

Prepared for:
Westcoast Energy Inc.
carrying on business as:



Spectra Energy Transmission

**ENVIRONMENTAL PROTECTION PLAN
FOR THE PROPOSED
WESTCOAST ENERGY INC.
SOUTH MAXHAMISH LOOP PROJECT**

**Issued for Construction
June 2010**

Prepared by:



TERA Environmental Consultants
Suite 1100, 815 - 8th Avenue S.W.
Calgary, Alberta T2P 3P2
Ph: 403-265-2885

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1.0 INTRODUCTION

Westcoast Energy Inc., doing business as Spectra Energy Transmission (Westcoast), is applying to the National Energy Board (NEB) under Section 58 of the *NEB Act* for authorization to construct and operate approximately 30 km of 609.6 mm O.D. (NPS 24) sour gas (0.02%) pipeline loop located within British Columbia (BC) approximately 60 km northwest of Fort Nelson. This proposed pipeline loop will be constructed parallel and adjacent to Westcoast's existing Maxhamish natural gas pipeline.

Westcoast has recently provided the NEB with its Environmental Manual for Construction Projects in Canada 2nd Edition, 2010 (Environmental Manual). This document applies to the South Maxhamish Loop Project (the Project) and describes environmental protection policies, mitigative measures and contingency plans for projects generally. Sections of the Environmental Manual that are referenced in this Environmental Protection Plan (EPP) have been included as Appendix E of this EPP.

This EPP describes the environmental protection measures to be used during the construction of the Project in order to minimize the potential impacts previously identified in Section 6.0 of the Environmental and Socio-economic Assessment (ESA). This EPP is written in construction specification format and should be read in conjunction with the Environmental Alignment Sheets, which identify where specific mitigative measures will be applied. Within each section of the EPP, measures to be addressed by Westcoast are noted, where applicable, as well as mitigative measures to be implemented by the Contractor.

Subject to regulatory approval, pipeline construction is scheduled to take place during the summer and fall of 2010. Rough clean-up will be conducted immediately following construction with final clean-up and reclamation to be completed in fall 2010, assuming the ground is not frozen, or after spring break-up, 2011, once ground conditions permit and the trench has settled.

The EPP has been prepared to address construction during nonfrozen conditions. If pipeline construction does not follow the proposed schedule, the EPP shall be reviewed and amended, as required.

1.1 Preconstruction Activities

The following construction preparation measures are the responsibility of Westcoast.

Activity	Preparation Measures
<i>EPP and Contract</i>	1. The EPP shall form part of the contract documents. Relevant environmental information will be incorporated on to the Environmental Alignment Sheets, which will also form part of the contract documents. Should any conflict in contract and EPP requirements arise, the more stringent conditions will apply.
<i>Construction Documents</i>	2. The Contractor and Westcoast's Environmental Inspector will be provided the EPP, Environmental Alignment Sheets and copies of all approvals including the most recent updates and revisions.
<i>Discipline</i>	3. Those who show careless or wanton neglect of the environment or disregard the EPP may be removed from the Project.
<i>Licences and Permits</i>	4. All necessary licences and permits shall be obtained or notifications made prior to the commencement of applicable local construction activities (see Appendix B of this EPP).
<i>Pre-job Meeting</i>	5. Prior to the commencement of construction, a pre-job meeting shall be held with Westcoast's Project personnel and the pipeline Contractor. This meeting is designed to make supervisory construction personnel aware of the Project requirements, including but not limited to key environmental issues, general environmental concerns, contingency plans, rules and regulations applicable to the construction area.
<i>Environmental Inspection</i>	6. Westcoast will have a qualified Environmental Inspector as part of the Project field staff for all phases of construction, as described in Section 8.0 of the ESA. Westcoast's Environmental Inspector will ensure the implementation of the EPP during all critical phases (strippings salvage and replacement; grading; watercourse and wetland crossings; and clean-up).
<i>Environmental Compliance</i>	7. All Project personnel, including visitors to the right-of-way, will receive the appropriate level of environmental training before they are allowed to access any development site associated orientation with the Project, as described in Section 8.0 of the ESA.

1.2 Environmental Compliance

1.2.1 *Accountability*

Westcoast's Inspection Team, which will include the Chief Inspector and Environmental Inspector, will be accountable for ensuring environmental compliance during the construction of the Project. All incidents that qualify as being in non-compliance of applicable laws, commitments made by Westcoast and/or specific approval conditions by regulators, shall be reported to the Inspection Team. Westcoast shall take necessary steps to rectify the situation through appropriate notification of regulators, implementation of suitable mitigation measures and record keeping of the circumstances that resulted in the non-compliance, as well as any remedial measures taken and recommendations for future monitoring.

1.2.2 *Decision Making Criteria*

Westcoast's Inspection Team will consider the following criteria when deciding which protection measures and/or procedures to implement during Project construction:

- site conditions at the time of construction (*e.g.*, slope gradient and aspect, soil texture, soil moisture, safety, etc.);
- weather conditions at the time of construction (*e.g.*, wind, precipitation forecast, air temperature, etc.);
- equipment and/or materials availability at the time of construction;
- Contractor experience with conducting specific construction techniques; and
- inspection staff experience with implementing applicable protection measures and/or procedures.

1.2.3 *Environmental Training/Orientation*

All Project personnel, including visitors to the right-of-way, will receive the appropriate level of environmental training before they are allowed to access the right-of-way. Environmental training will include, at a minimum, the following:

- the process to follow should an environmental feature be located and/or disturbed during construction;
- response and reporting procedures in the event that a spill of any controlled substance occur; and
- the expectation that speed limits and signage, flagging and/or fences delineating the environmental features shall be respected at all times.

2.0 ENVIRONMENTAL SCOPE OF WORK

The purpose of this section is to provide the Contractor with a brief overview of the environmental issues associated with the Project and to identify any mitigative measures necessary to address those issues. Construction activities that could affect these issues will be more carefully scrutinized by Westcoast's inspection staff.

2.1 Environmental Setting

The Project route:

- traverses BC provincial Crown lands for its entire length;
- follows the existing Westcoast Maxhamish Pipeline and Highway 77 for most of its length (approximately 95% and 87% respectively);
- traverses flat to gently rolling terrain, with some moderate slopes near watercourses;
- traverses the Boreal White and Black Spruce Biogeoclimatic Zone;
- is partially located within the range of the Maxhamish boreal caribou herd;
- encounters a number of populations of four BC-listed rare plant species (European water-hemlock, western Jacob's-ladder, northern bog bedstraw and jack pine), which are all ranked S2S3;
- crosses a number of small organic wetlands (*i.e.*, muskeg); and
- crosses six watercourses, including Tsinhia Creek and an unnamed tributary to the Kiwigana River, both of which are fish-bearing. In addition, numerous non-classified drainages are crossed, of which one has a record of fish presence and the remainder have been determined to lack suitable habitat to support overwintering fish populations.

More detailed Environmental Setting information can be found in Section 5.0 of the ESA.

2.2 Key Mitigative Measures

Mitigative measures that could be applied to address the key environmental concerns noted in the ESA include:

- Use of an existing highway vehicle crossing to traverse Tsinhia Creek.
- Isolated open cut crossings of all watercourses (except D16) flowing at the time of construction (see Table 1 of Section 11.0 of this EPP for a list of all watercourse crossings and timing constraints).

- Implementation of erosion and sediment control, where required (*e.g.*, watercourses and wetlands).
- Salvage of merchantable timber, if feasible.
- Limiting of disturbance of vegetation to minimize effects on rare plants through narrowing down, minimizing grubbing and/or ramping over rare plant populations.

3.0 NOTIFICATION OF CONCERNED PARTIES

Goal

To minimize interference with other land uses and to appraise relevant government personnel of the pipeline construction.

Company Measures

The following measures are the responsibility of Westcoast.

Contacts	Measures
<i>Government Authorities</i>	<ol style="list-style-type: none">1. Notify the NEB prior to construction if directed in the NEB Order. Contact shall be maintained until Project completion.2. Notify the BC Ministry of Environment (MOE) at least 45 days (min.) prior to commencement of vehicle water crossing installation or water crossing activities. Notify the Regional Office within 72 hours in the event of a contravention of the <i>Water Act</i>.3. Submit Notification Forms to Fisheries and Oceans Canada (DFO) at least 10 working days prior to commencement of vehicle water crossing installation or water crossing activities, as required in the Pacific Region Operational Statements. Review the Operational Statements and any letter(s) of advice or authorizations.4. Notify both DFO and BC MOE representatives, if instream blasting is necessary.
<i>Government Liaison</i>	<ol style="list-style-type: none">5. Contact with government field representatives as required during construction will be the responsibility of Westcoast's Environmental Inspector.
<i>Trappers, Guides and Outfitters</i>	<ol style="list-style-type: none">6. Inform any registered trappers and guides and outfitters, as identified by Westcoast's consultation group, of pipeline construction schedules, giving sufficient time for them to modify any planned activities and to remove any trapping equipment from the Project area.
<i>Aboriginal Groups</i>	<ol style="list-style-type: none">7. Notify representatives of First Nations and Aboriginal groups of the proposed construction schedule within sufficient time to allow them to modify their activities, unless otherwise specified in agreements.

Contractor Measures

The following measures are to be implemented by the Contractor.

Contacts	Measures
<i>Provincial Authorities</i>	8. Notify BC Ministry of Transportation, if required, on highway or road crossing agreements.
<i>Local Authorities</i>	9. Notify Utility Officer(s), if required, by road crossing agreements prior to construction.
<i>Resource Companies</i>	10. Notify applicable companies for road and foreign line crossings, as well as works within 30 m, if required, by crossing, road use or proximity agreements.
<i>Timber Haulers and Timber Mill</i>	11. Notify timber haulers and timber mills prior to commencing clearing to inform them of anticipated volumes and proposed schedule.

4.0 GENERAL ENVIRONMENTAL PROTECTION MEASURES

General environmental protection specifications are provided in Section 6.1 of the Environmental Manual (see Appendix E of this EPP). Project-specific details are provided below. These are followed by detailed specifications for each phase of pipeline construction.

Contractor Measures

The following measures are to be implemented by the Contractor.

Activity/Concern	Mitigation Measures
<i>Scheduling</i>	1. Abide by instream construction windows identified in Table 1 (Section 11.0 of this EPP), unless otherwise approved by site-specific permit.
<i>Contingency Plans</i>	2. Review the following documents prior to conducting any preconstruction environmental surveys and prior to kicking off construction. <ul style="list-style-type: none">• Extreme Weather Contingency Plan (Section 6.11.4 of the Environmental Manual [see Appendix E of this EPP]);• Contaminated Soils Contingency Plan (Section 6.11.6 of the Environmental Manual [see Appendix E of this EPP]);• Flood and Excessive Flow Contingency Plan (Section 1 of Appendix D of this EPP);• Fire Contingency Plan (Section 2 of Appendix D of this EPP);• Wet Soils Contingency Plan (Section 3 of Appendix D of this EPP);• Soil Erosion Contingency Plan (Section 4 of Appendix D of this EPP);• Siltation of Watercourse Contingency Plan (Section 5 of Appendix D of this EPP);• Spill Contingency Plan (Section 6 of Appendix D of this EPP);• Wildlife Species of Concern Discovery Contingency Plan (Section 7 of Appendix D of this EPP);• Wildlife Encounter Contingency Plan (Section 8 of Appendix D of this EPP); and• Heritage Resource Discovery Contingency Plan (Section 9 of Appendix D of this EPP).
	3. All inspectors and other key personnel on the right-of-way should be aware of these plans.

Activity/Concern	Mitigation Measures
<i>Wet Conditions</i>	4. In the event of wet soils, refer to Section 6.1, Items 12 to 15 of the Environmental Manual (see Appendix E of this EPP) and to the Wet Soils Contingency Plan (Section 3 of Appendix D of this EPP).
<i>Weeds</i>	5. Ensure that construction equipment arrives on the right-of-way in a clean condition to minimize the risk of weed introduction. Any equipment that arrives in a dirty condition shall not be allowed on the right-of-way until it has been cleaned off at a suitable location (see Section 6.1, Item 16 of the Environmental Manual [Appendix E of this EPP]).
<i>Spill Prevention</i>	6. Ensure that no fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides, or other chemicals are dumped on the ground or into any watercourse during the course of the Project. In the event of a spill, the Spill Contingency Plan shall be implemented (Appendix D of this EPP).
<i>Equipment Refuelling and Servicing</i>	7. During refuelling and lubrication of equipment, ensure spills are prevented by following the guidelines provided in Section 6.1, Item 7 of the Environmental Manual (Appendix E of this EPP).
<i>Air Quality / Emissions</i>	8. Use well-maintained equipment to minimize emissions. 9. Minimize unnecessary idling of Project equipment. 10. Utilize multi-passenger vehicles for the transport of crews to and from job sites, to the extent practical, to minimize emissions and reduce excess traffic during construction. 11. Control dust during construction and reclamation activities, if warranted.
<i>Noise</i>	12. Ensure that noise abatement equipment (<i>e.g.</i> , mufflers) on machinery is in good working order to control noise levels. Take reasonable measures to control construction-related noise.
<i>Hazardous Materials and Waste Management</i>	13. Follow the direction provided in Section 6.1, Items 8 to 11 and Section 6.10, Item 15 of the Environmental Manual (Appendix E of this EPP).
<i>Garbage</i>	14. Collect and dispose of all construction garbage at an approved facility to avoid the attraction of nuisance animals. Waste containers shall accompany each working unit. No waste shall be disposed of in the trench. 15. Store all garbage in animal-proof containers when potential animal/human conflicts may occur (<i>i.e.</i> , problem bears).

Activity/Concern	Mitigation Measures
<i>Roads, Access and Shoo-Flies</i>	<p>16. Confine construction activities to the allotted right-of-way and workspace. Construction traffic shall be restricted to existing roads, the right-of-way and approved shoo-flies. Any roads damaged by construction vehicles shall be repaired to preconstruction conditions. Shoo-flies shall be reclaimed as part of clean-up. All traffic safety and road closure regulations shall be followed.</p> <p>17. Restrict construction traffic to the trench area or work side of the right-of-way to reduce the area subjected to potential soil compaction.</p>
<i>Erosion and Siltation</i>	<p>18. Prevent or control soil erosion and water siltation to the satisfaction of Westcoast's inspection team and the BC Ministry of Forests and Range (MOFR) Representative, as directed in Section 6.2.2 of the Environmental Manual (see Appendix E of this EPP). Ensure personnel and equipment are available to control erosion, when warranted (see Section 4 of Appendix D of this EPP).</p>
<i>Wildlife</i>	<p>19. Follow the direction provided in Section 6.8 of the Environmental Manual (see Appendix E of this EPP) to protect wildlife.</p>
<i>Trappers</i>	<p>20. Do not permit the vandalism or theft of trapper equipment or trapped animals. Violators will be reported to local authorities. Trapper(s) will be notified in the event that trapping equipment is discovered and needs to be relocated.</p>
<i>Fires</i>	<p>21. Complete and implement all recommendations of the Forest Fire Prevention Risk Assessment prior to initiating Project activities (Section 2 of Appendix D of this EPP).</p> <p>22. Ensure that personnel are made aware of proper disposal methods for welding rods, cigarette butts and other hot or burning material. No fires shall be permitted when the fire hazard is high.</p> <p>23. Do not allow smoking in the open on the right-of-way when the fire hazard is high. At these times, smoking will only be allowed within vehicles.</p> <p>24. Ensure that exhaust and engine systems of equipment are in good working condition and inspect undercarriages periodically to ensure that vegetation does not accumulate. When the fire hazard is high, vehicles shall not be left idling for extended periods of time and shall not be parked in tall vegetation.</p> <p>25. Where warranted, place an appropriate nonflammable barrier between vegetation and the work area directly affected by welding operations. Nonflammable barriers are not required if strippings have been salvaged from the work area.</p>

Activity/Concern	Mitigation Measures
<i>Fires (cont'd)</i>	<p>26. Ensure that each crew carries appropriate fire-fighting tools as described in Section 2 of Appendix D of this EPP, as required by the Wildfire Regulations.</p> <p>27. Ensure that slash burning crews have fire-fighting equipment on hand that is capable of controlling any fire that may occur as a result of their activities as regulated by the Wildfire Regulations.</p> <p>28. Do not burn slash if the fire hazard is high. If burning is delayed, slash shall be stored along the right-of-way, in natural clearings, at cutline intersections, along the adjacent existing right-of-way, or in approved push-outs. Burning will be permitted once the fire hazard is low.</p> <p>29. Implement the Fire Contingency Plan (Section 2 of Appendix D of this EPP) and notify proper authorities in the event of an uncontrolled fire.</p>
<i>Archaeological, Palaeontological, or Historical Discovery</i>	<p>30. Suspend work in proximity to archaeological, palaeontological or historical sites discovered during construction and contact the Project Heritage Consultant immediately. No work at that particular location shall continue until permission is granted by Archaeological Branch of the BC Ministry of Tourism, Culture and the Arts (MTCA).</p>

5.0 SURVEYING, ACCESS AND CLEARING

Goal

To restrict the Project footprint to approved workspace and to limit the disturbance to vegetation (*i.e.*, merchantable timber and native vegetation) to the extent practical. General environmental protection measures to be implemented to achieve this goal are provided in Section 6.4 of the Environmental Manual (see Appendix E of this EPP) with Project-specific information below.

Company Measures

The following measures are the responsibility of Westcoast.

Activity/Concern	Mitigation Measures
<i>Staking</i>	1. Stake the right-of-way as directed in Section 6.4.1, Item 1 of the Environmental Manual (see Appendix E of this EPP), so that watercourses and roads are crossed perpendicularly or as per crossing drawings and agreements, and slopes are ascended or descended along the fall line.
<i>Workspace</i>	2. Identify the need for extra workspace prior to construction. Take extra workspace at: <ul style="list-style-type: none">• sharp sidebends, as well as foreign line and road crossings to ensure sufficient separation between strippings and spoil piles;• on hummocky terrain to ensure sufficient storage space for graded material;• locations where rollback storage is required; and• watercourse crossings to ensure sufficient room to permit storage of strippings and spoil a sufficient distance back from the top of the bank. Locate extra temporary workspaces (<i>e.g.</i>, laydown and assembly areas) at least 15 m from watercourse streambanks, as required by the DFO Dry Open-cut Stream Crossings Operational Statement.
<i>Rare Plants</i>	3. Engage the rare plant biologist to stake or flag locations of rare plants as identified on the Environmental Alignment Sheets. 4. Narrow down the right-of-way, if possible, at discrete populations of rare plants, as shown on the Environmental Alignment Sheets.

Activity/Concern	Mitigation Measures
<i>Preconstruction Wildlife Survey</i>	5. In the event clearing must take place between May 1 and July 31, conduct a breeding bird survey prior to clearing to ensure no migratory birds are nesting along the proposed right-of-way and consult with Environment Canada and the BC MOE. 6. In the event of a discovery, follow the Wildlife Species of Concern Discovery Contingency Plan (Section 7 of Appendix D).
<i>Traditional Land Use Sites</i>	7. Engage Westcoast's heritage consultant to stake or flag locations of Traditional Land Use sites as described in the Traditional Land Use Sites Assessment.

Contractor Measures

The following measures are to be implemented by the Contractor.

Activity/Concern	Mitigation Measures
<i>Survey Slash Lines</i>	8. Fell all timber onto the right-of-way during survey line clearing. No fallen or leaning trees shall be permitted off right-of-way or in watercourses.
<i>Bar Ditch Ramps</i>	9. Construct bar ditch ramps with subsoil. 10. Install culverts in bar ditch ramps to maintain drainage. Culvert specifications will be determined by the Project Engineer.
<i>Foreign Pipelines</i>	11. Construct ramps on the work side of the right-of-way over existing foreign pipelines as per Crossing Agreements.
<i>Hot Line Exposure / Hydrovac</i>	12. Salvage strippings prior to exposing hot lines. Strippings salvage is not required prior to exposing hot lines for holes less than 1 m, where the area to be exposed will be subsequently subject to strippings salvage as part of right-of-way preparation activities. 13. Empty the hydrovac truck at approved locations, as directed by the Environmental Inspector. Ensure that hydrovac material is contained within the designated release area (<i>i.e.</i> , will not migrate to a waterbody, wetland or other sensitive area). 14. In the event of contaminated soils discovery during hydrovac activities, follow the guidance provided in the Contaminated Soils Contingency Plan (Section 6.11.6 of the Environmental Manual [see Appendix E of this EPP]).

Activity/Concern	Mitigation Measures
<i>Vehicle Crossing Structures</i>	<p>15. Use the existing adjacent highway crossing for vehicle traffic crossing Tsinhia Creek.</p> <p>16. Install temporary single span bridges or alternate vehicle crossing method on flowing watercourses as directed in Table 1 (Section 11.0 of this EPP), as well as Section 6.6.3 and Appendix B, Dwgs. 20 and 22 of the Environmental Manual (see Appendix E of this EPP), the Project Aquatic Assessment (Appendix A of the ESA) and in compliance with the DFO Pacific Region Operational Statements.</p> <p>17. If installation of the vehicle crossing structure will result in disturbance to the bed and/or banks of a flowing waterbody, isolation of the watercourse prior to crossing installation is required and should be conducted as directed by DFO, as described in Section 6.6.2.a and Appendix B, Dwgs. 13 and 14, of the Environmental Manual (see Appendix E of this EPP) and as directed in the Project Aquatic Assessment (Appendix A of the ESA).</p> <p>18. Install ramp and culvert crossings on any dry watercourses (Table 1, Section 11.0 of this EPP), as well as any non-classified drainages as described in Section 6.6.3 and Appendix B, Dwg. 21 of the Environmental Manual (see Appendix E of this EPP).</p>
<i>Watercourses</i>	<p>19. Remove only that vegetation adjacent to a watercourse that is absolutely necessary and leave a minimal disturbance zone of at least 10 m adjacent to all watercourses as directed in Section 6.6.1, Items 13 to 17, of the Environmental Manual (see Appendix E of this EPP).</p> <p>20. With the exception of equipment required to construct and remove vehicle crossings at watercourses or to travel over vehicle crossings, no clearing equipment shall be permitted to operate within 5 m of any watercourse in accordance with the Timber Harvesting Practices Regulation of the <i>Forest Practices Code of BC Act</i>.</p>
<i>Corduroy / Rollback</i>	<p>21. Retain nonsalvageable timber, where warranted, for use as corduroy or rollback. Suggested locations where rollback may be applied are indicated on the Environmental Alignment Sheets. The amount of timber retained for use as rollback or corduroy will be determined by the Chief Inspector in consultation with the Environmental Inspector. Leave gaps in rollback windrow at obvious drainages and wildlife trails. Place additional gaps in areas where no obvious gaps can be identified, to allow for wildlife movement during construction. Locations where wildlife gaps are appropriate will be determined in the field by the Environmental Inspector.</p>

Activity/Concern	Mitigation Measures
<i>Wet Terrain / Muskeg</i>	22. Install corduroy, wooden mats or equivalent in areas of permanently wet soils to minimize terrain disturbance and soil structure damage.
<i>Merchantable / Salvageable Timber</i>	23. Salvage timber on Crown lands as per the specifications provided in the Occupational Licence to Cut. 24. 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>Timber Deck Site Preparation and Felling</i>	25. Prepare deck sites and conduct felling as described in Section 6.4.1, Items 11 to 15 of the Environmental Manual (see Appendix E of this EPP).
<i>Nonmerchantable Timber</i>	26. Use brushcutters, brushhogs or other equipment to clear nonmerchantable timber in order to minimize terrain disturbance and assist in maintaining an intact ground surface in areas where grading is not warranted.
<i>Grubbing</i>	27. Grub tree roots (where required) with a back hoe or brush rake attachment on the bulldozer to preserve strippings. 28. Consider using a stump mulcher rather than grubbing on areas where stripping and grubbing are not necessary. 29. Restrict grubbing within 2 m of the undisturbed edge of the right-of-way to prevent damaging adjacent trees. 30. Minimize the width of grubbing near watercourses and through wet areas to facilitate the restoration of shrub communities and to avoid creation of bog holes.
<i>Rare Plants</i>	31. At locations of rare plants and where grading is not required for safety, minimize the disturbance of the root mat by limiting grubbing to the trench line only. 32. In areas where rare plants have been identified, ramp over the travel lane with swamp or rig mats (see Detail 1, Section 6 of this EPP).
<i>Leaning and Damaged Trees</i>	33. Fell all trees damaged during construction activities immediately. Do not postpone until clean-up. Remove any trees that fall off right-of-way and workspace.
<i>Slash Piling</i>	34. Use a brush rake attachment on a bulldozer or a backhoe to push slash and nonmerchantable timber into piles along the centre line of the right-of-way or to a side of the right-of-way that has been previously cleared. This will facilitate preservation of any strippings. Leave a firebreak at 200 m (maximum) intervals.

Activity/Concern	Mitigation Measures
<i>Slash Disposal</i>	<p>35. Dispose of slash and stumps as directed in Section 6.4.1, Items 17 to 24 of the Environmental Manual (see Appendix E of this EPP).</p> <p>36. Implement Westcoast's Forest Fire Prevention Risk Assessment (Section 2 of Appendix D of this EPP) prior to burning slash.</p> <p>37. Avoid locating burn piles on peat-rich soils in order to limit the risk of residual fires after construction. Locate burn piles on exposed mineral soils (<i>i.e.</i>, where strippings salvage has occurred) or on burning sleds/sloops.</p> <p>38. Implement techniques to limit smoke production including limiting pile size, minimizing moisture content, and maintaining loose burning piles free of soil.</p>
<i>Beaver Dams</i>	<p>39. Contact the Environmental Inspector to request permission to remove beaver dams, where required. Where beaver dam removal is required, Westcoast will engage the registered trapper (or a licensed/registered nuisance trapper), submit a General Wildlife Permit for Beaver Dam Removal, file a notification to BC MOE and follow the requirements of the Standards and Best Practices for Instream Works (BC Ministry of Water, Land and Air Protection [MWLAP] 2004).</p>

6.0 STRIPPINGS SALVAGE AND GRADING

Goal

To minimize impacts to soil capability, surface drainage patterns, land use and wildlife habitat.

