible. ATV/Argos will be used if necessary.
- Efforts to control off road vehicle use will be coordinated with the appropriate authorities and will be conducted until the right-of-way has been satisfactorily reclaimed. Methods to control access may include one or a combination of the following:
 - posting of appropriate signage at all points of access;
 - create a visual barrier to reduce line of sight;
 - installation of locking gates and fencing; and/or
 - installation of slash or rock barriers.

3.0 HYDROVAC CUTTING HANDLING PLAN

In order to ensure the disposal of Hydrovac slurry complies with all applicable provincial and/or federal Guidelines and reclamation objectives, the Company will implement a number of measures during construction of the Project.

- The contractor will ensure that the Environmental Inspector has reviewed and approved a disposal site prior to starting Hydrovac operation.
- Ensure road weight restrictions are adhered to.
- The hydrovac contractor is to ensure that all tanks are clean and free of contaminants prior to arriving onsite.
- Salvage topsoil prior to hydrovac use. Topsoil salvage is not required for holes less than 1 m in diameter if soil will be removed using a hydrovac during frozen soil conditions or where the area to be exposed will be subsequently subject to topsoil salvage as part of right-of-way preparation activities.
- As hydro-vac slurry from new disturbances is generally of mineral soil content and is not likely to be contaminated, onsite disposal is the preferred method if subsidence is not a concern. The disposal area must be in a location that has had the surface materials removed. If a dike is required to contain slurry, dike material shall be of subsoil or an alternative material approved by the Environmental Inspector capable of containing the slurry.
- Non-contaminated slurry may be released into the hydrovac excavation if future subsidence of the site is not a concern and the area is fenced until the tailings are dry.
- If temporary onsite storage is to be constructed (e.g., sump or bermed area) the surface materials must be removed from the area. The area constructed must be able to contain slurry and prevent any off site migration.
- Hydrovac contractor may temporarily store slurry in their trucks or at a site that is designed to safely store slurry. Use clean oilfield storage tank or metal slop bin for temporary storage if other more practical storage options (i.e., temporary pits) are not desirable for the site.
- Wet hydrovac slurry cannot be sent to a landfill even if it is not contaminated with hazardous substances. Wet hydrovac slurry can be disposed of by the hydrovac contractor to a licensed treatment or disposal facility where accepted. Appropriate documentation must be provided to the Company to verify that hydrovac slurry disposal is in accordance with regulatory requirements and to the satisfaction of the Company
- Do not mix contaminated slurry with uncontaminated slurry.
- Contaminated and potentially contaminated slurry needs special handling storage and disposal requirements.
- If contaminants are suspected, do not remove the hydrovac slurry from the site. Arrangements should be made to temporarily contain the slurry onsite pending analysis and final disposal arrangements.
- All hydrovac holes shall be adequately back filled with mineral soil, or other materials as directed by the owner of the facilities, to ensure settling of material does not pose a hazard for wildlife, livestock or the general public.