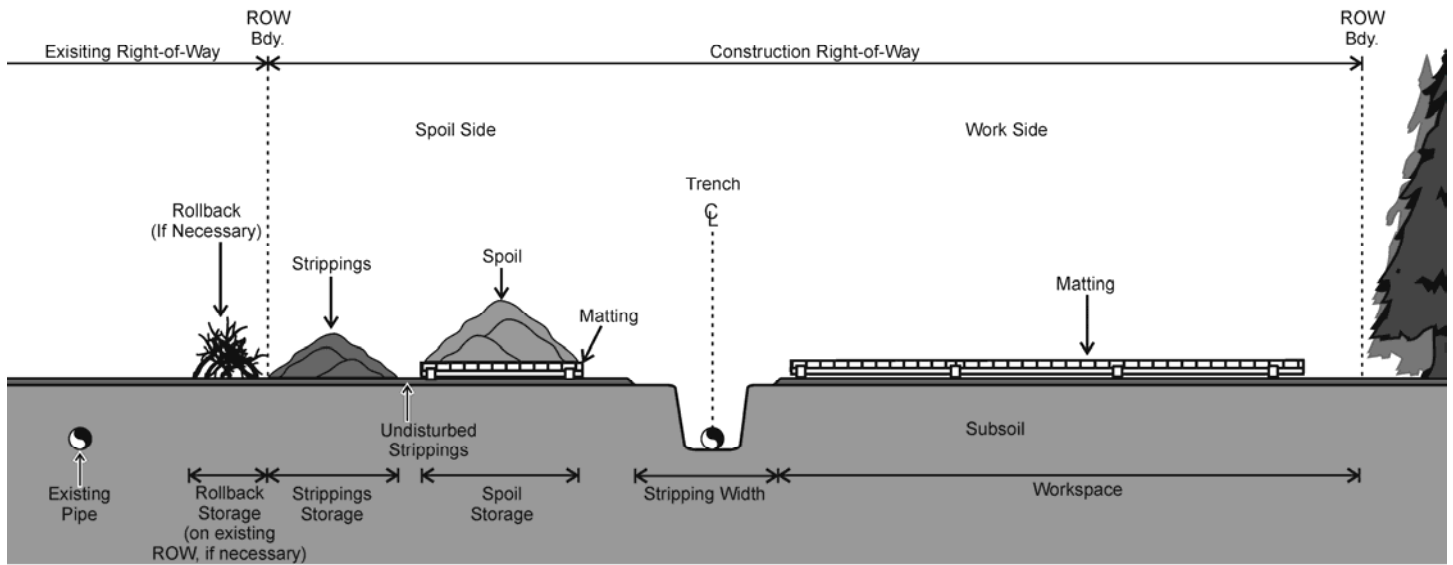
General environmental protection measures to be implemented to achieve this goal are provided in Section 6.3 of the Environmental Manual (see Appendix E of this EPP). Project-specific measures are detailed below.

Contractor Measures

The following measures are to be implemented by the Contractor.

Activity/Concern	Mitigation Measures
<i>Strippings Salvage</i>	<ol style="list-style-type: none">1. Salvage strippings from entire right-of-way (see Dwg. 11 of Appendix B of the Environmental Manual [see Appendix E of this EPP]).2. In areas of rare plants, strip a narrow blade width centred over the trench (see Detail 1). If rare plants are identified in areas where grading is required, strip and store grubblings and strippings separately and mark their location to ensure these materials are replaced in the same area during clean-up.
<i>Stripping Depth</i>	<ol style="list-style-type: none">3. Salvage all available strippings (15-20 cm or 50% organic material and 50% mineral soil).
<i>Organic Soils</i>	<ol style="list-style-type: none">4. In muskeg areas where the organic soils are uniformly greater than 40 cm, strippings salvage is not required.
<i>Windrow Gaps</i>	<ol style="list-style-type: none">5. Leave gaps in the strippings windrow, if warranted, at obvious drainage courses and wildlife trails. Place additional gaps in areas where no obvious gaps can be identified, to allow for wildlife movement during construction. Locations where wildlife gaps are appropriate will be determined in the field by the Environmental Inspector. Ensure that gaps coincide with gaps in the rollback windrows.
<i>Sidebends and Crossings</i>	<ol style="list-style-type: none">6. Salvage a greater width of strippings at sharp sidebends and at crossings of watercourses, roads and foreign lines to accommodate grading and/or a wider and deeper trench.7. Strip an area larger than the bellhole to allow feathering-out of spoil over the stripped area.

Activity/Concern	Mitigation Measures
<i>Grading</i>	<ol style="list-style-type: none">8. Salvage strippings from areas to be graded and windrow to the closest edge of the construction right-of-way. Avoid overstripping. The area stripped is to correspond to area to be graded.9. Minimize grading throughout the route, especially at watercourses and wetlands. Minimize the width of grading in order to limit the potential for erosion and subsoil compaction.10. Ensure graded material does not spread off right-of-way.
<i>Watercourses</i>	<ol style="list-style-type: none">11. Grade away from watercourses to minimize introduction of soil and organic debris. No windrowed or fill material shall be placed in the watercourses during grading.
<i>Temporary Berms / Silt Fences</i>	<ol style="list-style-type: none">12. Install temporary berms on approach slopes to watercourses and erect silt fence(s) near the base of approach slopes to watercourses following grading (see Dwg. 2 of Appendix B of the Environmental Manual [see Appendix E of this EPP]). Inspect the temporary erosion control structures on a daily basis and repair, if warranted, before the end of each working day.



Profile
(Not to Scale)

Activity:

Notes:

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Clearing 2. Grubbing 3. Access 4. Salvage Strippings 5. Excavate Trench and Stockpile 6. Backfill Trench 7. Replace Strippings and Clean-up | <ul style="list-style-type: none"> - Clear timber and brush level with the ground. - Minimize the disturbance of the root mat by limiting grubbing to the trench line only. - Ramp over the travel lane with swamp or rig mats, or subsoil on a geotextile base. - Blade off leaf litter, roots and some upper mineral soil from an area twice the width (2-3 m approx.) of the trench. - Avoid overstripping. - Leave breaks in strippings pile at obvious drainage courses. - Prior to start of trenching, install swamp or rig mats on the spoil side of the right-of-way. - Store spoil on top of the mats. - Backfill and compact trench, if feasible. Crown the trench to allow for settlement. Leave breaks in the crown at obvious drainages. - Evenly replace strippings over ditch area. - If strippings do not contain 50% mineral material, rip replaced strippings and mineral soil to a depth to mix leaf litter with mineral soils. - Remove mats from both sides of the right-of-way. - Allow disturbed area to revegetate naturally. |
|--|--|

Note: In areas where right-of-way grading is required (*i.e.*, areas of sidehill or moderate to steep grades) strip and store grubblings and strippings separately and mark their location to ensure these materials are replaced in the same area during clean-up.



CALGARY, ALBERTA

**SPECTRA ENERGY TRANSMISSION
SOUTH MAXHAMISH PIPELINE LOOP PROJECT**

STRIPPINGS SALVAGE - RARE PLANT LOCATIONS

6292

June 2010

Detail 1

7.0 STRINGING, WELDING, TRENCHING AND LOWERING-IN

Goal

To minimize ground disturbance, interference with other land uses and interference with wildlife movement.

General environmental protection measures to be implemented to achieve this goal are provided in Section 6.3 of the Environmental Manual (see Appendix E of this EPP). Project-specific measures are detailed below.

Contractor Measures

The following measures are to be implemented by the Contractor.

Activity/Concern	Mitigation Measures
<i>Compaction and Rutting</i>	1. Limit heavy equipment travel to machinery and vehicles equipped with low-ground-pressure tires or wide tracks to minimize compaction and rutting, if wet soil conditions are present.
<i>Gaps in Set-up Pipe</i>	2. Leave gaps in set-up and welded pipe to allow caribou and other wildlife to cross the right-of-way. Gaps shall be located at obvious game trails. Place additional gaps in areas where no obvious gaps can be identified, to allow for wildlife movement during construction. Locations where wildlife gaps are appropriate will be determined in the field by the Environmental Inspector. Breaks in pipe shall be coincident with gaps in strippings and rollback windrows.
<i>Trenching</i>	3. Follow the direction provided in Section 6.3.1, Items 6 to 10 of the Environmental Manual (Appendix E of this EPP) during trenching. 4. Minimize trench width during trenching in order to limit spoil storage requirements and sod disturbance. 5. If trench will be left open for an extended period (<i>i.e.</i> , overnight) leave gaps in spoil pile and trench line at obvious wildlife trails. Place additional gaps in areas where no obvious gaps can be identified, to allow for wildlife movement during construction. Locations where wildlife gaps are appropriate will be determined in the field by the Environmental Inspector. Gaps shall be coincident with gaps in set-up pipe and strippings and rollback windrows.
<i>Rare Plants</i>	6. In locations of rare plants place swamp or rig mats over the spoil side and place ditch spoil on top of the mats, to prevent ditch spoil from mixing with the unstripped surface materials (see Detail 1 in Section 6.0 of this EPP)

Activity/Concern	Mitigation Measures
<i>Bedrock</i>	7. Rip bedrock in trench, if encountered and if feasible.
<i>Blasting</i>	8. Blast bedrock encountered within trench depth only if ripping is not feasible. 9. Ensure that blasting is undertaken by licensed blasters and in accordance with professional practice and regulatory requirements. 10. Utilize warning sirens, blasting mats, blasting controls and monitoring to ensure the safety of humans and wildlife.
<i>Blasting Near Watercourses</i>	11. Follow appropriate procedures provided in <i>Guidelines for the Use of Explosives in or near Canadian Fisheries Waters</i> if blasting is necessary within 80 m of a fish-bearing watercourse.
<i>Strippings / Subsoil Separation</i>	12. Keep spoil pile separate from strippings pile. Maintain separation between strippings and spoil piles to ensure that piles do not mix.
<i>Unstable Trench Walls</i>	13. Back slope the trench walls until stable. Equip hoe with a swamp bucket, or equip trenching wheel with slope cutters, if practical, to minimize trench sloughing.
<i>Dewatering Trench</i>	14. Dewater the trench, if warranted, when laying pipe in areas with high water tables. Pump water onto stable and well-vegetated areas, tarpaulins or sheeting, at least 50 m away from the nearest watercourse, in a manner that does not cause erosion, or result in sedimentation of any watercourse or wetland. Place pumps on polyethylene sheeting above the high watermark of any watercourses or wetlands. 15. Do not dewater the trench in any permanent wetland to the extent that the water level of the wetland is lowered.
<i>Buoyancy Control</i>	16. Install buoyancy control (<i>e.g.</i> , pipe weights) in areas of high water table or muskeg, as directed by the Project Engineer, to prevent floating pipe.
<i>Lowering-in</i>	17. Minimize sideboom traffic on the strippings windrow located on the work side during lowering-in to prevent admixing of strippings. 18. Appropriately pad or otherwise protect the pipe where blasting or rock hammering has occurred and bedrock is present at bottom of the trench.

8.0 BACKFILLING

Goal

To control subsurface drainage prior to backfilling and to backfill trench to restore preconstruction grades during backfill operations in a manner that facilitates reclamation.

General environmental protection measures to be implemented to achieve this goal are provided in Section 6.3 of the Environmental Manual (see Appendix E of this EPP). Project-specific measures are detailed below.

Contractor Measures

The following measures are to be implemented by the Contractor.

Activity/Concern	Mitigation Measures
<i>Install Trench Breakers</i>	<ol style="list-style-type: none">1. Install trench breakers (e.g., sack, foam or bentonite) where warranted as described in Section 6.2.2, Item 10 of the Environmental Manual (see Appendix E of this EPP).2. Install trench breakers back from the edge of watercourses where the banks are of organic material to prevent washout of the trench.3. Exact location of breakers will be determined in the field. However, general locations where breakers may be needed are shown on the Environmental Alignment Sheets. Mark location of each breaker prior to backfilling to facilitate correct placement of diversion berm immediately downslope of the breaker.
<i>Install Subdrains</i>	<ol style="list-style-type: none">4. Install subdrains as directed by Westcoast's Project Engineer as described in Section 6.2.2, Item 12 of the Environmental Manual (see Appendix E of this EPP).
<i>Backfill Trench</i>	<ol style="list-style-type: none">5. Backfill the trench without mixing spoil with strippings pile.6. Compact the backfill, if feasible, to minimize trench settlement when the trench has been backfilled to the level of the surrounding ground. Take extra care to compact the trench at banks of watercourse crossings, intermittent drainages and ditches that have been trenched.7. Backfill mineral soil first, if salvaged separately from organic material in shallow muskeg or peaty areas, to ensure that cross drainage is maintained.8. Ensure that bedrock excavated from the trench is not backfilled directly on top of the pipe.

Activity/Concern	Mitigation Measures
<i>Backfill Trench (cont'd)</i>	<p>9. Ensure that potential sources for additional or replacement backfill are identified by the Contractor prior to construction.</p> <p>10. Dispose of excess blast rock and excavated rock in consultation with appropriate provincial regulator (<i>e.g.</i>, BC MOFR, BC Integrated Land Management Bureau [ILMB]).</p>
<i>Crown Trench</i>	<p>11. Crown the trench as directed in Section 6.3.3, Item 4 of the Environmental Manual (see Appendix E of this EPP).</p>
<i>Recontour Right-of-Way</i>	<p>12. Recontour the right-of-way and restore the preconstruction grades and drainage channels. Where restoration of the preconstruction grade is not feasible due to risk of failure of fill on slopes, recontour to grades as directed by Westcoast's Geotechnical Engineer.</p> <p>13. Ensure that wetlands are restored to their preconstruction profile.</p>

9.0 HYDROSTATIC TESTING

Goal

To withdraw and release hydrostatic test water in accordance with applicable regulations and to control erosion and prevent the contamination of surface waters during dewatering activities.

General environmental protection measures to be implemented to achieve this goal are provided in Section 6.5.2 of the Environmental Manual (see Appendix E of this EPP). Project-specific measures are detailed below.

Company Measures

The following measures will be the responsibility of Westcoast.

Activity/Concern	Mitigation Measures
<i>Obtain Approvals</i>	1. Obtain all applicable government agency approvals for water withdrawal and discharge to allow for hydrostatic testing of the pipeline.
<i>Federal Standards</i>	2. Ensure that hydrostatic testing is undertaken in accordance with Canadian Standards Association (CSA) Z662.
<i>Onshore Pipeline Regulations, 1999</i>	3. Conduct all hydrostatic testing activities in accordance with the NEB <i>Onshore Pipeline Regulations, 1999</i> .
<i>Sump Excavations</i>	4. If a sump within a waterbody is expected to be required, obtain any federal or provincial approvals required for instream work.

Contractor Measures

The following measures are to be implemented by the Contractor.

Activity/Concern	Mitigation Measures
<i>Approval Conditions</i>	5. Adhere to approved water sources and withdrawal rates. 6. Restrict water withdrawal for hydrostatic testing to less than 10% of the streamflow of the watercourse at the time of withdrawal, or as otherwise specified by the appropriate regulatory authority.
<i>Water Sources</i>	7. Identify water sources as described in Section 6.5.2, Item 2 of the Environmental Manual (see Appendix E of this EPP). 8. Shunt test water from test section to test section to the extent practical to minimize the volume of water, number of water sources, amount of water hauling and number or dewatering points.

Activity/Concern	Mitigation Measures
<i>Equipment and Workers</i>	9. Ensure that enough workers and equipment are available onsite to repair any rupture, leak or erosion problem that arises during testing.
<i>Water Trucks</i>	10. Ensure that water trucks, if used to transport test water to the fill site, are clean.
<i>Sump Excavation</i>	11. Employ sediment reduction methods (<i>e.g.</i> , sediment mats, silt fence, sand bag, coffer dam, etc.), if warranted, where a sump within a waterbody is required, to protect fish, fish habitat and water users from increased sedimentation or reduced water quality.
<i>Isolate Pumps</i>	12. Isolate test pumps and storage tanks with an impermeable lined dike or depression to prevent spills of fuels or lubricants.
<i>Pigging Debris</i>	13. Collect pretest pigging debris and water. Discharge the water at an acceptable location in a manner that does not cause erosion and does not allow unfiltered or silted water to directly re-enter a watercourse. Dispose of the remaining material with other construction waste, in accordance with BC Oil and Gas Waste Regulation. 14. Collect and dispose of pigging debris at an acceptable location in accordance with BC Oil and Gas Waste Regulation.
<i>Screen Intake</i>	15. Screen test water intakes in accordance with DFO screening requirements, to prevent the entrapment of fish or wildlife.
<i>Dewatering</i>	16. Sample test water as described in Section 6.5.2, Items 6 of the Environmental Manual (see Appendix E of this EPP). 17. Conduct dewatering as described in Section 6.5.2, Items 6 to 8 of the Environmental Manual (see Appendix E of this EPP).
<i>Daylighting</i>	18. Follow applicable EPP protection measures if exposure (daylighting) of the pipe is needed for inspection or repairs.

10.0 CLEAN-UP AND RECLAMATION

Goal

To reclaim disturbed surfaces, restore drainage patterns and control erosion to the satisfaction of the applicable government agency.

General environmental protection measures to be implemented to achieve this goal are provided throughout Section 6 of the Environmental Manual (see Appendix E of this EPP). Project-specific measures are detailed below.

Contractor Measures

The following measures are to be implemented by the Contractor.

Activity/Concern	Mitigation Measures
<i>Scheduling</i>	<ol style="list-style-type: none">1. Complete final clean-up on the entire right-of-way as quickly as practical and prior to freeze-up or as soon as possible following break-up in the following spring.2. Postpone work on excessively wet soils until conditions are dry.
<i>Restore Watercourses</i>	<ol style="list-style-type: none">3. Remove vehicle crossing structures from all watercourses in accordance with the Pacific Region Operational Statements (DFO).4. Restore streambanks and approaches immediately following construction of water crossing (see Section 11.0 of this EPP).
<i>Corduroy</i>	<ol style="list-style-type: none">5. Remove clay cap, if used, overlying corduroy and return to preconstruction location unless otherwise authorized by BC MOFR.6. Remove all corduroy from all locations along the right-of-way prior to final clean-up unless otherwise authorized by the BC MOFR.7. Burn corduroy, slash and any remaining leaning trees or incorporate into rollback, if required.
<i>Swamp Mats / Matting</i>	<ol style="list-style-type: none">8. Remove swamp mats and matting from all locations on the right-of-way.
<i>Ramps through Wetlands</i>	<ol style="list-style-type: none">9. All ramps through wetlands, in all circumstances, will be removed.
<i>Debris</i>	<ol style="list-style-type: none">10. Remove all remaining garbage and debris from the right-of-way.

Activity/Concern	Mitigation Measures
<i>Sediment Control Measures</i>	11. Install appropriate sediment control measures (<i>i.e.</i> , sediment barriers, temporary interceptor dikes, temporary and permanent diversion berms and cross ditches) at the discretion of the Environmental Inspector, in consultation with the Chief Inspector, as described in Section 6.2.2, Items 1 to 9 of the Environmental Manual (see Appendix E of this EPP). General areas where measures may be applied are mapped on the Environmental Alignment Sheets.
<i>Cleat Marks</i>	12. Create microsities on slopes to retain moisture and enhance seed germination success by aligning the final pass of dozers straight up and down the slope.
<i>Regrading</i>	13. Regrade areas with vehicle ruts, erosion gullies or where the trench has settled.
<i>Excess Trench Spoil</i>	14. Feather-out excess spoil over the stripped portion of the right-of-way to minimize the creation of a permanent mound. Ensure that excess spoil is not feathered-out over the stripped area to an extent that may cause excessive subsidence of the trench.
<i>Strippings Replacement</i>	15. Replace strippings evenly over all portions of the right-of-way that have been stripped. Postpone replacement during wet weather or high winds to prevent damage to soil structure or erosion of strippings. 16. Replace strippings in areas or rare plants in the same location as they were removed.
<i>Excess Rock</i>	17. Dispose of excess rock displaced from the trench in discrete piles, windrows or scattered along the right-of-way or as directed by government agency.
<i>Level and Gently Sloping Terrain - Natural Recovery</i>	18. Allow level and gently sloping lands to regenerate naturally, where erosion is not expected to occur.
<i>Rollback</i>	19. Rollback slash and small diameter, nonmerchantable timber on moderate to steep slopes. Walk down with dozer. Leave gaps in rollback at all obvious wildlife trails.
<i>Erosion Control</i>	20. Where required, implement erosion control measures as described in Section 6.2.2 and Section 6.4.2, Items 4 to 7, of the Environmental Manual (see Appendix E of this EPP).
<i>Seeding of Slopes and Streambanks</i>	21. Seed erosion prone areas (<i>i.e.</i> , steep slopes) and the banks of watercourses with the seed mix described below, unless otherwise directed by the BC MOFR. An equivalent native seed mix from a local supplier may also be used if approved by Westcoast and the BC MOFR representative.

Activity/Concern	Mitigation Measures		
<i>Seeding of Slopes and Streambanks (cont'd)</i>	(Native Seed Mix)	Species Composition % seed by weight	
	fringed brome	25%	
	Canada wild rye	20%	
	June grass	15%	
	tufted hair grass	15%	
	Rocky Mountain fescue	10%	
	slender wheatgrass	10%	
	fowl bluegrass	5%	
		@	35 kg/ha
		Cover crop (e.g., Fall Rye var. Kodiak)	@ 45 kg/ha
	Total	@ 80 kg/ha	
	Broadcast at 80 kg/ha.		
<i>Traditional Land Use Sites</i>	22. Clear traditional land use sites of felled trees, brush and debris where marked by the Westcoast's heritage consultant and as directed in the project Traditional Land Use Sites Assessment.		
<i>Burn Piles</i>	23. Confirm burn piles are properly extinguished prior to completion of clean-up. If requested by BC MOFR, conduct infrared scanning of burn pile locations to locate any hot spots.		

11.0 WATER CROSSINGS

Goal

To minimize siltation, protect fish habitat, maintain streamflow and prevent water pollution/contamination during construction of water crossings. To restore disturbed watercourse bed and banks to as close as preconstruction condition as practical.

General environmental protection measures to be implemented to achieve this goal are provided in Section 6.6 of the Environmental Manual (see Appendix E of this EPP). Project-specific measures are detailed below.

Company Measures

The following measures will be the responsibility of Westcoast.

Activity/Concern	Mitigation Measures
<i>Federal Authorities</i>	1. Ensure that copies of all applicable authorizations, advice and/or approvals from DFO and Transport Canada for Navigable Waters are available onsite prior to and for the duration of water crossing works.
<i>Survey Additional Workspace</i>	2. Obtain and mark extra temporary workspace, if warranted, prior to initiation of instream work. Locate extra temporary workspaces at least 15 m from watercourse streambanks, as required by the Pacific Region Operational Statement for Dry Open-cut Stream Crossings (see Section 5.0 of this EPP).
<i>Permit - Fish Salvage</i>	3. Obtain permit and salvage fish with seine net or electrofishing from isolated area of fish-bearing water crossings prior to and during dewatering and trenching at isolated water crossings (see Appendix B).
<i>Monitor</i>	4. Monitor watercourse crossing activities throughout the crossing construction period.

Contractor Measures

The following measures will be implemented by the Contractor.

Activity/Concern	Mitigation Measures
<i>Notification</i>	5. Notify the Environmental Inspector 12 hours (minimum) prior to commencement of water crossing construction.

Activity/Concern	Mitigation Measures
<i>Scheduling</i>	<p>6. Where feasible, abide by instream construction windows shown on Table 1 of this EPP. All instream works are scheduled to be conducted within the windows of least risk.</p> <p>7. Ensure that all necessary equipment and materials are onsite and ready for installation prior to commencing instream work. Complete all work as quickly as practical to minimize the duration of disturbance.</p>
<i>BC Regulations</i>	<p>8. Abide by all terms and conditions of approvals as dictated by the BC MOE Regional Habitat Officer.</p> <p>9. Limit instream construction to the shortest duration practical.</p>
<i>Vehicle Crossing Method</i>	<p>10. Adhere to measures related to vehicle crossing techniques identified in Section 5.0 of this EPP.</p>
<i>Floods</i>	<p>11. In the event of flooding during instream construction, implement the Flood and Excessive Flow Contingency Plan (Section 1 of Appendix D of this EPP) and Extreme Weather Contingency Plan (Section 6.11.4 of the Environmental Manual,- Appendix E of this EPP).</p>
<i>Wetlands</i>	<p>12. Where wetlands are encountered, follow the direction of Section 6.7 of the Environmental Manual (see Appendix E of this EPP).</p>
<i>Equipment Inspection and Servicing</i>	<p>13. Review and adhere to general protection measures in Section 4.0 related to equipment washing, inspection of hydraulic, fuel and lubrication systems of equipment, equipment servicing and refuelling, as well as fuel storage in proximity to watercourses. Ensure equipment is clean and free of leaks.</p>
<i>Clearing</i>	<p>14. Review and adhere to protection measures related to clearing and grubbing in vicinity of watercourses identified in Section 5.0 of this EPP.</p>
<i>Temporary Berms / Silt Fences</i>	<p>15. Inspect any temporary erosion control structures installed on approach slopes on a daily basis throughout crossing construction. Repair the structures, if warranted, before the end of each working day.</p>
<i>Weld, Coat, Weight</i>	<p>16. Weld, coat and weight pipe prior to commencement of instream construction.</p>
<i>Isolated Crossings</i>	<p>17. At all watercourses and non-classified drainages where flowing water is encountered, , except D16 (see Table 1), conduct Isolated Crossings as directed by DFO and as described in Section 6.6.2.a and on Dwgs. 13 and 14 of Appendix B of the Environmental Manual (see Appendix E of this EPP).</p>

Activity/Concern	Mitigation Measures
<i>Isolated Crossings (cont'd)</i>	<ol style="list-style-type: none">18. Schedule construction activities to allow for fish salvage to occur prior to dewatering, as described in section 6.6.1, Items 7 and 8, of the Environmental Manual (see Appendix E of this EPP).19. Stream bed excavation will not begin until the isolation is deemed functional to the satisfaction of the Environmental Inspector.
<i>Open Cut Crossings</i>	<ol style="list-style-type: none">20. Conduct typical open cut of seasonally dry watercourses in accordance with the Pacific Region Operational Statement for Dry Open-cut Stream Crossings. This is also described in Section 6.6.2.b and on Dwg. 16 of the Environmental Manual (see Appendix E of this EPP).21. Conduct a wet open cut crossing of D16 (see Table 1) as described in Section 6.6.2.b and on Dwg. 16 of the Environmental Manual (see Appendix E of this EPP).22. Do not store any excavation material in D16 during the open cut. Store excavation material a sufficient distance beyond the high water mark of the drainage to ensure saturated material or sediment cannot enter the drainage. Excavate a pit or construct berms of packed earth, staked straw bales or swamp weights, to prevent spoil or silty water from flowing back into the drainage, as shown in Dwg. 12 of the Environmental Manual (see Appendix E of this EPP).23. install instream sediment control measures to prevent sediments from the disturbed area from being transported downstream if flow is present, and ensure these measures are maintained throughout the duration of instream activities.24. Backfill with native material immediately after lowering-in. The streambed shall be returned to approximate preconstruction profile to ensure that flow patterns are unaltered.
<i>Blasting at Watercourses</i>	<ol style="list-style-type: none">25. Consult with DFO and BC MOE in the event the use of explosives is planned near a watercourse.26. Ensure use of confined explosives near watercourses.27. Utilize blasting mat to limit the spread of blasting debris in the area.28. Ensure removal of all detonation wires and other materials used for blasting.
<i>Bank Protection</i>	<ol style="list-style-type: none">29. Install trench breakers if banks are composed of organic materials as noted in Section 8.0 of this EPP.
<i>Restoration</i>	<ol style="list-style-type: none">30. Restore the watercourse as described in Section 6.6.4 of the Environmental Manual (see Appendix E of this EPP).

Activity/Concern	Mitigation Measures
<i>Restoration (cont'd)</i>	31. Maintain silt fences or equivalent sediment control structure in place at the base of approach slopes until revegetation of the right-of-way is complete.

TABLE 1

SUMMARY OF WATERCOURSE CROSSINGS ALONG THE SOUTH MAXHAMISH LOOP PROJECT

Site No.	Waterbody Name	UTM Co-ordinates (Zone 10)	KP	Stream Class ¹	Instream Work Window of Least Risk ²	Mean Bankfull Width (m)	Pipeline Crossing Method	Vehicle/Equipment Crossing Method
WC1	Unnamed tributary to Tsinhia Creek	E: 488731 N: 6593091	0.3	S6	Open	1.7	Isolate if water is present, open cut if dry	Clear span bridge or existing highway crossing
WC2	Unnamed tributary to Tsinhia Creek	E: 488190 N: 6592045	1.4	S6	Open	1.1	Isolate if water is present, open cut if dry	Clear span bridge or existing highway crossing
WC3	Tsinhia Creek	E: 485178 N: 6585508	8.8	S2	July 15 to March 31	11	Isolate	Existing highway crossing
WC4	Unnamed tributary to the Kiwigana River	E: 483035 N: 6580646	14.5	S6	Open	2.1	Isolate if water is present, open cut if dry	Clear span bridge or existing highway crossing
WC5	Unnamed tributary to the Kiwigana River	E: 483218 N: 6579252	16.1	S3	July 15 to March 31	1.9	Isolate if water is present, open cut if dry	Clear span bridge or existing highway crossing
WC6	Unnamed tributary to the Fort Nelson River	E: 483663 N: 6569780	26.4	S6	Open	1.1	Isolate if water is present, open cut if dry/frozen	Clear span bridge or existing highway crossing
D16	Unnamed Non-classified Drainage within the Fort Nelson River sub-basin	E: 483435 N: 6567468	28.9	NCD	July 15 to March 31	Not applicable	Open cut	Clear span bridge or existing highway crossing

Sources: 1 BC Ministry of Forests 1995
2 BC MWLAP 2004

12.0 POST-CONSTRUCTION ACTIVITIES

Goal

To monitor the condition of the right-of-way following reclamation to determine the success of revegetation and erosion and sediment control efforts.

Company Measures

The following measures are the responsibility of Westcoast.

Activity/Concern	Mitigation Measures
<i>Environmental As-built Report</i>	1. An Environmental As-built Report shall be prepared for the Pipeline Project, as described in Section 8.3 of the ESA.
<i>Post-Construction Monitoring and Follow-up</i>	2. Conduct post-construction monitoring and follow-up programs as directed in Section 7 of the Environmental Manual (see Appendix E of this EPP) and Section 9.0 of the ESA and as described below.
<i>Long-Term Monitoring</i>	3. 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 Westcoast's Environmental and/or Pipeline Integrity Staff. Westcoast will employ applicable remedial measures on a timely basis.

Post Construction Assessment Methods

Westcoast will use the following methods of assessing reclamation, revegetation and erosion control areas along the proposed South Maxhamish pipeline right-of-way and include the assessment and results in the Post Construction Environmental report to the Board:

- Visual Inspection and Assessment – Air and ground survey to review status of reclamation, revegetation and the opportunistic introduction of indigenous plant species. This survey will be conducted during unfrozen conditions (late summer, early fall)
- Review the environmental inspection record of construction to determine if there were any environmental monitoring issues that required investigation, monitoring or follow-up
- Conduct Survey transects of vegetation germination and success (seed/plant germination, distribution, % cover, and plant condition/health)
- Review seed mix certification and germination results from seed contractor/supplier and compare result to certification standards if germination success on the right of way is not occurring

- Identify and record success, failure, and effectiveness of erosion control structures and barriers and determine root cause(s) of failures; assess possible negative environmental effects of failures and develop a plan and schedule to repair failed or ineffective erosion control structures
- Maintain a photo record of the status of reclamation, revegetation and erosion control along with a record of any right of way maintenance or repairs.

Revegetation and erosion control along the South Maxhamish Project will be considered effective and successful when the vegetative ground cover is sufficient to inhibit erosion of soils on the disturbed right-of-way and the erosion control structures remain effective until vegetation cover can inhibit surface soil erosion.

As a measure of success, revegetation will be considered effective when vegetation has a uniform 70 percent ground cover on those areas which have been reseeded. Note that the BC Ministry of Environment and the BC Ministry of Forests and Range have recommended to Westcoast that areas that are not subject to erosion and areas where there is high organic content in the soils (i.e. muskeg or wetland) should not be seeded, but allowed to grow back naturally. This recommendation was made to allow natural regrowth of indigenous plants in areas that have caribou habitat potential.

If the amount of vegetative ground cover does not meet the objectives described above, Westcoast will take appropriate measures to prepare the soil, if necessary, and reseed areas to meet the measurable target of 70 percent areal coverage. Where reclamation planting is not successful, Westcoast will review the reclamation and revegetation status with the BC Ministry of Environment and BC Ministry of Forests and Range and develop and implement a site-specific plan to re-vegetate the reclamation areas. Follow-up monitoring will be continued annually until the re-vegetation objectives are met. Where natural regeneration is planned, the progress will be monitored.

13.0 REFERENCES

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British Columbia Ministry of Water, Land and Air Protection. 2004. *Standards and Best Practices for Instream Works*. Ecosystems Standards and Planning, Biodiversity Branch. March 2004.

Duke Energy Gas Transmission. 2006. *Environmental Manual for Construction Projects in Canada*. June 2006. Submitted to the NEB on August 24, 2006.

APPENDIX A

EMERGENCY CONTACTS

CONTACT	LOCATION	PHONE NUMBER
RCMP	Fort Nelson	(250) 774-2777
Ambulance	Fort Nelson	911 (250) 774-2344
Hospital	Fort Nelson	(250) 774-8100
BC Provincial Emergency Program	---	1-800-663-3456
	Streeper Contracting Fort Nelson	(250) 774-7247
Area "C" Oil Spill Co-operative	Eveready Industrial Services Corp. Fort St. John	(888) 698-5565
Forest Fire	---	1-800-663-5555 or *5555
HAZCO	Fort St. John	1-250-785-9001

APPENDIX B

APPROVALS/PERMITS POTENTIALLY REQUIRED FOR THE SOUTH MAXHAMISH LOOP PROJECT

<u>Permit/License</u>	<u>Issuing Agency¹</u>
NEB approval order	NEB
Surface Rights	
- Licence of Occupation/Statutory Right-of-Way	ILMB
Water Crossings	
- <i>Water Act</i> approval (Section 8 and 9)	MOE
- Navigable Waters approval (vehicle crossings of all navigable watercourses or pipeline crossings of large watercourses only)	TC
- Letter of advice or authorization under Section 35(2) and/or Section 32 under the <i>Fisheries Act</i> .	DFO
- Fish Collection Permit for salvage of fish at isolated crossings	MOE
<i>Heritage Conservation Act</i> Clearance	MTCA
Road Crossing Permits	MT
Occupant Licence to Cut	MOFR
Burning Permits	MOFR
Wildlife Permit for Beaver Dam Removal	MOE

1	DFO	=	Fisheries and Oceans Canada
	ILMB	=	BC Integrated Land Management Bureau
	MOE	=	BC Ministry of Environment
	MOFR	=	BC Ministry of Forests and Range
	MT	=	BC Ministry of Transport
	MTCA	=	BC Ministry of Tourism, Culture and the Arts
	NEB	=	National Energy Board
	TC	=	Transport Canada

APPENDIX C

CONTACTS

Brian Ritchie (Westcoast's Project Manager)
Senior Project Manager
Spectra Energy Transmission
2600, 425 1st - Street S.W.
Fifth Avenue Place, East Tower
Calgary, Alberta T2P 3L8
Phone: (403) 699-1824
Cell: (403) 336-2526
Email: britchie@spectraenergy.com

Prabhu Mishra (Westcoast's Project Engineer)
Principal Project Engineer
Spectra Energy Transmission
2600, 425 1st - Street S.W.
Fifth Avenue Place, East Tower
Calgary, Alberta T2P 3L8
Phone: (403) 699-1737
Cell: (403) 305-6769
Email: PMishra@spectraenergy.com

Fred Siwak (Westcoast's Construction Manager)
Construction Manager
Spectra Energy Transmission
Expansion Projects
2600, 425 - 1st Street S.W.
Fifth Avenue Place, East Tower
Calgary, Alberta T2P 3L8
Phone: (403) 699-1740
Cell: (403) 510-3933
Email: fsiwak@spectraenergy.com

Ken Berry (Westcoast's Environmental Contact)
EH&S
1100 - 1055 W. Georey St.
Vancouver, British Columbia V6E 3P3
Phone: (604) 691-5545
Cell: (604) 506-9200
Email: kberry@spectraenergy.com

Brian Davies
Land Resource Agent
Spectra Energy Transmission
Lands and Comm Relations
Bag Service 6180
Mile 53 Alaska Highway
Fort St. John, British Columbia V1J 4H7
Phone: (250) 262-3660
Cell: (250) 263-1258
Email: bsdavies@spectraenergy.com

(Westcoast's Lands Lead)

Steve Henderson
Manager, Community and Aboriginal Relations
Spectra Energy Transmission
3985 - 22nd Avenue
Prince George, British Columbia V2N 1B7
Phone: (250) 960-2036
Cell: (250) 960-9558
Email: shenderson@spectraenergy.com

(Westcoast's Community and
Aboriginal Relations Manager)

Angus Dickie
Community Coordinator, Fort Nelson
Spectra Energy Transmission
P.O. Box 30
Mile 301 Alaska Highway
Fort Nelson, British Columbia V0C 1R0
Phone: (250) 233-6316
Fax: (250) 233-6393
Cell: (250) 500-3504
Email: ajdickie@spectraenergy.com

(Westcoast's Community
Coordinator, Fort Nelson)

Andrew Povey
Senior Environmental Planner
TERA Environmental Consultants
1100, 815 - 8th Avenue S.W.
Calgary, Alberta T2P 3P2
Phone: (403) 265-2885
Email: apovey@teraenv.com

(Environmental Consultant for
EPP)

Joanna Zoffmann
Operations Manager
Landsong Heritage Consulting
2262 Highway 29
Chetwynd, British Columbia V0C 1J0
Phone: (250) 788-3813
Email: landsong@landsong.com

(Heritage Consultant)

Andrea Battistel
Fish Biologist
TERA Environmental Consultants
1100, 815 - 8th Avenue S.W.
Calgary, Alberta T2P 3P2
Phone: (403) 265-2885
Email: abattistel@teraenv.com

(Fisheries Consultant)

Steve Lindsey
District Manager
BC Ministry of Forests and Range
Fort Nelson District
Mile 301, Alaska Highway
Fort Nelson, British Columbia V0C 1R0
Phone: (250) 774-5511
Fax: (250) 774-3704

(Regional Forestry Contact)

Dan Laurie
Operations Manager
BC Ministry of Forests and Range
Fort Nelson District
Mile 301, Alaska Highway
Fort Nelson, British Columbia V0C 1R0
Phone: (250) 774-5503
Fax: (250) 774-3704
Email: Dan.Laurie@gov.bc.ca

(District Forestry Contact)

Alicia Goddard, M.Sc. R.P.Bio
Ecosystem Biologist
Ministry of Environment
400, 10003 - 110th Avenue
Fort St. John, British Columbia V1J 6M7
Phone: 250-787-3369
Fax: 250-787-3490
Email: Alicia.Goddard@gov.bc.ca

(Area MOE Contact)

Joelle Scheck
Ecosystem Section Head
BC Ministry of Environment
Fish and Wildlife Section
Peace District
Room 400, 10003 - 110th Avenue
Fort St. John, British Columbia V1J 6M7
Phone: (250) 787-3393
Fax: (250) 787-3490
Email: Joelle.Scheck@gov.bc.ca

(General Fish and Wildlife
Representative)

Dr. Steven Acheson
Heritage Resource Specialist
BC Ministry of Tourism, Culture and the Arts
Archaeology Branch
PO Box 9816, Stn. Prov. Govt.
Victoria, British Columbia V8W 9W3
Phone: (250) 953-3306
Email: Steve.Acheson@gov.bc.ca

(BC MTCA Project Officer)

Katrina Stipek
Information Coordinator
BC Ministry of Environment
Conservation Data Centre
Thompson Regional Office
P.O. Box 9358, Stn. Prov. Govt.
Victoria, British Columbia V8W 9M2
Phone: (250) 387-9798
Fax: (250) 387-2733
Email: Katrina.Stipek@gov.bc.ca

(BC Conservation Data Centre
[CDC] Representative)

Renee Mounteney
North Peace Operations Manager
BC Ministry of Transportation
Peace District Office
Suite 300, 10003 - 110th Avenue
Fort St John, British Columbia V1J 6M7
Phone: (250) 787-3237
Fax: (250) 787-3279
Email: Renee.Mounteney@gov.bc.ca

(Ministry of Transportation
Representative)

Jayson Kurtz
Senior Habitat Biologist
Fisheries and Oceans Canada
Northeast BC
3690 Massey Drive
Prince George, British Columbia V2N 2S8
Phone: (250) 561-5905
Email: KurtzJ@pac.dfo-mpo.gc.ca

(Notify if Contingency Water
Crossing Measures are to be
Implemented)

John Mackie
Navigable Waters Protection Officer
Transport Canada
Suite 820, 800 Burrard Street
Vancouver, British Columbia V6Z 2J8
Phone: (604) 775-8890
Email: john.mackie@tc.gc.ca

(Notify if Required by Navigable
Waters Approval Conditions)

Jamie Wilson
Oil Spill Co-operative
Area "C" Regional Custodian
Eveready Industrial Services Corp.
Phone: (888) 698-5565

(In the Event of a Spill)

BC OneCall
Phone: 1-800-474-6886

(Locate underground utilities)

BC Provincial Emergency Program
Phone: 1-800-663-3456

(In the Event of a Spill)

APPENDIX D
CONTINGENCY PLANS

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CONTINGENCY PLANS

Westcoast has a comprehensive emergency response program that includes procedures, inventory and maintenance of response equipment, as well as program development. In the event of an incident involving the existing Maxhamish Pipeline, an emergency response plan that is already in place for that pipeline would be implemented. The following contingency plans are provided to address construction-related situations for this Project.

Upon implementation of a contingency plan, Westcoast will notify the NEB, as well as other federal, provincial and municipal authorities, as appropriate, that contingency measures have been implemented (for contact information see Appendix C of this EPP).

1.0 FLOOD AND EXCESSIVE FLOW CONTINGENCY PLAN

Notify Westcoast's Environmental Inspector that contingency measures have been initiated as a result of flooding or excessive streamflow along the pipeline route, so that a record of the location, timing and reason for implementation of the contingency plan is maintained. See also Siltation of Watercourses Contingency Plan (Section 5 of this Appendix).

The weather conditions will be monitored by the Environmental Inspector 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.

If the potential for siltation of a watercourse due to Contractor activity is predicted, the contingency plans for Soil Erosion and for Siltation of Watercourses (Sections 4 and 5 of this Appendix) will be implemented.

At watercourses where an isolated crossing method is preferred, the proposed isolation crossing techniques may not be feasible during periods of excessive flow or unusually wet seasons. Excessive flows are flows that are greater than the seasonally expected normal range based on existing and predicted flow data.

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 forecasted flow rate with the proposed crossing method. If use of the proposed crossing method is determined by Westcoast to be still feasible, the crossing will proceed.
2. Defer water crossing construction to a later time when flows have subsided, if determined by Westcoast that the proposed crossing method is not feasible.

3. Alternatively, where the forecasted flow rates and window limitations combine to preclude the proposed primary crossing method, request the appropriate authority (*e.g.*, DFO and the BC MOE) for exemption of the timing window or permission to use an alternative 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. Withdraw all equipment or tanks containing fuel, oil or other hazardous materials from potential flood areas.
2. Relocate all strippings piles at the direction of the Environmental Inspector.
3. Relocate spoil piles, to the extent feasible, to a position above the anticipated high water level.
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. Evaluate vehicle crossing structures 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.

2.0 FIRE CONTINGENCY PLAN

Fire Suppression Measures

The following standard measures will be adhered to during Project construction:

1. Prior to start of construction, the Contractor will complete Westcoast's Forest Fire Prevention Risk Assessment (included at the end of this section).
2. All activity Project co-ordinators and Contractors' vehicles will carry fire-fighting equipment in accordance with the Forest Fire Prevention Risk Assessment.
3. All fires suppression measures outlined in Section 6.11.1 of the Environmental Manual (Appendix E of this EPP) will be implemented as warranted.

In the Event of a Wildfire

In the event of a wildfire, Westcoast and the Contractor will contact appropriate government representatives, as identified in the in the Project Emergency Contact List (Appendix C of this EPP) and the Forest Fire Prevention Risk Assessment. Fire suppression measures will be implemented immediately upon detection of the fire provided that fire conditions allow personnel to safely proceed, as described in Section 6.11.1 of the Environmental Manual (Appendix E of this EPP).



FOREST FIRE PREVENTION RISK ASSESSMENT*

Date: _____

Project / W.O#: _____

Team Leader/Project Lead: _____

Region: _____

1. Is the work listed as a 'High Risk Activity'? (refer to Attachment A):

- Yes (continue on with Risk Assessment)
- No (continue to work Fire-smart)

2. Identify Forest Region work area;

(A) Select from <http://www.for.gov.bc.ca/pscripts/protect/dgrcls/dgrcls.asp>

(B) Identify closest Danger Class Rating 'station' to work location

3. For the above Danger Class Rating station, list the current day's Danger Class Rating, the previous days' rating and any forecasted ratings:

Station:	Previous days:				Current Day:	Forecasted days:			

4. Based on the above Danger Class Rating information, review Table 1 (on next page) for any work restrictions on 'High Risk' activities, AND LIST those restrictions:

* A copy of this Risk Assessment **MUST** be available at the worksite and available for an Official when requested.



Table 1 (from Wildfire Regulations)

Column 1 Fire Danger Class (DGR)	Column 2 Restriction	Column 3 Duration
III (moderate)	After 3 consecutive days of DGR III or greater, maintain a fire watcher after work for a minimum of one hour	Until after the fire danger class falls below DGR III
IV (high)	Maintain a fire watcher after work for a minimum of 2 hours	Until after the fire danger class falls below DGR III
	After 3 consecutive days of DGR IV, cease activity between 1 p.m. PDT (Pacific Daylight Saving Time) and sunset each day	Until after the fire danger class falls to DGR III for 2 consecutive days, or falls below DGR III
V (extreme)	Cease activity between 1 p.m. PDT (Pacific Daylight Saving Time) and sunset each day and maintain a fire watcher after work for a minimum of 2 hours	Until after the fire danger class falls below DGR IV for 2 or more consecutive days
	After 3 consecutive days of DGR V, cease activity all day	Until after the danger class falls below DGR V for 3 or more consecutive days, or falls below DGR IV

5. Determine the minimum Fire Fighting equipment needed on site and list: (refer to Attachment B; Fire Fighting Tools - General)



6. Will there be any internal combustion engines working on site?

- Yes
- No

if 'Yes', ensure that:

- (a) You have the additional equipment on hand based on Attachment B
- (b) The engine is equipped with a safe and effective device for arresting sparks that is an integral part of the exhaust system and in good repair,
- (c) The engine is equipped with an exhaust system and muffler that are within the manufacturer's specifications.

7. If open burning of materials is required, contact your local Land Resource Agent for;

- (a) Burning Registration Number
- (b) Category of open fire
- (c) Additional fire suppression/water delivery systems needed based on category of open fire.

Important Contact Numbers

B.C. Forest Fire Reporting Number	1-800-663-5555
	Or *5555 on most cellular networks
Vancouver Gas Control	1-604-691-5565
Fort St John Gas Control	1-250-262-3446
Pipeline Emergency Number	1-800-663-9931
B.C. MoF General or Burning Information	1-800-565-1557
B.C. MoF Wildfire Information	1-800-336-7878

Regional Fire Zone Centers

From April to October there is a duty officer on cal 24/7, for local questions contact the appropriate Regional Fire Centre. The duty officer will provide direction or will forward you on to the local standby personnel.

Prince George Region	1-250-565-6126
Cariboo Region	1-250-989-2608
Kamloops Region	1-250-554-7701
Coastal Region	1-250-951-4200

Attachment A

Forest Fire Risk Classification

Definition of "High Risk Activity" from the Wildfire Regulations:

"High Risk Activity" means each of the following:

- (a) mechanical brushing;
- (b) disk trenching;
- (c) preparation or use of explosives;
- (d) using fire- or spark-producing tools, including cutting tools;
- (e) using or preparing fireworks or pyrotechnics;
- (f) grinding, including rail grinding;
- (g) mechanical land clearing;
- (h) log forwarding other than by logging truck on a road;
- (i) skidding logs;
- (j) yarding logs using cable systems;
- (k) using a vehicle with metal tracks, chains or studs other than such a vehicle while in use
 - (i) in a stationary position,
 - (ii) for road construction, road maintenance or road deactivation, or
 - (iii) loading logs on a road or a landing or in a log sort area;
- (l) operating a power saw other than while doing so on a road or a landing or in a log sort area;
- (m) clearing or maintaining right of ways, including grass mowing;
- (n) rock drilling;
- (o) tree processing, including de-limbing;
- (p) welding;
- (q) portable wood chipping, milling, processing or manufacturing;

Attachment B

Fire fighting Tools:

General:

Three or less persons on site:

- One round nosed shovel
- One Pulaski or mattock
- One hand-tank pump containing 18 liters of water.

More than three persons on work site:

- One round nosed shovel / Pulaski or mattock per person split as close to a 50:50 ratio.
- One hand tank pump containing 18 liters of water per 3 persons to a maximum of 8 hand-tank pumps.

For every 4- 10 workers require Water Delivery Systems:

- portable pump unit (not affixed to another machine able to maintain 145psi while delivering 135 liters of water per minute from 30m of hose with 9.5mm opening nozzle)
- a suction hose
- at least 450 m of discharge hose (33mm unlined or 35mm diameter lined hose)
- tools and accessories to maintain pump and hose
- if a surface water supply is not available, a water source of at least 4500 liters (1000 gallons), can be substituted. It must be at the site, and readily available.

For 11 or more workers, two water delivery systems as above.

Large Engines:

- one round-nosed shovel
- one Pulaski tool or mattock
- one fire extinguisher with ULC rating of at least 1A 5BC
- one fire extinguisher with ULC rating of at least 3A 10BC or an integral vehicle fire suppression system

Hot Work:

- 2 fire extinguishers each with a ULC rating of at least 3A 10BC
- one round-nosed shovel
- 2 hand-tank pumps containing at least 18 liters of water each

Explosives:

In addition to any other requirements you must have on site:

- 2 round-nosed shovels
- 2 hand-tank pumps containing at least 18 liters of water each

Appendix I: Selected definitions and sections of the Wildfire Act and Regulations

Selected definitions from the **Wildfire Act**

"Industrial activity" includes

- a. land clearing, and
- b. other activities included in this definition by regulation, but does not include activities excluded from this definition by regulation

"Official" means a person

- a. employed in the ministry of the minister responsible for the administration of this Act, who is designated by name or title to be an official by the minister for the purpose of a provision of this Act or of the regulations that is specified in the designation
- b. employed in the Oil and Gas Commission and designated, by the minister responsible for the *Oil and Gas Commission Act*, by name or title to be an official for the purpose of a provision of this Act or of the regulations that is specified in the designation, or
- c. who is a conservation officer designated by the minister responsible for the *Environmental Management Act*, by name or title to be an official for the purpose of a provision of this Act or of the regulations that is specified in the designation

Wildfire Act Sections

PART 1 – Forest and Range Protection Requirements

General duty to report fire

2. A person, other than a person acting in accordance with section 5 (2) or 6 (3), who sees an open fire that is burning in forest land or grass land or within 1 km of forest land or grass land and that appears to be burning unattended or uncontrolled must immediately report the fire
- (a) to an official employed in the ministry,
 - (b) to a peace officer, or
 - (c) by calling a fire emergency response telephone number

Mishandling burning substances

3. (1) Except for the purpose of starting a fire in accordance with this Act or another enactment, a person must not risk starting an open fire in forest land or grass land, or within 1 km of forest land or grass land, by dropping, releasing or mishandling
- (a) a burning substance, or
 - (b) any other thing that the person reasonably ought to know is likely to cause a fire
- (2) A person who does not comply with subsection (1) must immediately extinguish, if practicable
- (a) the burning substance, and
 - (b) any fire that results from dropping, releasing or mishandling the burning substance or the other thing, as the case may be

Industrial activities

- 6. (1)** Except in prescribed circumstances, a person carrying out an industrial activity must not light, fuel or use an open fire in forest land or grass land or within 1 km of forest land or grass land
- (2)** A person who carries out an industrial activity must do so
- (a)** at a time, and
 - (b)** in a manner that can reasonably be expected to prevent fires from starting because of the industrial activity
- (3)** If, except in the prescribed circumstances referred to in section 5 (1) or subsection (1) of this section, a fire starts at, or within 1 km of, the site of the industrial activity, the person carrying out the industrial activity must
- (a)** immediately carry out fire control and extinguish the fire, if practicable
 - (b)** continue with fire control for the fire until
 - (i)** the fire is extinguished
 - (ii)** it becomes impracticable to continue with fire control, or
 - (iii)** an official relieves the person in writing from continuing
 - (c)** as soon as practicable, report the fire as described in section 2, and
 - (d)** in accordance with prescribed requirements, rehabilitate the land damaged by fire control carried out by the person.

Hazard assessment and abatement

- 7. (1)** In prescribed circumstances and at prescribed intervals, a person carrying out an industrial activity or a prescribed activity on forest land or grass land or within 1 km of forest land or grass land must conduct fire hazard assessments
- (2)** A person carrying out an industrial activity or a prescribed activity must abate within a prescribed period a fire hazard of which the person is aware or ought reasonably to be aware
- (3)** Despite subsection (2), if an official identifies circumstances that the official considers constitute a fire hazard in relation to
- (a)** an industrial activity, or
 - (b)** a prescribed activity referred to in subsection (2), the official by written order may require the person to abate the fire hazard by a specified date
- (4)** A person who is the subject of an order under subsection (3) and to whom written notice of the order has been given must comply with the order.

Applicable **Regulation** definitions:

"engine" means an internal combustion engine but does not include:

- (a) an engine on or in a water craft that is in the water,
- (b) an engine in or on a vehicle primarily used for the transportation of people, or
- (c) an engine in an aircraft;

"fire suppression system" means a system that is used for the purpose of suppressing a fire and is appropriate for the type of fire, including:

- (a) a water delivery system,
- (b) a suppressant or surfactant delivery system, or
- (c) a fire extinguisher

"sufficient fire fighting tools" means hand tools in a combination and type and of an appropriate number to properly equip all persons taking fire control action, including but not limited to shovels, axes, pulaskis, hand tank pumps, and fire extinguishers;

"utility transmission operation" means the operation, transmission, construction, establishment, maintenance and repair of electrical, oil, gas, radio, microwave, and telephone service;

"water delivery system" means a system that can:

- (a) deliver a sufficient volume of water to effectively fight a fire of a reasonably foreseeable size, taking all factors into consideration, including the conditions of any area where the water delivery system may need to be used, and
- (b) deliver water to any place
 - (i) at the site of an industrial activity,
 - (ii) on the burn area or site of the high risk activity, or
 - (iii) reasonably adjacent to the burn area or the site of a high risk activity.

Selected Regulations:

Wildfire Regulations, Part 2, Division 1—Precautions

Sufficient fire-fighting tools for an industrial activity

5. At all times while there is a risk of a fire starting and spreading on an area that is forest land or grass land or is within 300 m of forest land or grass land, a person who carries out an industrial activity at a site in that area must ensure that sufficient fire fighting tools are available at that site

High risk activities

6. (1) A person carrying out a high risk activity on or within 300 m of forest land or grass land must determine the Fire Danger Class for the location of the activity
- (2) A person carrying out a high risk activity on or within 300 m of forest land or grass land must
 - a. do so in accordance with the applicable restriction and duration set out in Schedule 3 for the Fire Danger Class, and
 - b. if there is a risk of a fire starting and spreading, keep at the activity site sufficient fire fighting tools and an adequate fire suppression system.
- (3) A person who, in accordance with subsection (2) (a) and Schedule 3, is required to maintain a fire watcher, must ensure that the fire watcher
 - a. can reasonably see the site of the high risk activity during the time the fire watcher is required,
 - b. has sufficient fire fighting tools to carry out fire control,
 - c. actively watches and patrols for sparks and fires on the site of the high risk activity,
 - d. immediately carries out fire control and extinguishes the fire, if practicable, and has the means on site to report the fire.

Engines

8. A person carrying out an industrial activity or high risk activity
 - a. on forest land or grass land or within 300 m of forest land or grass land, and
 - b. at a time when there is a risk of a fire starting and spreading, must not operate an engine on that forest land or grass land, unless
 - c. the necessary precautions are taken to ensure that the operation of the engine does not cause a fire,
 - d. the engine is equipped with a safe and effective device for arresting sparks that is an integral part of the exhaust system and in good repair
 - e. the engine is equipped with an exhaust system and muffler that are within the manufacturer's specifications, and
 - f. if the engine is over 7.5 kw (10 hp) and is stationary or semi-permanent, the engine is surrounded by a fuel break

Utility transmission operations

- 10.** A person carrying out an industrial activity that is a utility transmission operation, on or within 300 m of forest land or grass land, must
 - a.** maintain utility transmission equipment, apparatus and materials in a manner that reduces the likelihood of producing an ignition source capable of starting a fire on or adjacent to the site of the utility transmission operation, and
 - b.** maintain the site in a manner that prevents any fire from spreading from the site.

3.0 WET SOILS CONTINGENCY PLAN

Westcoast will assign an Environmental Inspector 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 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 Chief Inspector in consultation with the Environmental Inspector. The Environmental Inspector or Chief Inspector will employ the criteria presented in Table D-1 as a guide to activities where contingency measures are warranted. A record of the location, timing and reason for implementation of the Wet Soils Contingency Plan will be maintained by the Environmental Inspector. In the event that activities are suspended during pipeline construction, the appropriate government representative will be notified as soon as practical by the Environmental Inspector, if required.

Soils are considered to be excessively wet when the planned activity could cause 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 soils due to heavy traffic.

Contingency measures will be implemented, if warranted, once one of the following indicators occurs:

- rutting of surface or root zone material to the extent that mixing of soil horizons may occur;
- excessive wheelslip;
- excessive build-up of mud on tires and cleats;
- formation of puddles; or
- tracking of mud on to roads as vehicles leave the right-of-way.

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. The contingency measures listed below will be implemented individually or in combination, based on site-specific conditions.

1. Restrict construction traffic, where feasible, to equipment with low-ground-pressure tires or wide pad tracks.
2. Work only in nonproblem areas, such as well-drained soils, until conditions improve.
3. Install geotextiles, swamp mats or corduroy constructed from nonsalvageable timber in problem areas.
4. Suspend construction until soils dry out or freeze.

If the indicators of excessively wet/thawed soil conditions previously noted above are not evident, soils will be considered dry enough to resume activity.

TABLE D-1

CRITERIA FOR THE SUSPENSION OF ACTIVITIES DUE TO WET SOIL CONDITIONS

Strippings Salvage Status	Construction Activity	Suspend Activity for Environmental Issue?
No salvage conducted	Soils handling (strippings salvage / replacement)	Yes
Full Width	Pipe stringing	No
Full Width	Welding	No
Full Width	Trenching	No
Full Width	Lowering-in	No
Full Width	Backfilling	No
Full Width	Testing	No
Strippings replaced	Testing	Yes - Testing would not be initiated but would continue if filling with test water has begun
Strippings replaced	Clean-up	Yes - heavy traffic not permitted No - quad traffic likely acceptable

4.0 SOIL EROSION CONTINGENCY PLAN

In the event that soil erosion is identified during construction, Westcoast's Environmental Inspector will recommend to the Chief Inspector that contingency measures be initiated. A record of the location, timing and reason for implementation of the contingency plan will be maintained by the Environmental Inspector. In the event that soils are impacted to an extent that reclamation may be impeded, the Environmental Inspector or Chief Inspector will notify the appropriate authority (*i.e.*, the BC MOFR).

Contractor equipment and personnel will be made available to control the erosion. During the construction phase of the pipeline, the Chief Inspector, in consultation with the Environmental Inspector, will determine appropriate procedures to be implemented to control soil erosion and other soil handling problems encountered. One or more of the following contingency measures listed below will be implemented, as appropriate. Similar procedures should be followed during the operational phase of the pipeline.

Concern	Mitigative Options
<i>Water Erosion</i>	<ol style="list-style-type: none">1. Install temporary berms of subsoil, logs, timbers, sandbags or bales during construction activities.2. Install silt fences near the base of slopes.3. Salvage remaining strippings and store away from area to be regraded.4. Regrade eroded areas and gullies.5. Replace salvaged strippings.6. Implement one or a combination of the following mitigative techniques:<ul style="list-style-type: none">• construct cross ditches and berms decreasing the spacing on steeper slopes or on more erodible soils;• armour the upslope face of berms with geotextile, logs or sandbags;• import small diameter slash then spread and walk down;• apply netting, mulch or tackifier to hold soil;• reseed and hand rake an annual cover crop, hydroseed or apply seed impregnated mats;• transplant native shrubs, plant willow stakes or use other bioengineering techniques; and• install slope indicators at locations where the risk of slope failure, or creep exists; consult a geotechnical engineer.

Concern	Mitigative Options
<i>Erosion of or Failure of Streambanks</i>	7. Implement one or a combination of the following mitigative techniques: <ul style="list-style-type: none">• plant willow stakes in the spring;• transplant willow clumps, install willow wattles, or brush layering;• apply netting or netting with straw mulch complete with seed mix;• install log cribwall bank protection;• armour bank with rock riprap;• install vegetated geogrid;• install rock gabions; or• reconstruct stream profile to remove scour holes or instream obstructions.

5.0 SILTATION OF WATERCOURSES CONTINGENCY PLAN

Westcoast's Environmental Inspector will notify the Chief Inspector that contingency measures have been initiated and will maintain a record of the location, timing and reason for implementation of the contingency plan. See also the Flood and Excessive Flow Contingency Plan (Section 1 of this Appendix).

Should an extreme precipitation/streamflow event threaten, or other circumstances occur which may render the existing sediment control measures inadequate, the procedures outlined below will be implemented progressively or individually as warranted.

1. Prohibit the operation of construction equipment close to the banks of watercourses where there is a risk of bank sloughing, failure of the vehicle crossing or flooding of the work area.
2. Install additional silt fencing to prevent silt-laden water from entering watercourses.
3. Excavate cross ditches to divert runoff away from watercourses.
4. Construct berms of subsoil, sandbags, rock, or timber on approach slopes and/or banks to divert runoff from the right-of-way and onto well-vegetated lands. The location and material of the sediment control structures will be determined by the Environmental Inspector.
5. Import sand bags and place strategically to help stabilize and add height to banks to prevent flooding of nearby areas, especially where vegetation has been removed.

6.0 SPILL CONTINGENCY PLAN

Spill Prevention

Guidelines for the safe handling, storage, use and disposal of potentially hazardous materials as well as spill prevention measures and guidelines for the refuelling and servicing of equipment are provided in Section 4.0 of this EPP.

Spill Response

Prior to the start of construction activities, the Contractor shall provide Westcoast with a spill response plan, as described in Section 6.11.2, Item 1 of the Environmental Manual (Appendix E of this EPP). Standard measures for the handling of spills on the Project are described in Section 6.11.2 of the Environmental Manual.

In the event of a spill of hazardous material, onsite personnel or the first person on the scene will immediately implement the spill response plan and the measures described in Section 6.11.2 of the Environmental Manual (Appendix E of this EPP). Once the spill has been contained, the onsite personnel will notify Westcoast's Inspection team.

The Chief Inspector and Environmental Inspector will immediately notify the applicable provincial and federal government agencies, including the NEB, of the spill as required by law when a reportable event occurs during the construction of any component of the Project (for contact information see Appendix C of this EPP). If this is not possible, notification will be made as soon as practical. Reporting requirements for BC are provided on the Spill / Leak Response Card, included in this section.

SET - BC Pipeline and Field Services

SPILL/LEAK REPORTING REQUIREMENTS AND REPORTABLE QUANTITIES

RESPONSE AND REPORTING

ALL spills or releases to the environment of any substance in a class listed on this card may be harmful to the environment and must be reported **IMMEDIATELY** following reasonable and practical action to contain and minimize the effects of the spill:

- **First Witness** - Report spill to On-Site/immediate Supervisor and initiates emergency response plan if required.
- **On-Site Supervisor** – Calls Emergency Response & Incident Notification number: **1-800-663-9931**
- **Notification Centre** – Documents caller information/contact number and contacts On-Call Incident Supervisor.
- **On-Call Incident Supervisor** – Contacts On-Site Supervisor and evaluates incident for regulatory reporting requirements. This may include communication with subject matter experts (EHS, etc.)
- **On-Call Incident Supervisor** – If incident deemed reportable, On-Call Incident Supervisor ensures it is reported (see Spill Report form) IMMEDIATELY to:
 1. Provincial Emergency Program (PEP): **1-800-663-3456**
 2. Transportation Safety Board (TSB/NEB): **1-819-997-7887**
- **On-Site Supervisor** - Submits incident report (via EHS website) to Area Management and the EHS Department.
- **Area Team Lead** - Complete **NEB Preliminary** and **Detailed** incident reports.



TSB/NEB REPORTABLE SPILLS/LEAKS

<p>“significant adverse effect on environment” includes any spill:</p>	<p>a. resulting in significant injury or damage to property, plant, or animal life or habitat</p> <p>b. where the public is affected</p> <p>c. of a PEP reportable substance (of a PEP threshold quantity)</p>
<p>“unintended or uncontrolled release of gas or high vapour pressure (HVP) hydrocarbons”</p>	<p>(a) includes a release:</p> <p>(i) endangering the public;</p> <p>(ii) on the right-of-way that has been leaking for an undetermined period of time; or</p> <p>(iii) that cannot be isolated without affecting the business</p> <p>(b) does not include (unless the public is endangered):</p> <p>(i) a planned release;</p> <p>(ii) a controlled release;</p> <p>(iii) fugitive emissions;</p> <p>(iv) releases from identified sources under the provincial discharge/emission authorizations; or</p> <p>(v) a release from relief valves (unless repetitive in nature)</p>

PEP REPORTABLE SPILLS/LEAKS

TDG Class.	SUBSTANCE SPILLED <i>NOTE:</i> This list is not all-inclusive. Refer to the TDG Regulations, MSDS, or check with Environment, Health and Safety (EHS) Dept	MINIMUM REPORTABLE QUANTITY (THRESHOLD) (if spill to water see note**)
2	NATURAL GAS (SOUR OR SWEET) — ONLY reportable IF the spill results from pipeline breakages on lines operated above 100 psi and the release is sudden and uncontrolled. Unburned sour gas venting is considered to be uncontrolled, and therefore is reportable.	500 scf (equals 10kg)
2.1 & 2.2	FLAMMABLE & NON-FLAMMABLE GASES — Ethane, Butane, Propane, Acetylene, Cutting Oil, Liquid Nitrogen	≥10 (kg or L)
2.3	POISONOUS GASES — Hydrogen Sulphide, Calibration Gas	5 (kg or L)
2.4	CORROSIVE GASES — Chlorine	5 (kg or L)
3	FLAMMABLE LIQUIDS (to 61°C Flashpoint) — Condensate, Crude oil, Fuel (diesel, gasoline, jet fuel, kerosene), Mercaptan, Methanol, Paint, Pigging Liquid, Scrubber Fluids, Solvent	100 L
4	FLAMMABLE SOLIDS — pyroforics e.g. Iron Sulphide, Sulphur	25 kg
5	OXIDIZERS — e.g. Hydrogen Peroxide	50 (kg or L)
6	POISONOUS SUBSTANCES — Antifreeze, some Cleaners, Resin, some gases	5 (kg or L)
8	CORROSIVE SUBSTANCES — Acids (includes Battery fluid), pure Amine (e.g. MEA), Caustic (e.g. NaOH, KOH), Lime (may include sludges), Mercury	5 (kg or L)
9.1	MISCELLANEOUS — includes Asbestos	50 (kg or L)
9.2	MISCELLANEOUS (Environmentally Hazardous) — includes heavy metals >100ppm in waste, BTEX	1 (kg or L)
9.3	MISCELLANEOUS (Leachable Waste) — includes leachable heavy metals in soil or filter media	5 (kg or L)
N/A	WASTE OIL — includes wastes with greater than 3% oil (e.g. hydrocarbon contaminated soil, oily rags), Filters (oil & gas production filters), Lube oil (synthetic & non-synthetic)	100 (kg or L)
N/A	WASTE PEST CONTROL PRODUCTS — includes unrinsed containers	5 (kg or L)
N/A	ANY OTHER SUBSTANCE not captured above that has potential to cause pollution, e.g. glycol (EG, TEG), amine solutions (DEA, MEA, MDEA, SULFINOL)	200 (kg or L)

****Any spill to water body/ course must be reported to PEP**

7.0 WILDLIFE SPECIES OF CONCERN DISCOVERY CONTINGENCY PLAN

In the event that wildlife species of concern or their site-specific habitat are discovered during construction of the pipeline, follow the measures 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 who will notify the Chief Inspector.
3. The Environmental Inspector 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.*, BC MOE, NEB, BC Conservation Data Centre, and Environment Canada) as required (for contact information, see Appendix C of this EPP); and
 - Westcoast's Wildlife Consultant.
4. Westcoast's Wildlife Consultant may deem it necessary to visit the site and will, regardless of whether a site visit is warranted, develop an appropriate mitigation plan in consultation with Westcoast's Environment staff. The mitigative measures available include those listed above.

8.0 WILDLIFE ENCOUNTER CONTINGENCY PLAN

In the event of an encounter or vehicle collision with wildlife during the Project construction phase, either at the construction site or on the commute to and from the construction site; follow the measures outlined below.

1. Report any incidents (*e.g.*, aggressive behaviour, nuisance behaviour) with wildlife to the Environmental Inspector who will immediately notify the applicable provincial agency (*i.e.*, BC MOE) and, if warranted, the local police detachment (for contact information, see Appendix A of this EPP).
2. Report any trapped, injured, or dead animals on the site to the Environmental Inspector. The Environmental Inspector will contact the applicable provincial agency to consult on appropriate action (*i.e.*, removal of trapped animals from trench).
3. Report location and details of collisions with wildlife to the Environmental Inspector. The Environmental Inspector will notify the applicable provincial authorities and, if warranted, the local police detachment (see Appendix A of this EPP for contact information).
4. Once the preceding contacts have been made, the Environmental Inspector will also contact the Westcoast's Environment staff.

9.0 HERITAGE RESOURCE DISCOVERY CONTINGENCY PLAN

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 who will notify the Chief Inspector and the Archaeological Resource Specialist.
3. The Archaeological Resource Specialist will develop an appropriate mitigation plan in consultation with the Environmental and Chief Inspectors and the BC MTCA - Archaeological Branch. The mitigative measures available include those listed below.
 - Site avoidance - may include amending the development footprint or temporarily covering the site using geotextile pads, swamp mat(s), or subsoil ramps.
 - Systematic data recovery - ranging from artefact collection and site documentation to salvage excavations.
 - Surveillance/monitoring - this involves assigning a qualified archaeologist or palaeontologist to monitor the trenching operations.

APPENDIX E

**EXCERPTS FROM THE WESTCOAST ENVIRONMENTAL MANUAL 2nd EDITION -
SECTIONS 6 AND 7; APPENDIX B**

6.0 ENVIRONMENTAL MANAGEMENT PRACTICES

This section contains the Company's environmental management practices for various features that potentially may be impacted by a pipeline or plant/station construction project. Management practices have been arranged by specific environmental and socio-economic elements. The applicability of these practices will vary with each construction project and will be dependent upon the scope and setting of the project. The Project Manager, Environment Lead and/or designated construction support personnel are responsible for determining the applicability of each of the practices listed in this Manual. Measures outlined in a project-specific EPP will take precedence over the Manual.

Drawings referenced in the section are found in Appendix B – Typical Construction Drawings.

6.1 GENERAL PRACTICES

The following general practices apply to all environmental and socio-economic features potentially impacted by construction:

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| <i>Communication</i> | 1) Environmental management practices outlined in the Manual or other mitigation measures included in environmental assessment reports, environmental protection plans or project approvals and permits, will be communicated by the Company to the construction inspection personnel and the construction contractor. |
| | 2) Prior to the start of any construction activity, the Company will inform the contractor of any project environmental sensitivities and related environmental protection requirements. |
| <i>RoW Restriction</i> | 3) All construction activities will be restricted to the designated RoW and approved work spaces and access roads unless otherwise approved by the Company. |
| | 4) Personnel showing careless regard or neglect of the environment, or who disregard environmental instructions, will be reported to Company management and disciplined, including removal from the construction site. |
| <i>Permits/Approvals</i> | 5) All necessary environmental permits and approvals associated with construction will be obtained by the Company. Copies will be stored and made available at the project field office. |
| <i>Timing Restrictions</i> | 6) Specific construction activities will abide by all relevant timing restrictions as required by permit approvals unless otherwise noted by the Company. |
| <i>Spill Prevention</i> | 7) Fuelling and lubrication of construction equipment will be carried out in a manner that minimizes the possibility of spills. On-site fuel tanks, generators and other stationary equipment containing fuel will be situated in a designated area that has been bermed and lined with an impermeable barrier. Refuelling of mobile construction equipment will occur a minimum of 30 m from any waterbody. Refuelling activities will be monitored at all times; vehicles and equipment must not be left unattended while being refuelled. All containers, hoses and nozzles will be free of leaks. All fuel nozzles will be equipped with functional automatic shut-offs. |

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| <i>Hazardous Waste Management</i> | <ul style="list-style-type: none"> 8) Bulk storage of hazardous material must be confined to an approved designated storage area, which must be inspected regularly. Where feasible, storage areas must not be located within 200 metres of a waterbody or wetland. 9) Labelling of hazardous materials must comply with WHMIS. 10) On-site fuel storage tanks larger than 1,000 L will be located where leakage will not enter a waterbody or wetland and will be contained within a bermed area with a holding capacity equal to at least 110% of the largest tank within the berm. 11) Used oil, filters and grease cartridges and other products of equipment maintenance will be collected and disposed of at an approved waste site. Proper containment and documentation will be required for the transportation of such material. |
| <i>Unstable Wet Soils</i> | <ul style="list-style-type: none"> 12) In unstable, wet soils, construction equipment with low ground pressure tires or wide pad tracks will be used to prevent rutting or soil mixing. 13) Where feasible, postpone construction activities until drier or frozen soil conditions occur. 14) Install geotextiles, swamp mats or timber corduroy in unstable areas. |
| <i>Winter Construction</i> | <ul style="list-style-type: none"> 15) Employ frost inducement measures such as snow packing or plowing to increase the load bearing capacity of unfrozen ground. |
| <i>Invasive Weeds</i> | <ul style="list-style-type: none"> 16) Equipment must arrive to the project site in a clean condition free of any remnant soil to minimize the risk of weed introduction. Any equipment which arrives in a dirty condition, as determined by the Environmental Inspector or other Company construction inspection personnel, will not be allowed on the RoW or facility site until the equipment has been cleaned by hand (track shovel and broom), high pressure water or compressed air. Equipment clean-off stations will be constructed at appropriate locations determined by the Environmental Inspector. The size of individual stations is to be adequate to accommodate the maximum size of equipment expected. Cleaning pads will be constructed of filter fabric under skids. Filter fabric will be removed to an acceptable landfill when the station is dismantled. |

6.2 PHYSICAL ENVIRONMENT

This section outlines the environmental management practices that will be implemented for various physical elements including acid generating rock, soil erosion and sediment control and aggregate resources.

6.2.1 Acid Generating Rock

Acid generating rock is comprised of a group of mineralized geologic formations that contain various sulphides. When acid generating rock is disturbed and comes into contact with water, oxygen and iron reducing bacteria, the sulphide minerals become oxidized and acid is generated in the process. The presence of iron reducing bacteria serves as a catalyst that

accelerates acid production and the potential for generation of acid rock drainage (ARD). Carbonate minerals, where present, serve to buffer acid generation.

As part of the planning and construction of the M&NP system in Atlantic Canada, M&NP has developed an extensive acid generating rock management plan. Refer to Appendix C for a full description of the acid rock management plan and procedures.

6.2.2 Soil Erosion and Sediment Control

The following measures will be implemented to minimize soil erosion and sediment runoff resulting from the disturbance of soils during construction activities. Measures such as sediment barriers, temporary interceptor dikes/berms, rollback, erosion control blankets, mulches and revegetation will be used to stabilize erosion prone soils and control run-off. Measures are provided for both forested and agricultural lands.

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| <i>Sediment Barriers</i> | <ol style="list-style-type: none">1) Sediment barriers, which are temporary structures intended to minimize the flow and deposition of sediment, will be installed where deemed appropriate. Barriers may be constructed of materials such as silt fence, staked straw bales, compacted soil, sandbags or equivalent material. Refer to Drawings No.'s 1, 2 and 3 (Appendix B).2) Sediment barriers will be inspected regularly to ensure proper functioning and maintenance. Barriers will be inspected and maintained on a weekly basis throughout construction and within 24 hours following storm events.3) Sediment barriers will be left in place until permanent revegetation measures are successful and the upland areas adjacent to wetlands and waterbodies are stabilized. |
| <i>Temporary Interceptor Dikes</i> | <ol style="list-style-type: none">4) Interceptor dikes, which are temporary structures intended to reduce runoff velocity and divert water away from the construction area, will be installed in locations deemed appropriate. Interceptor dikes may be constructed of materials such as compacted soil, silt fence, staked straw bales, or sand bags.5) The outfall from interceptor dikes will be directed to a vegetated area. Alternatively, an energy-dissipating device (silt fence, staked straw bales, erosion control fabric) will be constructed at the end of the interceptor dike. Interceptor dikes will be positioned to prevent sediment discharge into wetlands, waterbodies, or other sensitive areas.6) Drivable berms, which are smaller versions of interceptor dikes constructed of compacted soil or sand bags, may be used in place of staked straw bales at the entrances and exits of travel lanes at road crossings, waterbodies, and wetlands. Berms are installed the width of the travel lane at the start of the equipment crossing and made low enough to allow equipment and other vehicles to pass.7) Inspect temporary interceptor dikes daily in areas of active construction to insure proper functioning and maintenance. In other areas, the interceptor dikes will be inspected and maintained on a weekly basis throughout construction, and within 24 hours following storm events. |

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| <i>Temporary Diversion Berms and Cross Ditches</i> | 8) | Surface diversion berms and cross ditches (Appendix C, Drawing No. 4) will be installed in areas deemed necessary by the Company or on slopes greater than 5 percent. |
| <i>Permanent Diversion Berms</i> | 9) | Permanent diversion berms will be installed in conjunction with final clean-up and reclamation on moderate and steep slopes to divert surface water off the RoW. |
| <i>Trench Breakers</i> | 10) | Trench breakers (ditch plugs) (Appendix B, Drawing No. 5) will be installed where required to control water seepage along the trench line and to prevent erosion of backfill materials. |
| | 11) | Where dewatering of the trench or bell-hole is required, the water will be discharged onto stable vegetated surfaces, or into constructed containment ponds in a manner that does not cause erosion or any unfiltered water to re-enter a watercourse or wetland. Landowner permission is required for any off RoW discharge of trench water or containment pond. Discharge areas shall be pre-determined prior to use and shall be monitored for erosion or flooding. |
| <i>Subdrains</i> | 12) | Where required, subdrains will be installed to divert shallow groundwater flow away from the pipeline trench, to improve slope stability and prevent saturation of backfilled materials (Appendix C, Drawing No. 6). |

6.2.3 Aggregate Resources

Management practices for aggregate resources are listed below:

- 1) Where feasible, aggregate resources utilized during construction will be obtained from existing approved or licensed pits, or from excess aggregate generated from the construction site with the approval of the landowner.
- 2) All borrow sites for aggregate used for construction must be approved by the Company and the applicable government agency.

6.3 SOIL CONSERVATION AND PRODUCTIVITY

This section outlines the environmental management practices that will be implemented to minimize the effects of construction on soil productivity in both agricultural and forested lands.

6.3.1 General Measures

The general environmental management practices for soils are outlined below.

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| <i>Work Boundaries</i> | 1) | Prior to the start of construction, the boundaries of the RoW, additional temporary workspaces, work sites, staging areas and any temporary access roads will be staked and/or flagged. |
| <i>Topsoil</i> | 2) | Topsoil (including the forest duff layer) will be stripped from the RoW or other work areas and stored until it is returned during clean up (Appendix B, Drawings 7 to 11). See Appendix C for the criteria to be used to determine the |

- appropriate topsoil salvage width.
- 3) Topsoil is usually distinguishable from subsoil by colour. Where it is not, or where soils mixing has occurred on previously disturbed non-agricultural land, the Environmental Inspector can provide guidance on the need for topsoil stripping.
 - 4) Topsoil (including the forest duff layer) will not be used as padding material.
 - 5) Topsoil (including the forest duff layer) will be stripped and stored in such a way as to minimize the mixing of topsoil with sub-surface soils.
 - 6) All soil handling is to remain within the confines of the designated RoW and work area.
- Trench*
- 7) The duration of time that the trench is open will be minimized by backfilling as soon as practical after lowering-in of the pipe.
 - 8) The trench will be backfilled and compacted in a manner that minimizes any below grade settlement.
- Extraneous Material*
- 9) Material excavated from the RoW and not suitable as backfill, such as large rocks, will either be windrowed along the edge of the RoW with landowner permission, buried on or off the RoW with landowner permission, or hauled off the RoW and disposed of in an approved location.
- Sediment Barriers*
- 10) Maintain all sediment barriers throughout the construction period and reinstall as necessary (such as after backfilling of the trench) until permanent re-vegetation measures are successful and the adjacent upland areas are stabilized.
- Clean-up*
- 11) Weather and soil conditions permitting, clean-up and reclamation of the RoW and other construction sites will take place as soon as possible following backfilling operations.

6.3.2 Agricultural Land

- Stringing Trucks*
- 1) Where feasible, on agricultural lands, stringing trucks hauling the pipe will travel along the centre of the proposed trench line to help minimize the extent of soil compaction along the RoW.
- Erosion*
- 2) Where high winds have the potential to erode topsoil piles or remove topsoil from the working side of the RoW, measures such as the application of water, mulch, or tackifiers, will be used to stabilize the topsoil.
- Topsoil*
- 3) Topsoil stripping and/or replacement will be suspended during excessive wet weather or high winds to prevent loss of topsoil.
- Tile Drainage*
- 4) Where warranted, a drainage contractor/consultant will be retained prior to construction for advice on any issues related to tile drainage repair. Landowners will be contacted prior to construction to confirm the location and type of existing tile drains. Any future tile plans should also be discussed with the landowner.
 - 5) Drainage tile systems will be probed within the area of disturbance to confirm

the extent of any pre-existing damage to the tile system.

- 6) The pipeline trench will be excavated to a depth that will allow adequate clearance between the top of the pipeline and the bottom of any existing or planned drainage systems. Drains severed during trenching must be recorded and flagged by a stake. Survey crews will record the location of all damaged drains. If a main drain, header drain, or large diameter drain is severed, a temporary repair will be made to maintain field drainage and prevent flooding of the trench and adjacent lands. The downstream side of severed drains that cross the trench will be capped to prevent the entry of soil, debris or rodents.
- 7) Damaged and severed drain tiles will be repaired. After the repair and prior to backfilling, landowners will be invited to inspect and approve the tile repair.
- Stones* 8) On agricultural land, stones will be picked from the RoW during cleanup; stone picking will occur before and after topsoil replacement to ensure that the stoniness on the RoW is comparable to conditions off-RoW.
- Trench* 9) To decrease the potential for localized trench subsidence, the trench will be crowned upon backfilling to allow for settlement unless alternative measures are arranged with the landowner. Gaps in the crown will be located at obvious drainage channels to avoid altering the natural drainage patterns.
- Wet Soils* 10) Construction activities will be temporarily halted during excessively wet soil conditions. To minimize soil structure damage through rutting or compaction due to wet soil conditions on agricultural land, the Company will determine the need to temporarily halt construction using the following indicators as a guide:
 - Rutting of topsoil to the extent that mixing of soil horizons may occur;
 - Excessive wheelslip;
 - Excessive build-up of mud on tires and cleats;
 - Formation of puddles; or,
 - Excessive tracking of mud on to roads as vehicles leave the RoW.
- Clean-up* 11) Initial clean-up activities including soil stabilization and erosion protection measures will commence as soon as possible after backfilling. Site plans and schedules for this work will be developed as required with affected landowners and tenants. The Company will arrange to have landowners seed and fertilize cultivated segments of the RoW as part of their normal farming operations.
- 12) Where warranted, the subsoil on the stripped portion of the RoW will be chisel ploughed during the clean-up to alleviate compaction. Travel on the RoW after chisel ploughing will be minimized to avoid compaction.
- 13) Final grade of agricultural lands will ensure that the surface flow of water is not impeded.
- 14) Final restoration of the RoW will begin as soon as possible following backfill operations, weather and soil conditions permitting. Restoration measures include the re-establishment of final grades and drainage patterns, stone picking and chisel ploughing as required.

6.3.3 Forested Land

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| <i>Surface Soils</i> | 1) | In forested areas, the upper surface material (15-20 cm) consisting of approximately 50% organic matter (duff layer) and 50% mineral soil, will be stripped and stored along the RoW. |
| <i>Organic Soils</i> | 2) | In muskeg areas where the organic soils are uniformly greater than 40 cm, topsoil salvage is not required, unless specified by the Company. |
| | 3) | On existing RoWs, the Environmental Inspector will determine if previously disturbed surface material will be considered salvageable topsoil on a site-specific basis. |
| <i>Trench Crowning</i> | 4) | To decrease the potential for localized trench subsidence, the trench will be crowned upon backfilling to allow for settlement, unless otherwise directed by the landowner or appropriate government authority. Gaps in the crown will be located at obvious drainage channels to avoid altering the natural drainage patterns. |
| <i>Spoil Piles</i> | 5) | The subsoil will be stockpiled in such a manner that it does not encroach onto the duff piles; if required, a physical barrier (e.g., straw mulch) should be used to assist in delineating the separation between the two piles. |
| | 6) | The salvaged duff layer will be returned and graded within the RoW after the trench has been backfilled and crowned. |

6.4 VEGETATION

The environmental management practices for vegetation are related primarily to clearing and restoration of forested land and include the following sections: forest resources, revegetation and restoration.

6.4.1 Forest Resources

The following general environmental management protection measures will be applied during construction activities on forested lands.

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| <i>Stake Work Boundaries</i> | 1) | Prior to the start of construction, stake and/or flag the boundaries of the RoW, facilities sites, additional temporary workspaces, work sites, staging areas and any temporary access roads. |
| <i>Permits and Approvals</i> | 2) | Obtain all necessary permits and approvals prior to clearing. For example, the clearing of the RoW cannot commence on Crown land until an authorization to cut (e.g., a "License to Cut" in BC) has been obtained from the applicable provincial/territorial forest agency. |
| <i>Salvage Plan</i> | 3) | Where applicable, a timber salvage plan (logging plan) will be developed. The required dimensions and quality for merchantable timber will be verified with the intended end user as a component of the salvage plan. |

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| <i>Environmentally Sensitive Features</i> | 4) | Flag and/or fence environmentally sensitive areas (riparian areas, nests, rare plants, mineral licks, traditional use sites, heritage sites, etc.) as specified by the project ESA or EPP prior to the commencement of clearing and construction. |
| <i>Reduced Worksite Dimensions</i> | 5) | Reduce work site dimensions and lessen disturbance to vegetation in sensitive areas (e.g., riparian areas, rare plants, wildlife areas) as specified in project ESA or EPP. |
| <i>Survey Slash Lines</i> | 6) | Avoid unnecessary removal of trees when preparing survey line-of-sight slash lines in sensitive areas (e.g., riparian areas). |
| <i>Access Roads</i> | 7) | Avoid unnecessary removal of trees when using existing access or opening up previously used access and consider trimming of existing vegetation where required, particularly near watercourses. |
| <i>Winter Work</i> | 8) | Restrict access, clearing and construction activities to frozen soil conditions (i.e., winter), where applicable, to minimize disturbance to vegetation and terrain. |
| <i>Wet Weather</i> | 9) | Salvage operations will be minimized during excessively wet weather to reduce spoilage of merchantable timber. Suspend timber skidding operations or implement other measures (e.g., use tarps or plastic sheeting) if the potential exists for merchantable timber to be damaged through contact with wet or muddy soils. |
| <i>Timber Salvage</i> | 10) | Timber salvage operations will be undertaken in a manner that minimizes butt shatter, breakage and avoids off-site disturbance. |
| <i>Deck Sites</i> | 11) | Decking sites, where possible, will be located on or adjacent to existing dry weather access roads in close proximity to the RoW to facilitate timber pick-up by salvage trucks. Where such sites are not readily available in the vicinity of the RoW, decking sites will be developed on approved extra workspace immediately adjacent to the RoW. Wherever possible, such sites will be developed on existing clearings or in non-merchantable stands of timber. |
| | 12) | At decking sites, salvaged logs will be limbed, topped and decked with butt ends facing the same direction. For sites along the RoW, log decks will parallel the direction of the RoW, with butt ends facing the direction that the logs will be hauled from the RoW to facilitate loading by picker trucks. |
| | 13) | All decked timber will be removed from the RoW and transported to a designated all-weather access road or mill prior to final clean-up, unless otherwise arranged with the appropriate provincial authority. |
| <i>Felling</i> | 14) | All brush and trees will be felled toward the RoW or other construction areas where possible to minimize damage to trees and structures in adjacent areas. Trees that inadvertently fall beyond the edge of the RoW or other construction areas will be moved to an approved area. |
| | 15) | All timber will be felled onto the RoW during survey line clearing. No fallen or leaning trees will be permitted off the RoW or in watercourses. |

<i>Rollback, Slash Berms, Corduroy</i>	16)	Where required, retain larger diameter woody debris to be used as rollback for erosion or access control, as wildlife slash berms, corduroy or in conjunction with other reclamation measures.
<i>Slash Disposal</i>	17)	Slash material will be disposed of by burning, chipping or hauling away to an approved disposal location.
	18)	In selected areas, timber and slash debris may be utilized as rollback for erosion control or for access control.
<i>Stump Disposal</i>	19)	Stumps will be burned, chipped or hauled away to an approved disposal location. Stump burial will only be permitted with approval of the landowner and the applicable government agency.
<i>Corduroy</i>	20)	Where soft, wet areas are encountered and government regulations permit, timber corduroy may be installed to stabilize surface conditions.
	21)	Following construction, corduroy may remain in-place, however, remove any sections necessary to maintain natural surface flow patterns.
<i>Stump Removal</i>	22)	In wetland areas or riparian zones, stump removal will only occur over the trench line unless otherwise specified by the Company.
<i>Fire Prevention</i>	23)	Prior to burning, a burning permit will be obtained from the appropriate government agency. Burning will be scheduled to avoid high fire hazard periods. Firebreaks will be constructed and maintained along the work area where there is a risk of spreading fire.
<i>Fire Contingency Plan</i>	24)	Company site personnel and the contractor must be fully prepared to implement a fire contingency plan (see Section 6.11.1 for detailed information on the fire contingency plan).

6.4.2 Revegetation

This section outlines the revegetation practices that will be used for restoration of the RoW and other work areas on forested lands.

<i>Seeding</i>	1)	A revegetation program will be initiated along the RoW and in other work areas as designated by the Company as soon as practical after construction. The typical mix used will be Certified Canada #1 seed, and free, to the extent feasible, of noxious or restricted weed species. Seed certificates of analysis will be obtained and copies made available for inspection. Appropriate seed mix and/or fertilizer will be applied as specified by the landowner, applicable government agency or project-specific environmental instructions.
	2)	When required, scarify the seedbed to a depth of 7 to 10 centimetres to facilitate lodging and germination of seed.
	3)	Seed disturbed areas in accordance with the recommended seed mixes, rates and dates. Seeding is not required in actively cultivated croplands unless requested by the landowner.

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| <i>Erosion Control</i> | <ul style="list-style-type: none"> 4) Erosion control seed mixes containing rapidly growing grasses and legumes or cover crops, such as fall rye, oats or barley, may be used to stabilize erosion prone soils. 5) Install fences, if required, to restrict cattle grazing and trampling of seeded RoW and other work areas until the vegetation becomes established. 6) Co-ordinate reclamation and revegetation activities to minimize interference with, or disturbance from other land users (e.g., agricultural or forestry operations). 7) Reclamation sequence and scheduling will address requirements for growing seasons, short and long term site stabilization, potential follow-up inspections (e.g., checking of backfill and erosion control following spring thaw). |
| <i>Wetlands</i> | <ul style="list-style-type: none"> 8) Natural recovery (e.g., no seeding) may be undertaken in wetland or muskeg areas. The RoW in these areas will only be reseeded if specified by the applicable government agency. 9) Avoid the use of fertilizer within 15 m of stream banks and wetlands. |

6.5 WATER QUALITY AND QUANTITY

This section details the environmental management practices that apply to construction activities that may impact wells, subsurface springs and groundwater.

6.5.1 General Measures

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| <i>Water Wells</i> | <ul style="list-style-type: none"> 1) Wells within the vicinity of trenching and/or blasting will be monitored as necessary. The need for a monitoring program and the details of any program will be defined by a hydrogeologist retained by the Company. 2) Modification to backfill materials may be needed in areas where water supply disruptions have occurred during construction, due to alteration in shallow groundwater flow. Backfilling with coarser grained materials such as gravel can promote the re-establishment of shallow groundwater flow to former downgradient receptors. 3) To minimize shallow groundwater flow impacts, any post-excavation groundwater will not be pumped out and will remain in the excavation until immediately prior to installation of the pipeline and backfill, if scheduling and safety considerations permit. Such action would result in standing water within portions of the excavated trench and would minimize the need for excavation pumping and/or limit gravity drainage of groundwater into the excavation by maintaining an elevated water table. |
| <i>Springs</i> | <ul style="list-style-type: none"> 4) Identified subsurface springs will be flagged if adjacent to the RoW. Erosion and sedimentation controls as outlined in Section 6.2.2, will be implemented to address potential construction interaction with subsurface springs. |

6.5.2 Hydrostatic Testing and Dewatering

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| <i>Permit</i> | <ul style="list-style-type: none"> 1) A water withdrawal permit may be required from the appropriate government |
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| <i>Water Sources</i> | 2) | Hydrostatic test water will be obtained from nearby lakes, watercourses or municipal sources in accordance with applicable permits for the withdrawal of water. Water withdrawal from natural waterbodies will not exceed maximum withdrawal rates specified by agency permits or authorization letters. |
| <i>Pump Intakes</i> | 3) | Pump intakes used in fish bearing waters will not disturb the streambed and will be screened in accordance with the DFO Freshwater Intake Fish Screening Guidelines (1995). |
| <i>Additives</i> | 4) | Chemical additives will not be used in hydrostatic test water unless testing is undertaken during freezing conditions, in which case methanol may be used. All waters in which methanol has been added will be disposed of at an appropriate waste disposal facility. Proper waste characterization will be required for the transportation and disposal of this material. |
| <i>Reference Monitoring</i> | 5) | Hydrostatic test waters will be sampled and analyzed for identified water quality parameters in compliance with provincial water quality criteria. Metals analysis will only be performed when required. Copies of field test results, laboratory reports and other test documentation will be included in the project files. |
| <i>Dewatering</i> | 6) | Test water will be discharged back into the same watershed or river basin system from which it was withdrawn, unless otherwise approved by the applicable government agency. |
| | 7) | At dewatering points, discharge piping will be free of leaks and properly anchored to prevent bouncing or snaking during surging. The rate of discharge should not exceed the rate of filling or the rate stipulated in the water withdrawal permit. |
| | 8) | Protective riprap, sheeting, tarpaulins or equivalent will be used as required to dissipate the energy of the discharged water to minimize soil erosion during dewatering. Discharge locations will be pre-determined and monitored for erosion or flooding. If energy dissipation measures are found to be inadequate, the rate of dewatering will be reduced or ceased until satisfactory mitigative measures are in place. |

6.6 FISH AND FISH HABITAT

This section outlines the environmental management practices that pertain to the protection of fish and fish habitat and include: general practices, watercourse crossings (dry, wet and trenchless), vehicle crossing structures and restoration. These practices supplement the measures noted in the various regional DFO Operational Statements, which can be found on their website at:

http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_e.asp

6.6.1 General Measures

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| <i>Water Flow</i> | 1) | Downstream water flow will be maintained during the watercourse crossing activities. |
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| <i>Refuelling</i> | 2) | Refuelling and lubrication of equipment will not be conducted within 30 m from a watercourse. |
| <i>Notification</i> | 3) | The Company will notify the appropriate provincial/territorial or federal agencies prior to commencement of a watercourse crossing in accordance with regulatory permit conditions. Identified stakeholders will be notified in advance of construction activities. |
| <i>Permits</i> | 4) | The Company will adhere to all permits and approvals of federal and provincial/territorial agencies related to watercourse crossings. |
| <i>Timing Windows</i> | 5) | In-stream work will occur during the appropriate timing windows for the geographic region and for the fish species present unless otherwise permitted by the appropriate federal/provincial agency. Refer to the appropriate government agency for the specific in-stream work timing windows for the fish species and geographic areas under consideration. |
| <i>Pump Intakes</i> | 6) | Water intakes used in fish bearing waters will be screened in accordance with the DFO Freshwater Intake Fish Screening Guidelines (1995). |
| <i>Fish Salvage</i> | 7) | Fish salvage will be conducted in fish bearing streams prior to and during the isolation of flow and in accordance with permit regulations. |
| | 8) | In-stream activities in all watercourses (e.g., trenching, pipe installation and backfilling) will be completed in as short a time as possible to ensure minimal disturbance to water quality and fish and fish habitat. |
| <i>Weather</i> | 9) | Prior to commencing watercourse crossings, local weather stations will be monitored to determine if precipitation is forecast. In-stream activity will be delayed until weather conditions are favourable. |
| <i>Equipment Availability</i> | 10) | All required materials (e.g., silt fencing, filter cloth, polyethylene liners, granular material, rip rap, sandbags) and installation equipment (e.g., pipe, flumes, pumps, pump hoses, generators, spares, energy dissipaters) will be on-site and in good working order prior to construction. |
| | 11) | In situations where the crossing can be completed in one day, in-stream excavation will begin in the early morning to allow for same day installation. |
| <i>Environmentally Sensitive Features</i> | 12) | Flag and/or fence environmentally sensitive areas (e.g., riparian areas, root wads, log overhang) prior to commencement of clearing and construction near watercourses. |
| <i>Clearing: Felling Trees at Watercourses</i> | 13) | Trees will be felled away from watercourses to reduce damage to stream banks and beds. To maintain bank stability, trees within 10 m of watercourses will be close cut and stumps left in place except along the trench line. |
| | 14) | Logs will not be skidded across any watercourse. Trees and slash inadvertently introduced into any watercourse will be removed. |

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| <i>Minimal Disturbance Zone</i> | 15) | All watercourses will require a minimal disturbance zone (MDZ) and be flagged prior to the commencement of clearing activities or any construction activity near the watercourse. This flagging will typically be set back 10 m minimum on the RoW to delineate the MDZ and will be based on site specific conditions. Extra work area required at watercourse crossings will be situated beyond a minimum MDZ. |
| <i>Riparian Buffer Zone</i> | 16) | Leave a temporary uncleared buffer zone at watercourses extending back from the crest of erosion prone approach slopes. These areas are to remain as permanent buffer zones. |
| <i>Restricted Grubbing in MDZ</i> | 17) | Stump removal will be limited to over the trench line in the MDZ. Grubbing will be restricted within this buffer. |
| <i>Winter Construction</i> | 18) | Ensure snow graded from the RoW is stored in a manner that does not result in increased erosion and sedimentation along the RoW or into a watercourse during snow melt. Ensure that “dirty” snow is not deposited in a watercourse or allowed to run-off into watercourses. |
| <i>Grading Near Watercourses</i> | 19) | Minimize grading on steep watercourse approach slopes. Use approved access where available to limit equipment and vehicle traffic on steep approaches. |
| | 20) | Do not store graded material on sloping areas with potential instability where “loading” from the spoil may trigger slide action or erosion into a watercourse. |
| <i>Sumps/Berms</i> | 21) | Sumps and/or berms will be constructed, if required, to contain excavated materials from watercourses so that silty run-off does not re-enter the watercourse (see Appendix C, Drawing No. 12). |
| <i>Temporary Sediment Barriers</i> | 22) | Install temporary sediment barriers prior to or immediately after initial disturbance of the watercourse or adjacent uplands (see Appendix C, Drawing No.’s 1, 2, and 3). |
| <i>Blasting</i> | 23) | The <i>Guidelines for the Use of Explosives In or Near Canadian Fisheries Water</i> (DFO, 1998) will be followed where applicable. |

6.6.2 Watercourse Crossings

The three main types of watercourse crossings are: dry crossings, wet crossings (also called open cut crossings) and trenchless crossings. Environmental management practices associated with watercourse crossings are discussed below.

a) Dry Crossings

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| <i>Dry Crossings – General Techniques</i> | 1) | Dry crossings are carried out in a manner that effectively isolates the in-stream construction site from the natural stream flow. Dry crossing techniques include the dam and pump (Appendix C, Drawing No. 13), and flume (Appendix C, Drawing No. 14) methods. |
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*Dam and Pump Method
(Drawing No. 13)*

- 2) As a general guide, the dam and pump method will be applied to streams where the expected maximum discharge of the watercourse does not exceed 1.0 m³/s. Adequate pump capacity will be on-site to handle anticipated water flows and any potential increases in flow during the construction period. Back-up pumps with adequate capacity to handle 100% of the downstream flow must be readily available on-site for immediate replacement service should the primary operating pump(s) fail.
- 3) If the streambed has adequate slope such that the pumped water does not impact the downstream side of the excavation, a downstream flume seal or dam may not be required. The length of the isolated area will be sized to ensure that trench sloughing will not threaten the integrity of the dam.

*Flume Method
(Drawing No. 14)*

- 4) As a general guide, the flume method will be applied to streams where the expected maximum discharge of the watercourse exceeds 1.0 m³/s. A combination of pumps and flumes may be required to bypass stream flow and to control water entrained within the isolated area. Specific methods proposed for each stream crossing will also be influenced by site specific conditions such as channel configuration, bank configuration and flow rates.
- 5) The capacity of the flume(s) will be sized to handle 150% of the anticipated flow.
- 6) If the streambed has adequate slope such that water does not impact the downstream side of the excavation, a downstream dam may not be required.
- 7) The upstream and downstream flume seals or dams will be set back far enough from the trench area and the flume will be of sufficient length that integrity of the dam will not be at risk during trenching.

b) Wet Crossings (Open Cut Crossings)

*Wet crossing –
general
techniques*

- 1) Wet crossings may be specified on larger watercourses (Appendix C, Drawing No. 15) where high stream flows, watercourse configuration or technical factors (e.g. substrate composition) prohibits the use of dry crossing methods or trenchless crossing techniques. Wet crossings can also be considered on small streams (Appendix B, Drawing No. 16) with limited or no water flow at the time of crossing.
- 2) Trench plugs will be left in-place at water crossing approach areas to prevent silty trench water from entering watercourses. Hard plugs will be left in the trench until the watercourse crossing has been initiated.
- 3) Where possible, excavate the pipeline trench working from both banks or if required, within the watercourse, to complete in-stream trenching activities in the shortest practical time period.

c) Trenchless Crossings

- 1) Trenchless crossings are completed either under or over a watercourse and include the “bore or punch” method, horizontal directional drill (HDD) or aerial span.

*Bore or Punch
(Drawing No. 17)*

- 2) Locate bell holes and staging areas outside minimum 10 m riparian buffer zones (unless otherwise directed by the local regulatory agency). Erect fencing as required about bore hole excavations to protect wildlife and for the safety of workers and/or general public.

- 3) Pump bell holes onto stable well-vegetated areas or constructed containment areas in a manner that does not cause erosion or sedimentation of a watercourse or wetland. Pre-determine discharge locations and monitor to ensure no flooding or erosion occurs.

- 4) Prior to initiating the crossing, refer to the applicable geotechnical data.

*Horizontal
Directional Drill
(Drawing No. 18
and No. 19)*

- 5) Locate drilling equipment and staging areas outside minimum 10 m riparian buffer zones.

- 6) Where tracking sensors are used along the drill path, minimize vegetation clearing through riparian buffer zones to narrow hand cut slash lines.

- 7) The deployment of tracking sensors across a navigable watercourse requires prior consultation and approval from Transport Canada.

- 8) Pre-determine the composition of drilling fluid to be used and ensure that it is non-toxic. The standard composition of drilling fluid is bentonite and water. The use of any drilling mud additives is not allowed without the approval of the Company and the appropriate regulatory authorities.

- 9) Monitor the watercourse for signs of surface migration (frac-out) of drilling mud.

- 10) Ensure on-site personnel are prepared for the inadvertent release of drilling mud and are familiar with the contingency plan (Section 6.11.3).

- 11) Ensure drilling fluids are not deposited in an area where they could enter a watercourse.

- 12) Identify drilling mud containment and disposal methods. Install suitable drilling mud tanks, sumps or containment berms as necessary.

Aerial Span

- 13) Aerial spans are not commonly used, however may be considered where methods such as dry techniques or directional drilling may not be feasible and wet crossing are not an option.

- 14) Ensure aerial spans are designed so that navigation on the watercourse is not impeded. Aerial spans require prior consultation and approval from Transport Canada.

6.6.3 Vehicle Crossings

Vehicle crossings typically include temporary bridges such as wooden mats (swamp mats), portable bridges and culvert/grade fill ramps (see Appendix C, Drawing No.'s. 20, 21, and 22). The environmental management practices for watercourse vehicle crossings are outlined below.

- General*
- 1) Use existing vehicle access across watercourses wherever possible.
 - 2) Vehicle crossings of fish bearing waters will be designed to comply with the requirements of DFO and relevant provincial/territorial standards for protection of fish and fish habitat. All necessary approvals will be obtained prior to the construction of vehicle access across a watercourse.
 - 3) Vehicle crossing structures capable of handling anticipated high water flows during the construction period will be used.
 - 4) All temporary vehicle crossing structures will be removed upon completion of construction with banks and approaches immediately restored and stabilized.
 - 5) On the approaches to vehicle crossing structures, road ditches constructed for drainage control will incorporate the necessary sedimentation control measures (e.g., silt fence, check dams) to prevent sediment from entering the watercourse.
 - 6) Install, use and remove vehicle crossing structures in a manner that minimizes disturbance to a watercourse, such as working from the banks where possible to avoid in-stream activities.
 - 7) To ensure that stream flows and fish passage are not obstructed, culverts will be designed to comply with provincial/territorial standards.
 - 8) Use coarse cobbles, sandbags, geotextile liners and/or curb stringers to protect culvert and ramp approach fills from erosion and to prevent sedimentation of a watercourse.
- Ice Bridges, Snow Fills, and Winter Fords*
- 9) For winter construction projects, install ice bridges over existing ice surfaces when a safe ice thickness can be maintained or suitable snow cover is available.
 - 10) Construct snow fills over dry channels or over existing and undisturbed ice surfaces using clean, compacted snow and ice.
 - 11) Construct approaches to ice bridges, winter fords and snow fills using clean, compacted snow and ice to a sufficient depth to protect the shoreline.
 - 12) If water is drawn from the watercourse to strengthen the ice bridge surface, withdrawal rates will not exceed 10% of the measured flow at the time of construction. A water withdrawal permit may be required from the appropriate government agency. Remove broken ice from work areas to prevent ice jamming against and under the ice bridge or snow fill. Ensure crossings do not impede water flow.
 - 13) Ensure that any logs used for reinforcement of ice bridges or snow fills are clean, de-limbed, bundled and placed on the surface of the ice. Logs must be removed prior to spring freshet.

- 14) Any sediment or materials that accumulate on the ice or snow surfaces must be removed to the extent practical, prior to the spring thaw.
- 15) During removal of the winter crossing, create a v-notch in the centre of the ice bridge/snow fill crossing to allow it to melt from the centre and also to prevent channel erosion and flooding.
- 16) Restore and stabilize disturbed banks and approaches prior to spring thaw.
- 17) Equipment fording will only be allowed with approval from the applicable government agencies. Fording will only be considered if:
 - The fording site does not support known critical aquatic habitat, such as spawning gravels;
 - The fording does not take place during fish spawning, incubation or migration periods;
 - The work site cannot be accessed from the opposite side of the watercourse to avoid fording activities;
 - The fording site has low profile and gradual banks that will not require grading to support vehicle traffic;
 - The fording site has shallow water depths at the time of use;
 - The fording site has coarse substrate that will support vehicle travel without creating erosion and sedimentation; and,
 - Run-off from the approach slopes to the ford can be effectively controlled to prevent sediment introductions to the stream.
- 18) The number of crossings of the fording site will be minimized.
- 19) Boundaries of the fording site will be marked on both sides of the crossing to confine all vehicle traffic to the ford.
- 20) Fords will be aligned at right angles to the channel flow wherever possible to minimize in-stream travel.
- 21) Excess soil will be removed from vehicles before fording. In addition, all vehicles using the ford will be in good working order and checked to ensure no fuel, hydraulic fluid or lubricating fluid leaks are present.
- 22) Bed and banks of ford sites will be restored when no longer needed.

*Fording
(Drawing No. 23)*

6.6.4 Restoration

General

- 1) Following the installation of a watercourse crossing, stabilize the bed and banks of the crossing as quickly as possible. Monitor the crossing site through periods of peak water flow to ensure the crossing site remains stable.
- 2) Recontour banks and approach slopes to pre-construction profiles where possible or to a stable profile unless otherwise directed by site-specific design.

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- 3) To comply with DFO requirements for “no net loss” of fisheries capability, bank and in-stream restoration measures designed to replace pre-construction habitat components may be required. The necessity and extent of streambank stabilization and in-stream restoration measures shall be determined in consultation with DFO and/or provincial government agencies.
- Existing Stream Bed Material*
- 4) Where present, existing gravel and cobble streambed materials will be utilized for restoration of the streambed. Prior to trenching, the surface streambed materials contained within the anticipated width of disturbance will be salvaged separately from the trench spoil. These natural gravel and cobble materials will be replaced back on top of the streambed as a cap over the disturbed area following backfill of the trench.
- 5) Where the native streambed materials are not appropriate in quantity or quality, gravel and cobble will be imported and used as a cap over the disturbed streambed. Importing of cobble and gravel will be used where needed to restore the streambed to its original condition.
- Stream Bank Stabilization – Rock Riprap*
- 6) Rock used for bank stabilization must be angular, such as quarry rock, and of varying sizes so that smaller rocks fill the voids between the larger ones and effectively lock the rocks together. The size of rock will be dependent upon the expected maximum water velocity. The largest rocks should be placed at the toe of the bank and should extend to at least the 1:10 year flood level or the top of the bank (whichever is lower).
- 7) The permeability of the stone armouring will be adequate to allow any lateral water seepage. Filter fabric, geotextile or a layer of clean filter gravel will be used to prevent fines from washing out from behind the stone armouring.
- 8) Where warranted, vegetative cover (e.g., willows) may be planted on any remaining exposed soil surfaces to further assist in bank stabilization.
- 9) The use of riprap at a particular site will depend upon the results of the final design of the crossings, as well as the geotechnical and hydrotechnical aspects of the crossing site.
- 10) Transport Canada approval may be required prior to the installation of stream bank protection and/or fish habitat restoration measures where modifications are required to be made to the streambed and/or shoreline of a navigable watercourse.
- 11) Seeding of erosion prone disturbed banks with grasses following completion of construction is an important component of the reclamation process. Under certain situations, revegetation of the banks may be difficult due to steep approaches, eroding soils and/or timing of revegetation. To provide erosion control and enhance revegetation efforts, erosion control matting, mulches or netting will be installed where appropriate.

6.7 WETLANDS

This section outlines the environmental management practices in wetlands.

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| <i>Notification</i> | 1) The Company will notify the appropriate agencies prior to the commencement of work in a wetland in accordance with regulatory permit conditions. |
| | 2) Refuelling and lubrication of equipment will be conducted a minimum of 30 m away from any wetlands. |
| | 3) Wetland boundaries will be delineated on site plans or alignment sheets and marked in the field with signs and/or flagging. |
| <i>Extra Work Space</i> | 4) Extra work areas (such as staging areas and additional spoil storage) will be avoided in wetlands. Any additional working area, if required, will be located a minimum of 10 m away from wetland boundaries. |
| | 5) If standing water or saturated soils are present, or if construction equipment causes excessive rutting in wetlands, use low ground-weight construction equipment or operate equipment on timber riprap, prefabricated equipment mats or swamp mats. |
| <i>Clearing</i> | 6) Cut trees and other vegetation just above ground level and, if necessary, grind stumps to ground level leaving existing root systems in place. Remove all cut trees and branches from the wetland and stockpile in an upland area for disposal. Vegetation cleared from the RoW (slash, brush, wood chips) will not be permanently placed within wetland areas. |
| | 7) Minimize construction traffic in wetlands to only that required for construction activity. Use upland access roads around wetlands, wherever available. |
| <i>Corduroy</i> | 8) Use harvested timber for corduroy wherever equipment movement is necessary in wetlands. It is preferable that non-merchantable timber be used when feasible. Measures to maintain adequate cross drainage will be implemented where required. |
| <i>Erosion and Sediment Control</i> | 9) Install sediment barriers immediately after initial ground disturbance at the following locations: <ul style="list-style-type: none"> • Within the RoW at the edge of the boundary between wetland and upland; • Along the edge of the RoW, where the RoW slopes toward a wetland, to protect any adjacent, off RoW wetlands; and, • Along the edge of the RoW, as necessary, to contain spoil and sediment within the RoW through wetlands. |
| | 10) Minimize the length of time that the trench is left open in wetlands. |
| | 11) Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe. Use “push-pull” or “float” techniques to place the pipe in the trench where water and other site conditions allow. |
| <i>Trench Plugs</i> | 12) Install trench plugs and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may act as a drain. |
| <i>Revegetation</i> | 13) Seed, fertilizers or mulch will not be applied in wetlands. Restrict the use of fertilizer within 15 m of wetlands. The RoW in wetland areas will not be reseeded unless specified by the appropriate government agency. |

Restoration

- 14) Within the wetland area, original contours and drainage patterns will be restored. Ensure corduroy does not restricted the movement of water flow in wetlands by removing corduroy to below existing grade levels. Government agency approval is required for any corduroy remaining in wetlands.

6.8 WILDLIFE AND WILDLIFE HABITAT

This section outlines the environmental management practices for the protection of wildlife and wildlife habitat.

- 1) Fencing will be erected around such areas as boreholes, entry/exit pits and sump pit excavations to prevent wildlife entrapment.
- 2) Feeding or harassment of wildlife is prohibited. Construction personnel are not permitted to have pets on the construction site. Firearms are not permitted on the construction site unless a Company specific Firearms Policy allows Company personnel to have firearms where there is the risk of bear attack.
- 3) Project-related wildlife deaths and nuisance animals will be immediately reported to the Company and appropriate authorities (e.g., provincial/territorial fish and wildlife branch personnel, local police detachment).
- 4) Environmentally sensitive areas (nests, rare plants, mineral licks, traditional use sites, heritage sites etc.) will be flagged and/or fenced in the field, as specified by project ESA and related environmental instructions, prior to commencement of clearing and construction.
- 5) Any previously unidentified sensitive habitat features (e.g., beaver dams, ponds or lodges; muskrat push-ups or other aquatic furbearer habitats; raptor nests; mineral licks; bear dens; etc.) are to be reported to an Environmental Inspector or other Company representative who will then report this information to provincial/territorial fish and wildlife agency personnel. A mitigation plan will be developed in consultation with the agency.
- 6) Speed limits both on and off the RoW must be obeyed at all times. Speed limits may be lowered where specific wildlife concerns have been identified.
- 7) Recreational use of all-terrain vehicles (ATVs) along the RoW and in other construction areas is prohibited.
- 8) To facilitate the movement of wildlife, trenching will be followed as closely as practical by lowering-in and backfilling operations.
- 9) In areas where public access to the RoW or construction area has been identified as an issue, unauthorized entry will be discouraged by using signs and gates at appropriate locations.
- 10) Gaps in stockpiled soil and pipe will be created to allow for the potential movement of wildlife across the RoW at obvious wildlife trails.

6.9 AIR QUALITY AND NOISE

This section outlines the environmental management practices for air quality and noise.

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| | 1) | Construction equipment will be maintained in good working order and properly muffled. |
| <i>Vehicle Idling</i> | 2) | Company and construction personnel will avoid excessive idling of vehicles. Vehicles or equipment are to be turned off when not in use unless required for effective operation. |
| <i>Gas Release</i> | 3) | In situations where a release of natural gas is planned in conjunction with a construction project (such as during the purge and pack of a newly constructed pipeline), a gas release management plan will be developed by the Company with the intent of minimizing the quantity of gas released to the atmosphere. The plan will outline the methods available for the planned release of the natural gas, the benefits or negatives of each viable method and the rationale for the preferred method of natural gas release. |
| <i>Dust Control</i> | 4) | Dust suppressants will be applied (i.e., water, calcium chloride, or tree lignin based dust suppressant) on the RoW or access roads as required. Calcium chloride must not be used on agricultural fields. Local authorities will be informed prior to the application of dust suppressants on roads. Watering for dust control must not result in the formation of puddles, rutting by equipment or vehicles, the tracking of mud onto roads or the siltation of watercourses. |
| <i>Blasting</i> | 5) | Approval for blasting must be obtained from the appropriate government authority. Advanced notice of blasting will be given to local residents and other potentially affected parties. |
| | 6) | Drills (used in areas of blasting) will be equipped with dust collectors in good working order. |
| <i>HDD</i> | 7) | If required, noise abatement measures such as fabricated structures or barriers will be erected around the drilling unit in proximity to residential or other sensitive areas. |

6.10 SOCIO-ECONOMIC

This section outlines management practices for various socio-economic issues.

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| <i>Notice</i> | 1) | Prior to entering privately-owned land, the Company will provide reasonable notice of activities and scheduling to the landowners. |
| | 2) | Appropriate signs will be posted along access roads, trails or other points of possible public access in the vicinity of construction activities to warn the public of construction dangers. |
| | 3) | Potentially impacted owners of registered trapping areas, as well as guides and outfitters, will be notified of the construction schedule prior to commencement of clearing and other construction activities. Notification to potentially affected local user groups (i.e., recreational fishing associations, |

snowmobile clubs, nature societies, etc.) will be conducted prior to construction. Where required, notices will be placed in local papers or by other means outlining the schedule of construction activities.

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|---------------------------------|-----|--|
| | 4) | Company and construction personnel must show safe care and proper conduct when travelling along access roads, the RoW and other construction areas with ATVs or vehicles to minimize disturbance to private and public property. |
| <i>Utilities</i> | 5) | Notify applicable One Call Systems, or municipalities having utilities in the vicinity of construction, prior to the commencement of construction. |
| <i>Recreational Use</i> | 6) | Where required, signs will be posted at known access points outlining the dates for construction activities across watercourses used for boating or other recreational activities. |
| | 7) | Watercourse beds and banks will be restored so as not to interfere with recreational pursuits. |
| <i>Aesthetic Impacts</i> | 8) | Vegetative buffers at watercourse and road crossings will be restored to reduce visual impacts and discourage access to the RoW. |
| <i>Public Safety</i> | 9) | Install safety fence at the edge of the construction RoW in residential areas or other areas where public safety considerations are required. |
| <i>Specimen Trees</i> | 10) | On residential properties, leave mature trees and landscaping intact within the construction work area unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions. |
| <i>Traffic Management</i> | 11) | Where required, vehicle/access control during construction, such as restricted access areas, gated/manned access, signs, in/out privileges, traffic flows (one way traffic), crew buses and speed limits must be considered prior to commencing on-site activities. |
| <i>Road Crossings</i> | 12) | Where required, approvals will be obtained from the appropriate authority regarding road crossings. The duration of the construction at road crossings is to be minimized. A traffic management plan will be developed to control traffic at road crossings when required. |
| <i>Heritage Resources</i> | 13) | In the event a previously unknown archaeological resource is uncovered during construction, work activity in the area of the discovery will be suspended and the Environmental Inspector is to be contacted and informed of the discovery. The Environmental Inspector will inform the appropriate provincial authorities of this discovery. (See Section 6.11.5 Resource Discovery for additional information.) |
| <i>Worker and Public Safety</i> | 14) | The location and contact phone numbers of health facilities and community infrastructure (hospital, police, fire), will be identified by the Company and contractor for posting at the construction site. |
| <i>Waste Management</i> | 15) | Collect waste material and remove from the RoW or construction site on a regular basis. Ensure waste materials, including hazardous wastes, are contained and removed to an appropriate location and recycled where practical. |

6.11 CONTINGENCY PLANS

The following contingency plans and measures have been developed to minimize the risk of adverse impacts on the environment and public health and safety in the event of accidents or unplanned events. Contingency measure requirements for individual construction projects will vary with the scope and location of the project and risk of events.

6.11.1 *Fire Contingency Plan*

Fire prevention and suppression measures will be developed in accordance with applicable provincial regulations. When requested by the Company, the contractor must submit a fire contingency plan to the Company prior to construction. This plan will vary for individual projects depending on the location, timing and risk of fire potential for each site. The fire contingency plan must be developed in consideration of the following:

- 1) Contractors shall ensure that all necessary fire-fighting equipment is available at the job-site and shall appoint a Fire Boss (e.g., on-site foreman).
- 2) A list of 24-hour fire dispatch co-ordinators and regional helicopter companies' telephone numbers shall be developed and posted at the job-site.
- 3) In the event of a fire, the Fire Boss will inspect the fire site immediately and take charge of directing suppression measures.
- 4) The Fire Boss shall report any fires and relevant information to the Company's Chief Inspector, local fire department, landowner(s) and any on-site occupants as well as the appropriate government agencies and request assistance as needed.
- 5) The Fire Boss will deploy fire-fighting equipment and crew(s) to plow or clear fire breaks or extinguish the fire directly if possible. All necessary equipment and personnel will be made available to control the fire.
- 6) Movable equipment and materials, including explosives or flammable materials and vehicles, will be promptly moved to a safe location.
- 7) Fire suppression measures will continue until the fire is extinguished or until otherwise notified by the local fire department, Regional District or provincial/territorial Forest Service.
- 8) The Fire Boss will ensure that the burn area is monitored and that the fire has been completely extinguished.

6.11.2 *Spills*

All hazardous spills shall be reported immediately to the Company's Chief Inspector, Environmental Inspector or other designated Company representative, who will then ensure that the contractor has initiated appropriate spill response measures and undertakes the necessary spill reporting procedures.

Spill Plan

- 1) When requested, contractors shall provide the Company with a Spill Response Plan prior to the start of project construction. This plan shall include information on individuals responsible for spill response, the

materials/equipment available both on-site and off (with time of response) and general procedures to be employed for spill containment, clean-up and disposal.

Initial Response

- 2) In the event of a spill of hazardous material, the first person on the scene will:
 - if possible and without further assistance, control danger to human life (i.e., remove ignition sources);
 - identify the material spilled and implement appropriate safety procedures, based on the nature of the hazard;
 - cut off the source of the spill if possible;
 - immediately obtain the assistance of others and begin to contain and clean-up the spill; and,
 - notify the Company representative (e.g., Chief Inspector, Environmental Inspector) and, if necessary, the appropriate provincial services (local police) in the event that a risk to the public exists.
- 3) The Company and Contractor will make all necessary resources available to contain and clean-up the spill.
- 4) Once the emergency contacts are made and the initial efforts to contain and clean-up the spill are underway, the designated Chief Inspector or other Company representative will notify the appropriate government agencies.

Notification

- 5) Spills that are determined to have an impact on the environment must be reported immediately to the appropriate government agency; contact numbers are provided below:
 - Nova Scotia, New Brunswick, 1-800-565-1633
 - Ontario 1-800-268-6060
 - Manitoba 1-204-944-4888
 - Saskatchewan 1-800-667-7525
 - Alberta 1-800-222-6514
 - British Columbia 1-800-663-3456

Local spill reporting numbers must be confirmed by a designated Company representative prior to project commencement.

General Spill Containment Procedures

- 6) Containment measures will be immediately initiated to limit the spread of the spill and to minimize impacts on water bodies or other areas of environmental concern and to prevent damage to property.
- 7) If the spill source is from a leaking fuel truck, the tanker will be pumped dry and transferred into another tanker or other appropriate and secure container(s).
- 8) Any nearby culverts will be blocked to limit spill migration, if required.
- 9) If certain there are no underground pipelines or utilities, a shallow depression will be excavated or surface berm constructed in the path of the spill to stop and contain flow.
- 10) All free products will be collected with a vacuum truck or absorbents and

transported to an approved waste management facility.

- 11) All fuel and service vehicles will carry a minimum of 10 kg of suitable commercial sorbent materials, suitable for use on both soil and water. This will be applied to contain and recover spilled material.
 - 12) Any contaminated soil and vegetation, as well as spent sorbent material, will be collected and disposed of at an approved waste facility.
 - 13) Traffic will be avoided on soils contaminated by a spill.
 - 14) The spill will be documented by preparing a sketch with dimensions showing the spill location and a report describing the type of spill, cause of spill, clean-up and reclamation procedures undertaken.
 - 15) The general public, construction personnel and/or wildlife will be restricted from entering the affected area, if necessary, by fencing.
 - 16) If a hazardous substance is spilled, the following safety precautions must be observed:
 - Refer to container labels and material safety data sheets (“MSDS”) to identify any potential health or flammability hazards;
 - Wear appropriate personal protective equipment when handling or working near hazardous substances; and,
 - If the substance is flammable, eliminate ignition sources and secure the area.
 - 17) Final clean-up and reclamation of a contaminated site will be conducted following an assessment of soil conditions.
- Spills Adjacent to or Into a Water Body*
- 18) Berms or trenches will be constructed to contain spilled product in the event of possible entry into a water body.
 - 19) For spills on water, containment shall be achieved utilizing floating containment booms, sorbent booms and pads or through the construction of straw bale filter dams.
- Spot Spills*
- 20) Since impacts from small spot spills can generally be minimized if prompt action is taken, all small spot spills will be cleaned up immediately and then reported to the Chief Inspector and Environmental Inspector.
 - 21) Contaminated soils will be cleaned up in consultation with spill response specialists and the appropriate government agencies.
- Reclamation of Spill Area*
- 22) In-situ reclamation will only be conducted as approved by the Company and appropriate government agencies.

6.11.3 HDD Mud Release

An inadvertent drilling mud release during horizontal directional drilling may occur in permeable soils, gravel substrates or fractured clay and rock structures. Permeable soils and fractured bedrock substrates can exhibit the tendency to absorb drilling fluid circulation losses or in some

cases provide a conduit to the surface resulting in surface discharge of drilling fluids. Inadvertent returns at a specific location are typically temporary and cease as the drilling operation progresses.

The Company (or representative) will apply the following contingency measures to minimize the risk of adverse impacts during directional drilling in the event of drilling mud spills or unexpected discharge from the drill hole to the surface. When requested by the Company, the drilling contractor must submit a drilling mud release contingency plan to the Company prior to construction. The contingency measures will vary with the location, timing and risk of potential release of drilling mud at each site.

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|-----------------------------|-----|--|
| <i>Notification</i> | 1) | The Company will notify the appropriate agencies prior to commencement of a drill in accordance with regulatory permit conditions. |
| <i>Mud Composition</i> | 2) | The drilling mud composition will be limited to bentonite and fresh water. Additives, if required, will be non-toxic (i.e., mud conditioners). The composition of the mud and additives (if used) must be approved by the Company prior to use. |
| <i>Contingency Measures</i> | 3) | The drilling contractor and Company inspection personnel will be made aware of the contingency measures prior to commencement of drilling activity. |
| | 4) | The contractor will maintain the following equipment and material on-site in sufficient quantities during drilling operations to contain any inadvertent drilling mud releases: <ul style="list-style-type: none"> • Sandbags • Geotextile • T-bar posts • Post pounders • Straw bales • Light towers • Shovels • Polyethylene • 2-trash pumps c/w sufficient lengths of leak free hose and suction heads |
| | 5) | Maintain water quality sampling equipment (e.g., 1 litre plastic sample bottles complete with labels and large cooler(s)) on-site during drilling operation. In winter conditions, an ice auger will be required. |
| | 6) | Monitor the quantity of fluid return to the mud tank/pit and the quantity of make up drilling fluid required in the mixing tanks during drilling of the pilot hole and hole opening (reaming). |
| | 7) | Monitor both onshore and in-stream portions of the drill path on a regular basis for signs of drilling mud release. |
| | 8) | Ensure communications equipment, if required, is on-site and available for use in monitoring operations. |
| | 9) | Assign drilling contractor supervisory personnel to be on-site at all times during drilling, reaming and pullback operations to ensure that response measures will be implemented immediately and effectively. |
| <i>Primary</i> | 10) | In the event of a release, drilling contractor supervising personnel will |

Response

immediately notify the Chief Inspector or designated Company representative and Environmental Inspector (if assigned) who will then notify the appropriate provincial/federal agencies. Take remedial action to re-establish containment and circulation to the drilling mud. Remedial action will include, but not be limited to, “sizing” the hole to remove annular obstructions, reducing pumping rates, or modifying drilling mud properties. Employ best efforts to maintain full annular circulation of drilling fluids.

- 11) Inadvertent surface returns on or adjacent to riverbanks will be contained with hand place barriers (e.g., hay bales, sandbags, silt fences, etc.) and collected using pumps as practical. If the amount of the surface return exceeds that which can be contained with hand placed barriers, small collection sumps may be used. If the amount of the surface return exceeds that which can be contained and collected using small sumps, drilling operations will be suspended until surface return volumes can be brought under control.
- 12) If inadvertent surface returns occur within the watercourse, conduct water quality sampling at both up and downstream locations from the point of entry into the watercourse.

Secondary Response

- 13) If excessive inadvertent returns continue, consider secondary response measures including:
 - Plug fissures/fracture with sealers or plugging agents. Sealing agents such as saw dust, nutshells, bentonite pellets, cement or other commercially available products are pumped into the drill hole and left undisturbed for an appropriate period of time.
 - Employ downhole cementing to seal off a large portion of the existing drill hole if practical, to a point where a new drill path can be attempted.
 - Suspend drilling operations and move the drill in an attempt to re-drill from a new location employing the same protection measures implemented on the initial drill. Prior to commencing the re-drill, the proposed drill path will be reviewed and revised accordingly.
- 14) Inadvertent mud releases will be collected and disposed of at an approved location. If the amount of the surface return is not of sufficient quantity to allow practical collection, the affected area shall be diluted with fresh water and the fluid will be allowed to dry and dissipate naturally on the RoW.
- 15) The Company will prepare a report upon completion of drilling operations summarizing the events leading up to the inadvertent mud release as well as measures taken following the release to minimize impacts on the environment.

6.11.4 Extreme Weather

Extreme Precipitation/ Streamflow Events

- 1) Prohibit the operation of construction equipment close to the banks of watercourses where there is a risk of bank sloughing, failure of the vehicle crossing or flooding of the work area.
- 2) Monitor existing erosion control measures to determine adequacy in the event of an extreme precipitation event.

- 3) Excavate or reinforce existing cross ditches to divert runoff away from watercourses.
- 4) Construct berms of subsoil, timber, sandbags, rock, straw bales or hay bales on approach slopes and/or banks to divert runoff off the RoW and onto well vegetated lands.
- 5) Import sand bags and place strategically to help stabilize and add height to banks to prevent flooding of nearby areas especially where vegetation has been removed.
- 6) Following periods of excessive rainfall or saturated soil conditions, construction will be suspended until suitable soil conditions return.
- 7) If extreme precipitation has impacted watercourses in the construction area, restoration measures as outlined in Section 6.6.4 will be implemented.

6.11.5 Resource Discovery

The occurrence and protection of archaeological, palaeontological or historical sites, rare and endangered plants, or wildlife or wildlife habitat features in the project area is typically determined during pre-construction planning through environmental assessment or traditional land use studies.

In the unlikely event that a previously unidentified significant resource feature is discovered during construction, the following general requirements will apply.

- 1) Suspend work immediately in the area of any newly discovered resource.
- 2) Notify the Environmental Inspector or designated Company representative. The Environmental Inspector or designated Company representative will notify the appropriate government agencies and Company Environmental Lead.
- 3) Resource Specialists (archaeological/heritage), vegetation, wildlife specialists will assess the site, as required, and develop appropriate mitigation plans in consultation with Company environmental staff and government agencies.
- 4) Construction at the site may resume once permission has been granted by the Resource Specialist, the Environmental Inspector, designated Company representative or government agency.

6.11.6 Contaminated Soils

The following measures will be implemented in the event contaminated soils are encountered during construction.

- 1) The contractor will immediately inform the Company that contaminated soil has been encountered or suspected.
- 2) The Company will retain expert advice on assessing the type and level of contamination present.
- 3) Excavated material must be segregated and stockpiled on impervious liners until laboratory testing determines how it can be disposed. Any runoff from the stockpile(s) must be collected for proper treatment and disposal.

- 4) If necessary, erect appropriate signage and fencing around the stockpiled material.

7.0 POST-CONSTRUCTION ENVIRONMENTAL MANAGEMENT

7.1 MONITORING PROGRAM

Following construction, monitoring programs will be conducted as specified by the project-specific environmental assessment or as directed by the Company. Typically, these programs are undertaken during the first and/or second complete growing season following construction. The objective of post-construction monitoring programs is to ensure that mitigation measures implemented during final clean-up and reclamation are successful and continue to be effective.

In addition, the programs provide a means to implement additional mitigation measures as necessary. The post-construction monitoring programs will typically focus on soil and land reclamation, revegetation (seeding, riparian planting and reforestation), erosion control and slope stability.

As part of the monitoring program, the observations noted and remedial measures undertaken will be recorded and reported to governmental agencies or other stakeholders as requested in any project Conditions of Approval and may include:

- 1) A project description including the work conducted and the construction kick-off and completion dates.
- 2) The general procedures, equipment used and mitigation measures implemented for activities in sensitive areas such as watercourses.
- 3) Any procedures implemented to address unforeseen environmental issues and the decision making process leading to those procedures.
- 4) A record of any discussions and decisions made regarding permit requirements or requests from government agencies.
- 5) A description of problems encountered (e.g., equipment breakdown) that may have been detrimental to the efforts of implementing mitigative measures and a discussion of any steps taken to alleviate or counteract those problems.
- 6) A record of any instances where recommendations (e.g., use of a specific type of seeding equipment) could not be implemented, the circumstances and location of the event, and the decision-making that followed.
- 7) A record of government and stakeholder liaison undertaken during and following construction activities.
- 8) A photographic record.
- 9) Drawings outlining the location of unique or “a-typical” events, such as spot spills, drilling mud releases, significant resource sites encountered during construction.
- 10) A list of environmental and socio-economic issues and their respective status (i.e., resolved and unresolved). In the case of unresolved issues, the steps proposed to resolve those issues.

Any issues remaining at the end of the post-construction monitoring period will be integrated into the Company's operations and maintenance program.

7.2 FOLLOW-UP PROGRAM

As required, the Company will develop and implement a follow-up program for a construction project. The need for specific follow-up programs are typically noted in project environmental assessment reports and will be implemented by the Company where warranted. Wetlands, fisheries and watercourses are resources typically included in follow-up programs.

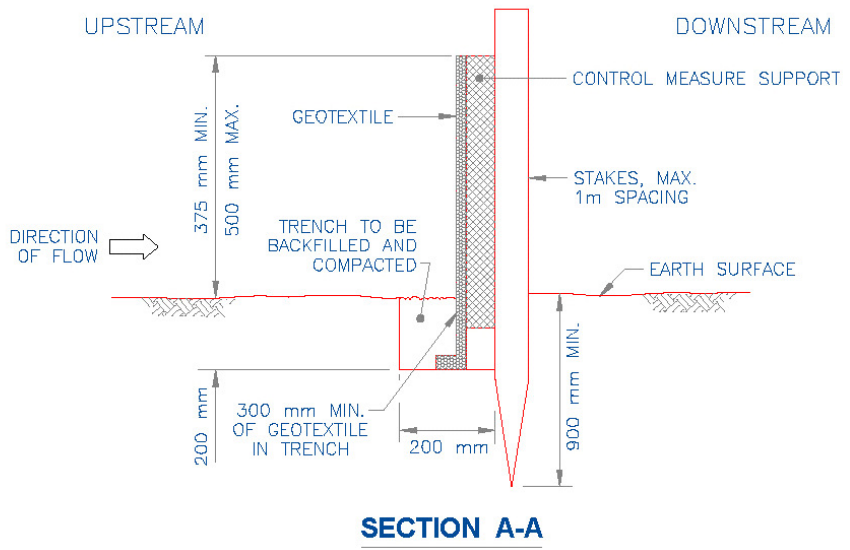
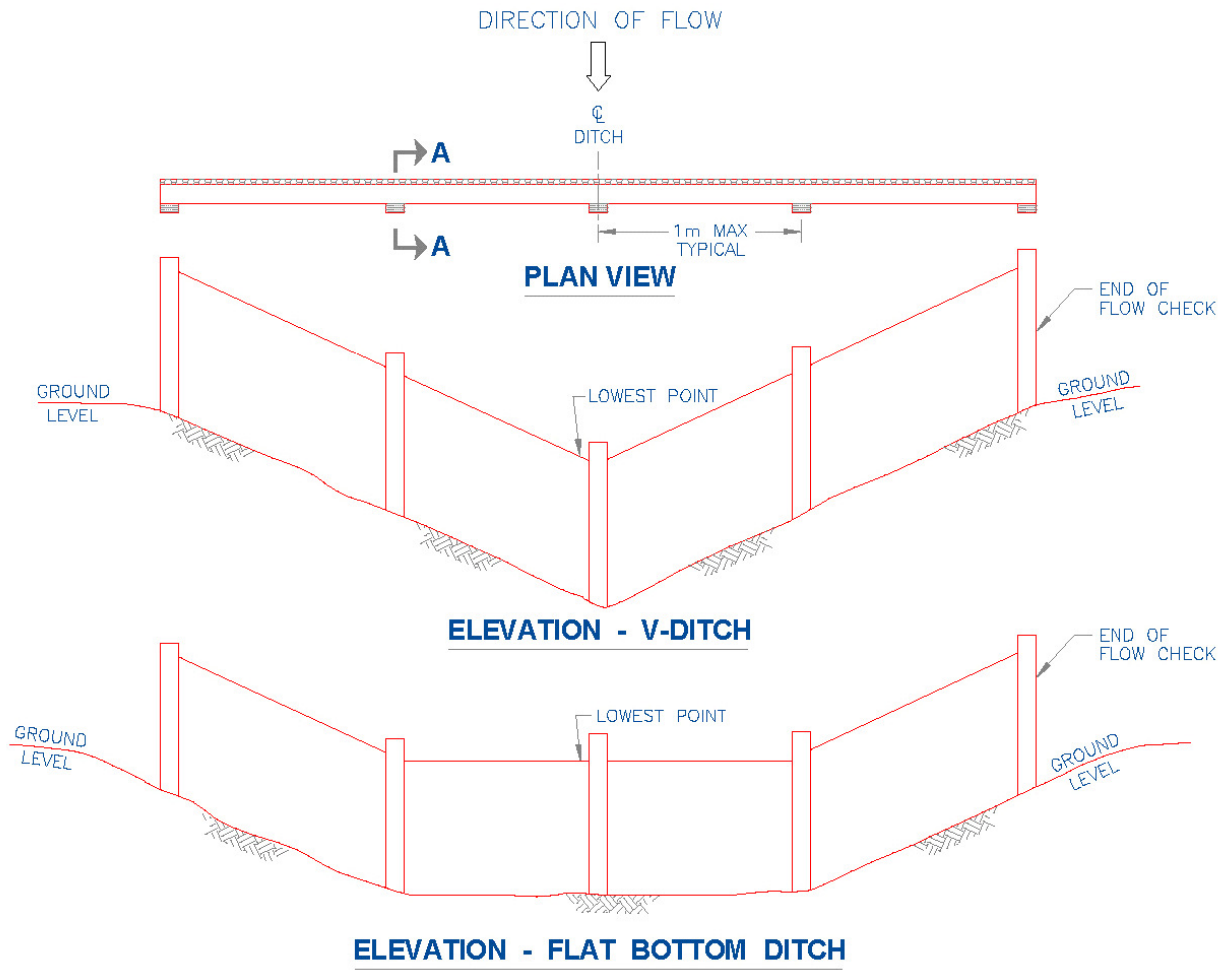
According to the Canadian Environmental Assessment Agency's guidance notes, follow-up programs may be used when:

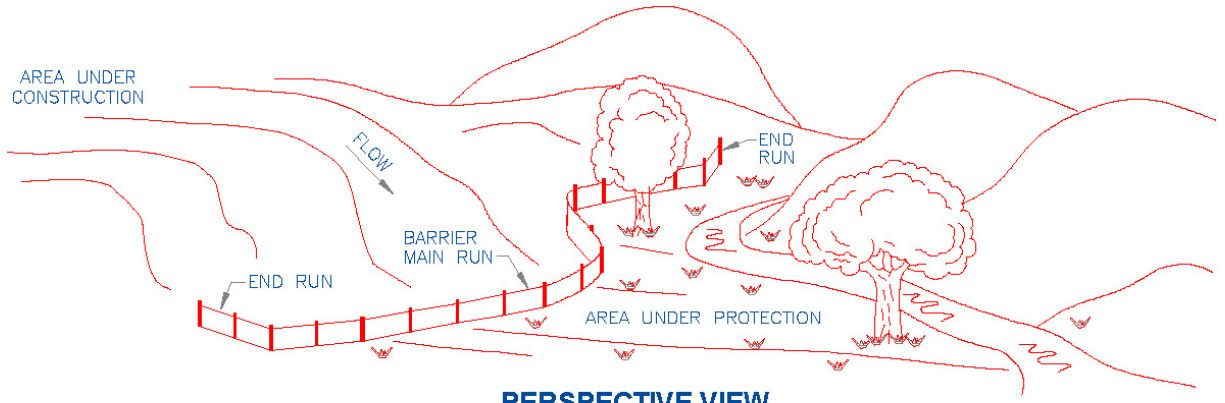
- There is a need to address project-related issues of public concern;
- There is a need to test the accuracy of the predictions of the environmental assessment;
- There is a need to verify that mitigation measures were effective or successful;
- The environmental effects of a project were assessed using new or unproven analytical or modelling techniques or the proposed project involves technology or mitigation measures that are new or unproven;
- There is limited experience implementing the type of project being proposed in the environmental setting under consideration; or,
- The scientific knowledge used to predict the environmental effects of the proposed project is limited.

**APPENDIX B
TYPICAL CONSTRUCTION DRAWINGS**

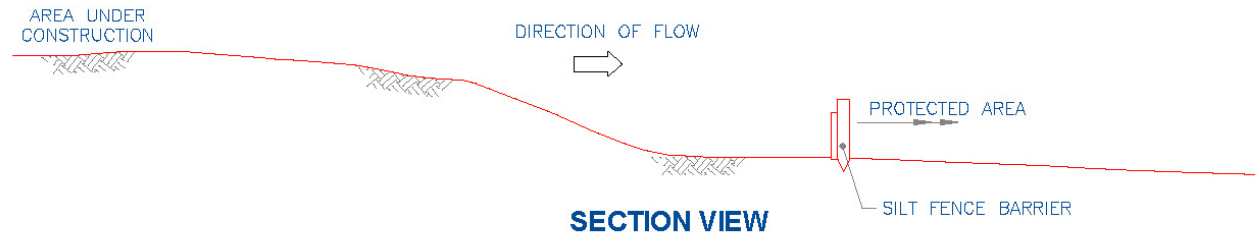
LIST OF CONSTRUCTION DRAWINGS

Drawing Number	Title of Drawing
1	Silt Fence Flow Check
2	Silt Fence Barrier
3	Straw Bale Barrier
4	Surface Erosion Control – Typical Cross Ditches and Diversion Berms
5	Subsurface Drainage Control – Typical Trench Breakers / Ditch Plugs
6	Subsurface Drainage Control – Typical Subdrain
7	Surface Material Salvage in Forested Areas
8	Topsoil Conservation, Ditchline and Spoil Side
9	Topsoil Conservation, Blade Width
10	Typical Topsoil Conservation of Trench and Workside
11	Handling of Surface Organic and Mineral Material (Full Width)
12	Sediment Control – Typical Spoil Berms and Sump
13	Construction Techniques – Typical Dam and Pump
14	Construction Techniques – Typical Flume
15	Construction Techniques – Typical Open Cut of Large Watercourses
16	Construction Techniques – Typical Open Cut of Small Watercourses
17	Construction Techniques – Typical Bore or Punch
18	Construction Techniques – Typical Horizontal Directional Drill
19	Construction Techniques – Typical Horizontal Directional Drill
20	Vehicle Crossing – Typical Temporary Bridge – Log
21	Vehicle Crossing – Typical Ramp and Culvert
22	Vehicle Crossing – Typical Temporary Bridge – Portable
23	Vehicle Crossing – Typical Ford
24	Surface Erosion Control – Typical Fibre Log

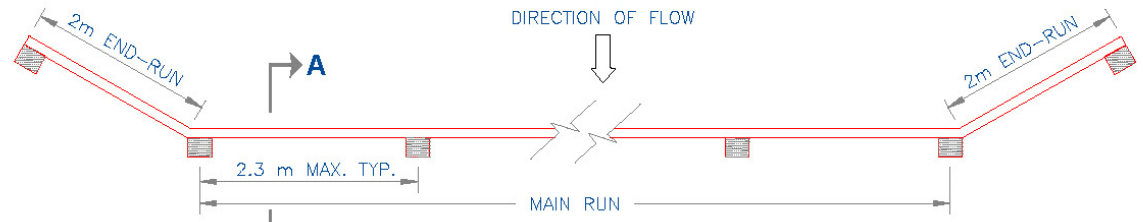




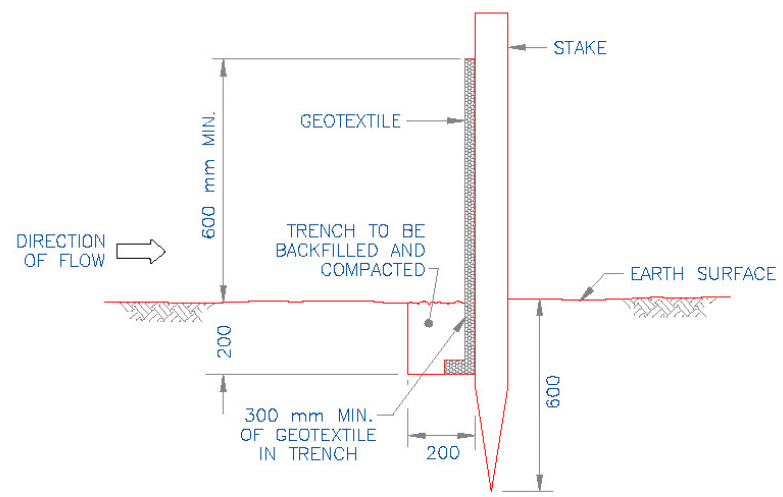
PERSPECTIVE VIEW



SECTION VIEW



PLAN OF SILT FENCE BARRIER

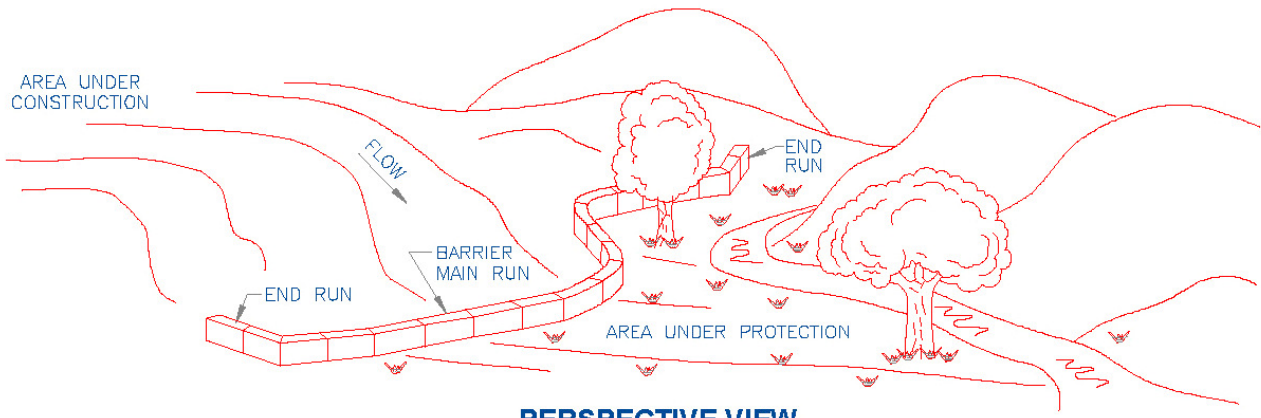


SECTION A-A

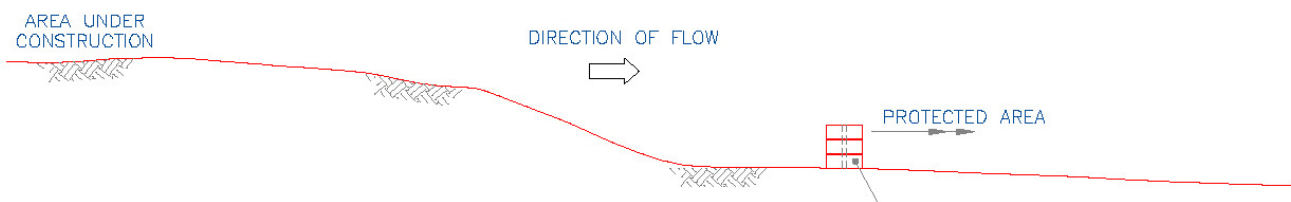


SILT FENCE BARRIER

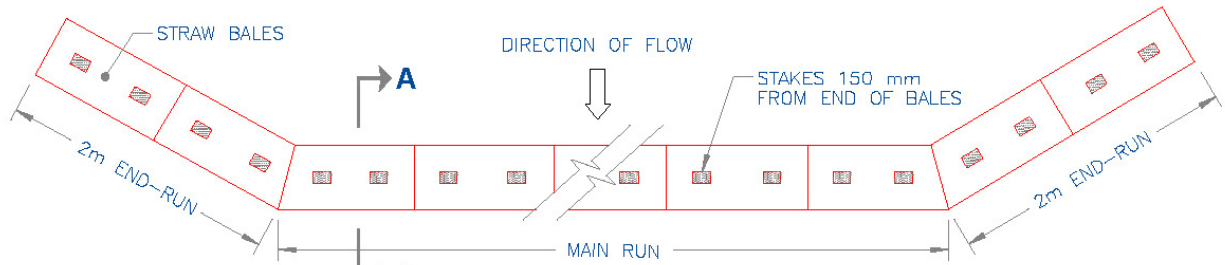
Drawing No.: 2
Revision Date: Feb. 2006



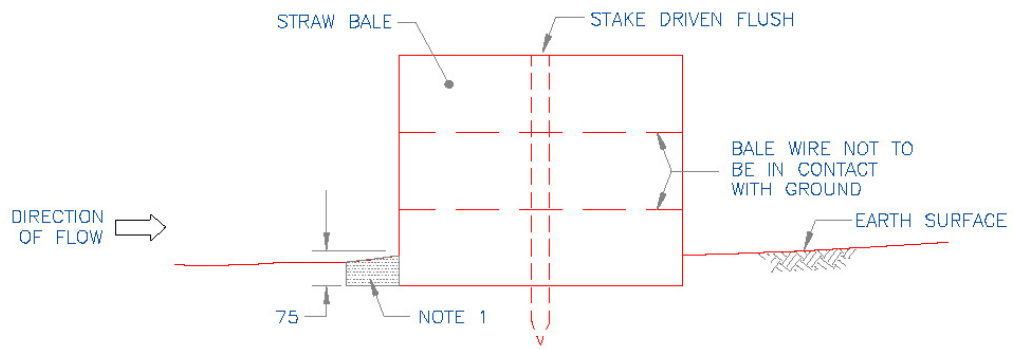
PERSPECTIVE VIEW



SECTION VIEW



PLAN VIEW



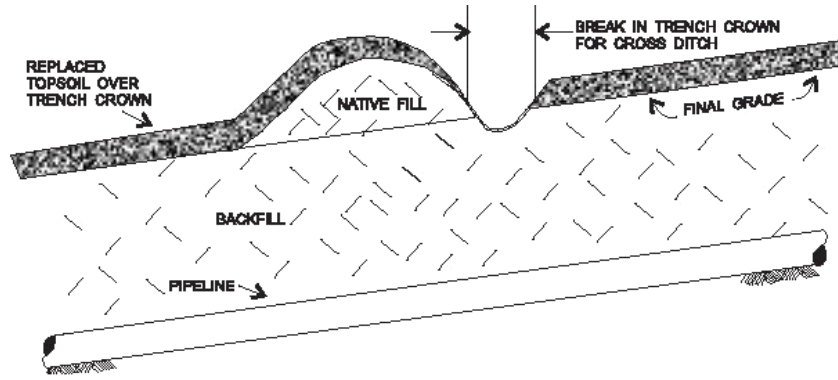
SECTION A-A



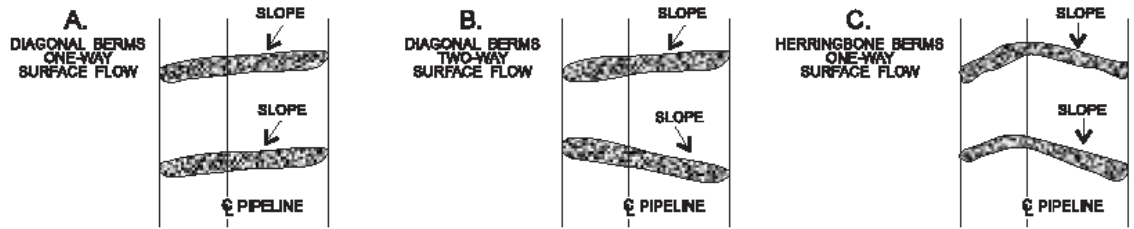
STRAW BALE BARRIER

Drawing No.: 3
Revision Date: Feb. 2006

PROFILE
(Not to Scale)



PLAN VIEW
(Not to Scale)



Notes:

1. Install diversion berm and cross ditch in conjunction with final clean-up and reclamation on moderate and steep slopes to divert surface water off the right-of-way. Also install berms immediately downslope of trench breakers to collect seepage forced to the surface.
2. Skew berm across the right-of-way at downhill gradient of 5%-10%.
3. Construct diversion berm of compacted native soils where extensive disturbance of the sod layer has occurred. Diversion berms should be constructed of timbers, imported logs, strawbales or sandbags if disturbance of the sod layer is limited. Avoid use of organic materials. Where native material is highly erodible, protect upslope of berm and base of cross ditch with sod or by burying a geotextile liner 16 to 20 cm below the surface or armour upslope face of berm with earth filled sand bags.
4. Typical diversion berm height is approximately 30 cm to 75 cm. Inspect berms after heavy rains and the first spring following construction; replace or restore berms if warranted.
5. Leave a break in trench crown immediately upslope of diagonal berm and cross ditch to allow passage of water across right-of-way.
6. Use diagonal berms where direction of slope and surface water movement is oblique to pipeline right-of-way.
7. Use herringbone berm and cross ditch where direction of slope and surface water movement is parallel to right-of-way so runoff does not cross ditch line.
8. Determine location and direction of berm based on local topography and drainage patterns. Skew berms with downhill gradient of 5%-10%.
9. Typical diversion berm spacing.

Slope Gradient (:%)		Typical Spacing (m*)
<8;	<15	As required
8-14;	15-25	45
14-17;	25-30	34
17-20;	30-35	20
>20;	>35	10-15

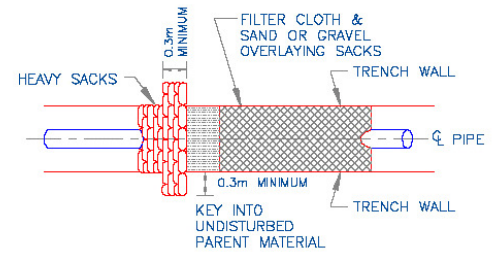
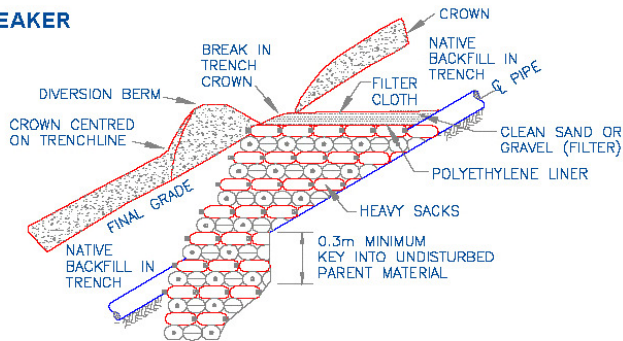
* Rely on field judgement to determine appropriate spacing. For example – install berms approximately 50% closer than indicated on highly erodible materials such as glacial-lacustrine deposits.

10. To facilitate traffic on the right-of-way during temporary applications, strawbales maybe inserted in the berm as a “gate”. The bales may be removed for access, but replaced each night.

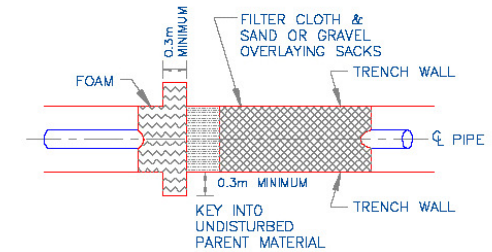
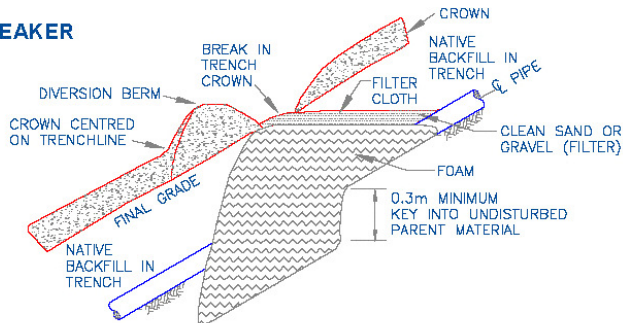
Source: CPWCC 2005



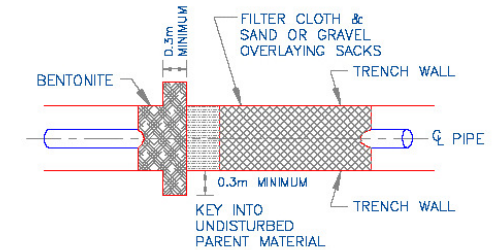
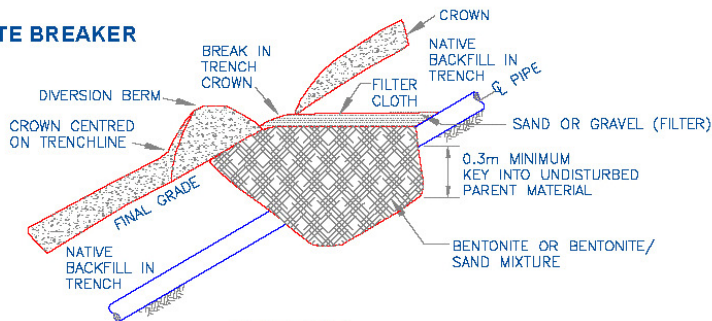
SACK BREAKER



FOAM BREAKER



BENTONITE BREAKER



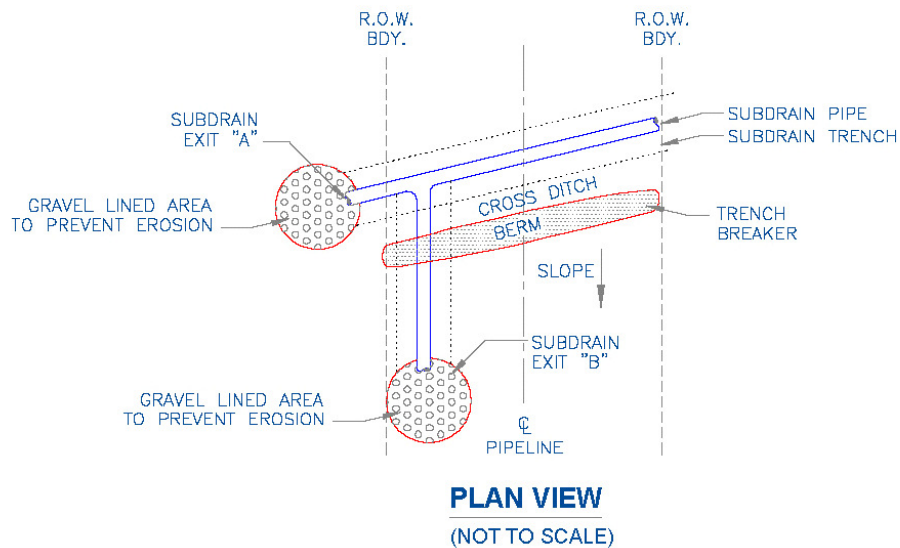
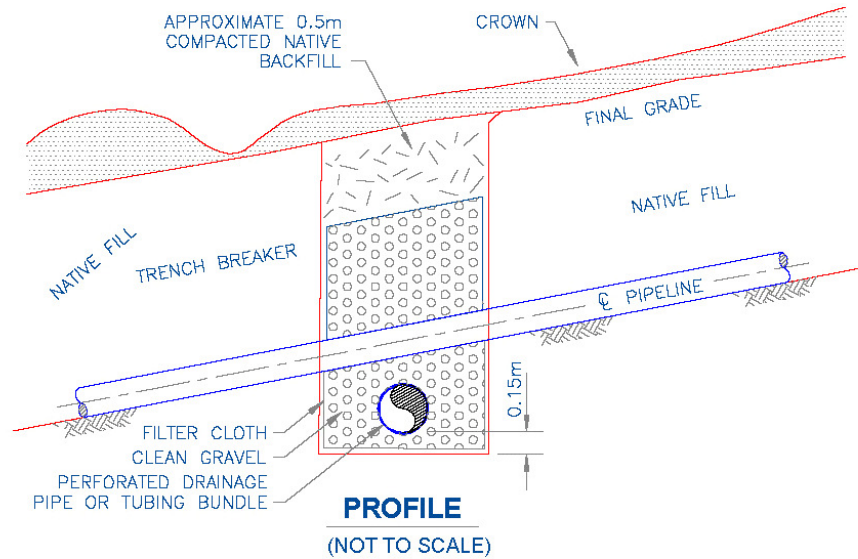
PROFILE
(NOT TO SCALE)

PLAN VIEW
(NOT TO SCALE)

Notes:

1. Install trench breakers (ditch plugs) to control water seepage along the trench line and prevent erosion of backfill materials.
2. Trench breakers may be constructed using earth filled sacks, bentonite, foam or equivalent materials to provide a barrier to water seepage.
3. The drawing above provides a schematic representation of trench breaker installation. Final locations and design of trench breakers will be determined by the Project Engineer based on site specific conditions at the time of construction.
4. Dig keys into trench bottom and sides of the extent feasible for added stability.
5. Install a prefabricated drain or a layer of sand or gravel covered with filter cloth over the breaker.
6. Backfill native material and mark location of breaker.
7. Ensure cross ditches are located over the end of the drain.
8. Construct diversion berms downslope from the breaker but not over the end of the drain.
9. Ensure that trench crown does not encroach upon the breaker drain or cross ditch.
10. Backfill trench on downslope side of breaker before upslope side.

Source: Adapted from Alliance 1997.



Notes:

1. Install a subdrain to divert shallow groundwater flow away from the pipeline, to improve slope stability. Clean gravel and a filter cloth ditch liner, permits drainage aiding in retention of backfill. In certain circumstances, a parallel drain may be installed lengthwise down the slope underneath the pipeline. A geotechnical engineer can advise as to which method is most appropriate.
2. Install trench breaker downslope of drain, where drains cross pipeline trench, to prevent drain water flowing down pipe trench.
3. Determine the location of drain by on-site investigation considering such factors as groundwater conditions in trench, soil types, local topography and drainage patterns. Discharge may either be off right-of-way on the downslope side of the subdrain (see subdrain exit "A"), or on right-of-way downslope of the berm (see subdrain exit "B"). Special permission will be required from the appropriate regulatory authority and landowner to construct a subdrain exit off right-of-way. Ensure discharge is into a well protected area with gravel, riprap or vegetation.
4. Skew across drain 5' off horizontal to ensure sufficient drainage.
5. The above drawing is a schematic diagram. A geotechnical engineer should be consulted for the detailed site specific drain design and the incorporation of the trench breaker.

Source: Adapted from Alliance 1997

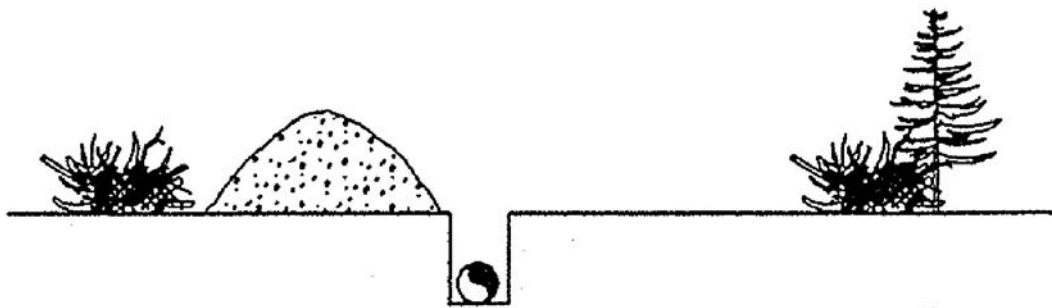
1. - CLEAR TIMBER FROM R.O.W.



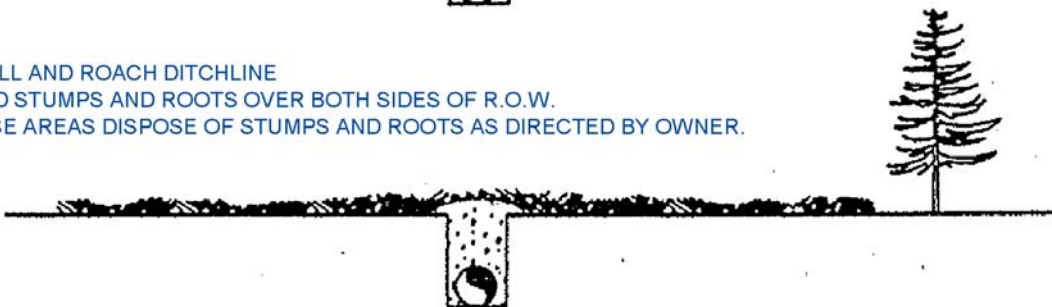
- 2A. - WHERE NO GRADING IS REQUIRED TO CREATE A SUITABLE WORKING SPACE, USE BRUSH RAKE TO GRUB STUMPS AND ROOTS.
- PLACE STUMPS AND ROOTS ON BOTH SIDES OF THE R.O.W. INCLUDE AS LITTLE ORGANIC MATERIAL AS POSSIBLE.
- IF DUFF ORGANIC LAYER IS TOO THICK (>15cm) FOR REVEGETATION SEED BED, RIP R.O.W. TO A DEPTH THAT WILL INCORPORATE 50-70 % MINERAL SOIL WITH ORGANIC MATERIAL, MUSKEGS ARE EXEMPT FROM THIS REQUIREMENT.
- AREA TO BE RIPPED WILL BE IDENTIFIED ON THE ALIGNMENT SHEET OR BY OWNER'S AUTHORIZED REPRESENTATIVE.
- IN SUMMER CONSTRUCTION, RIPPING MAY BE DONE DURING CLEAN-UP.
- BLADE ORGANIC MATTER TO FORM WORK SURFACE AND LEAVE ON R.O.W.
- 2B. - WHERE GRADING IS REQUIRED TO CREATE A SUITABLE WORKING SURFACE, THE GRUBBING MATERIAL REMOVED FROM THE R.O.W. MUST CONTAIN 50-70 % MINERAL SOIL. THESE MATERIALS WILL BE PLACED ON BOTH SIDES OF THE R.O.W. (UNLESS OTHERWISE SPECIFIED) WITHOUT ENTERING TREE LINE.
- 2C. - WHERE GRADE CUTS ARE REQUIRED, THE ORGANIC LAYER CONTAINING 50-70 % MINERAL SOIL WILL BE REMOVED FIRST AND PLACED ON EDGE OF THE WORKSPACE WITHOUT ENTERING TREE LINE. GRADE CUT MATERIAL MAY OVERLAP THE ORGANIC MIXTURE, BUT MUST BE SEPARATED DURING REPLACEMENT.



3. - DITCH

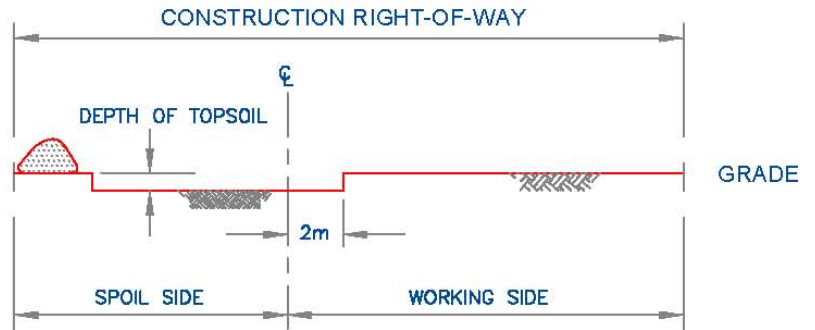


4. - BACKFILL AND ROACH DITCHLINE
- SPREAD STUMPS AND ROOTS OVER BOTH SIDES OF R.O.W.
- IN LEASE AREAS DISPOSE OF STUMPS AND ROOTS AS DIRECTED BY OWNER.



GRADE

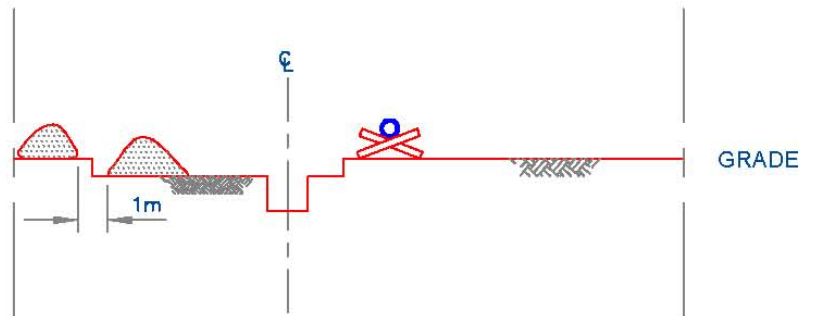
Strip topsoil and stockpile at edge of right-of-way



SPECIAL ATTENTION IS NECESSARY TO ENSURE SEPARATION OF TOPSOIL AND SUBSOIL AT SIDE BENDS AND FOREIGN PIPELINE CROSSINGS.

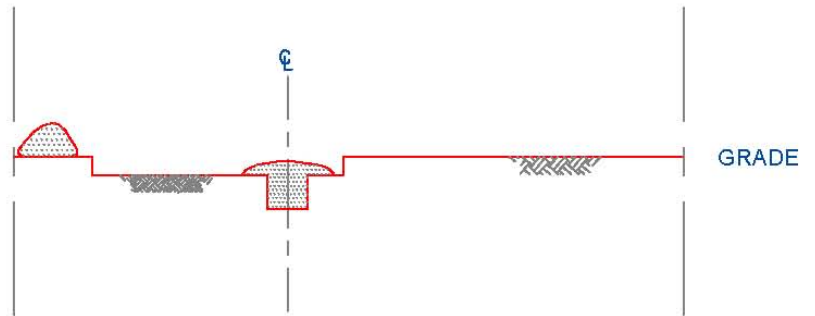
DITCH

As subsoil is stripped, maintain 1 m clearance between topsoil and subsoil pipes.



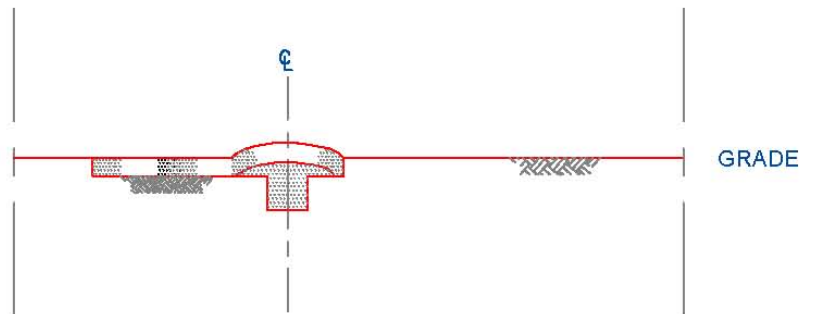
BACKFILL & MACHINE CLEANUP

Replace subsoil. Scrape subsoil into roach over ditchline and compact.



FINAL CLEAN-UP

Replace topsoil evenly over disturbed right-of-way.

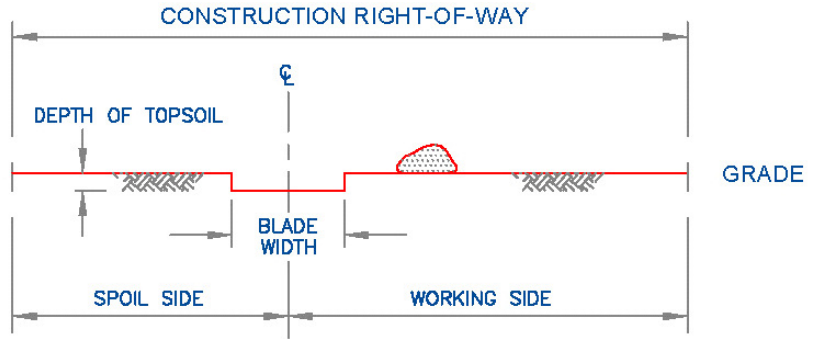


APPLICATION:

- 1. Pasture and cultivated land and where directed by the Company.

GRADE

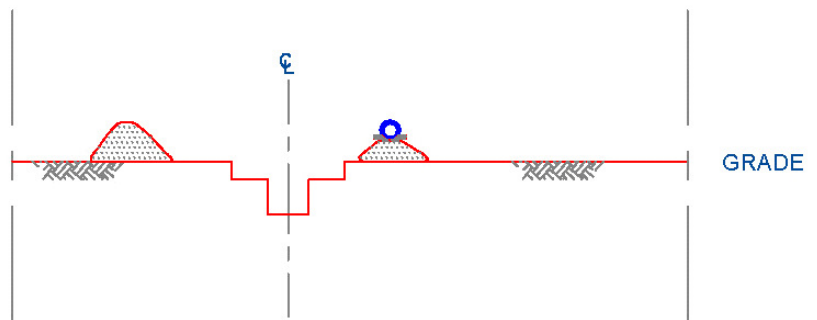
Strip topsoil for blade width over ditch line and stockpile on working side.



SPECIAL ATTENTION IS NECESSARY TO ENSURE SEPARATION OF TOPSOIL AND SUBSOIL AT SIDE BENDS AND FOREIGN PIPELINE CROSSINGS.

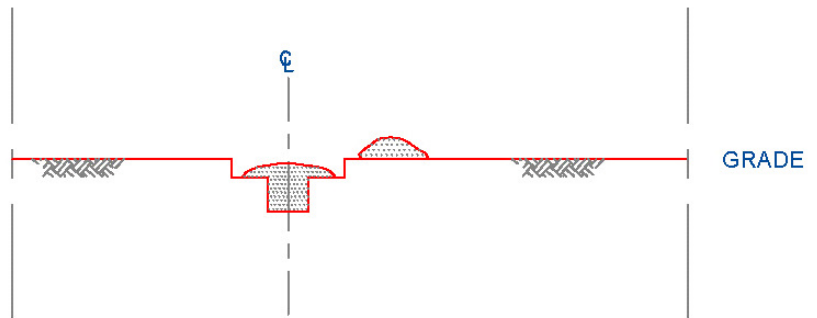
DITCH

Subsoil to be stockpiled on spoil side. Pipe may be strung on.



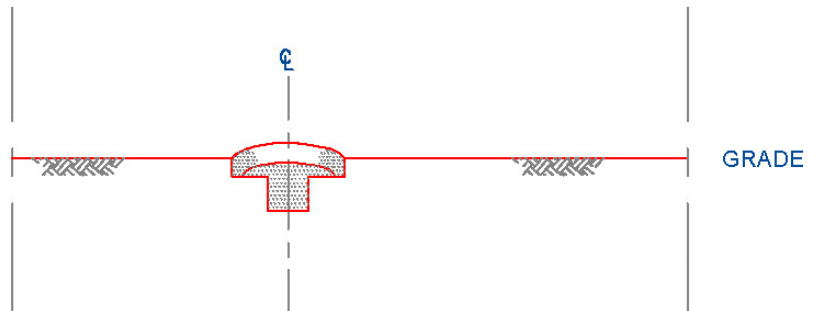
BACKFILL & MACHINE CLEANUP

Replace subsoil. Scrape subsoil into reach over ditchline and compact.



FINAL CLEAN-UP

Replace topsoil evenly over disturbed right-of-way.

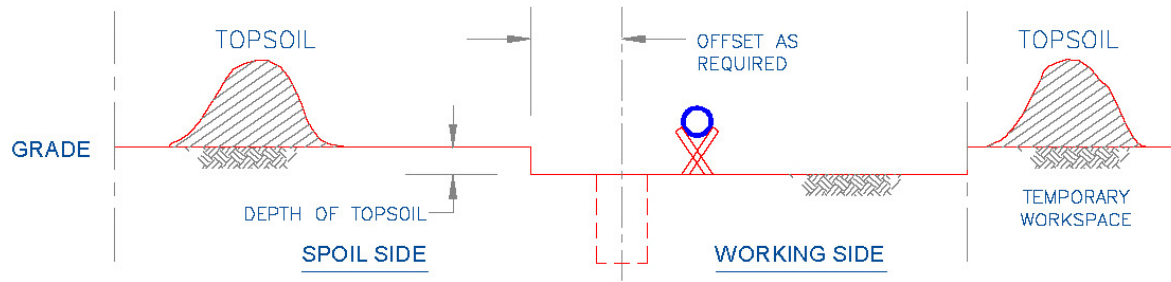


APPLICATION:

- 1. Pasture and cultivated land and where directed by the Company.

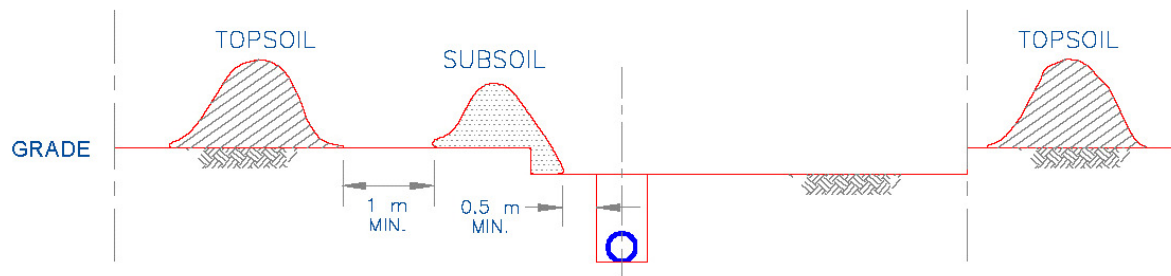
1. GRADE

STRIP TOPSOIL FROM DITCHLINE INCLUDING A SPOILSIDE OFFSET AND FROM ENTIRE WORKSIDE OF THE R.O.W. STORE TOPSOIL ON AVAILABLE SPACE ON EITHER SIDE OF THE R.O.W.



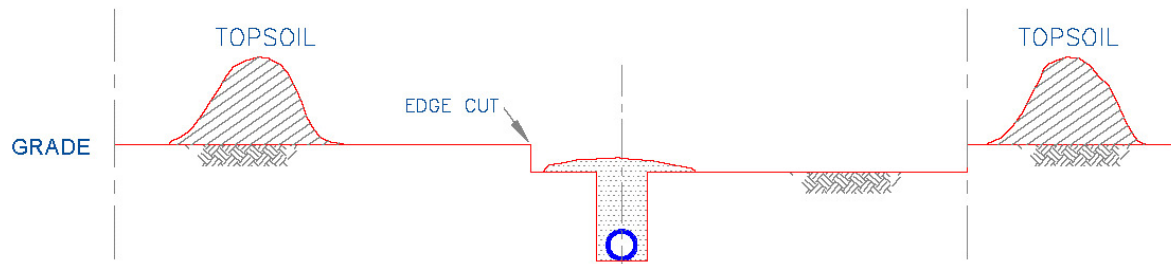
2. DITCH

EXCAVATE TRENCH AND STOCKPILE SUBSOIL ON THE SPOILSIDE.



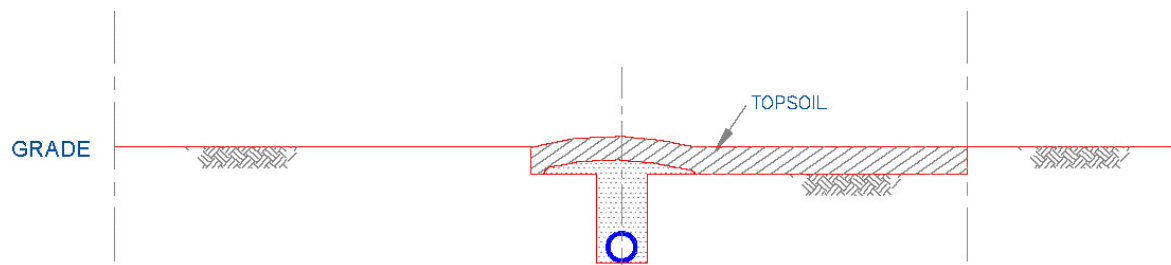
3. BACKFILL AND MACHINE CLEAN-UP

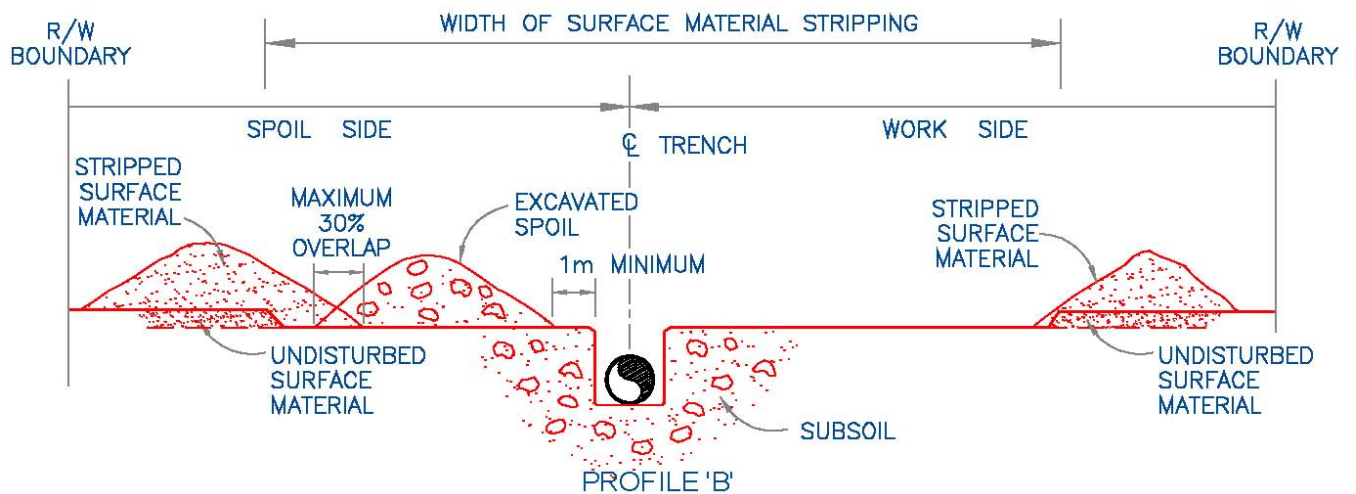
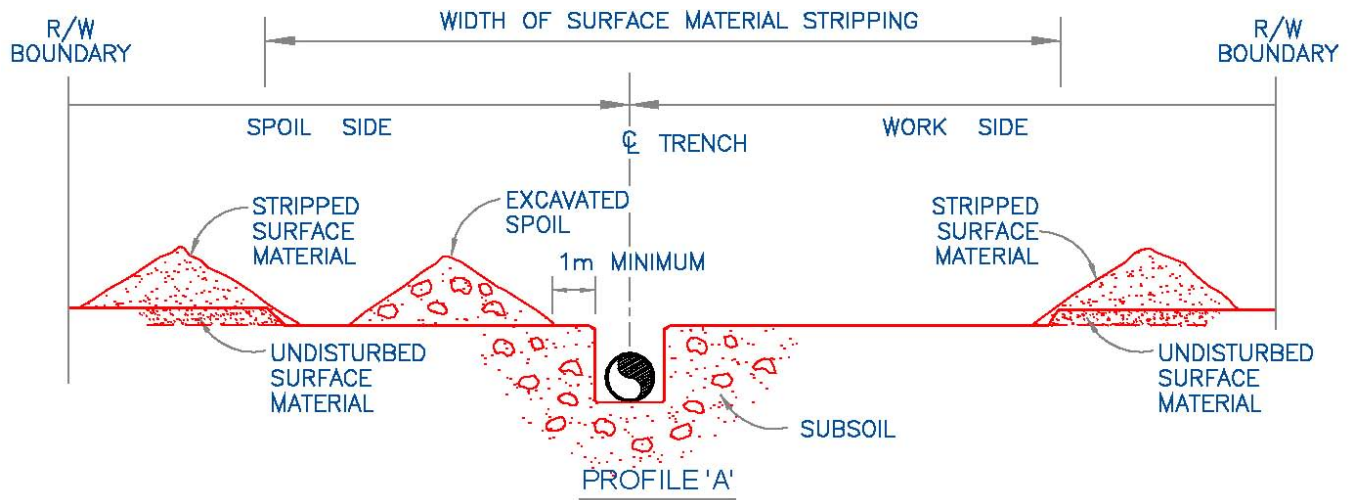
REPLACE SUBSOIL MINIMIZING SCALPING AND DEPOSITION OF AREA NOT STRIPPED. COMPACT DITCHLINE AND LEAVE ROACH HEIGHT AS APPROVED. RESTORE TOPSOIL EDGE CUT AND SMOOTH SUBSOIL OVER THE ENTIRE STRIPPED AREA.



4. FINAL CLEAN-UP

REPLACE TOPSOIL EVENLY OVER THE STRIPPED AREA.





Notes:

1. Remove surface material and store on one or both sides of the right-of-way adjacent to the stripped area. Surface material and spoil pile storage locations may vary depending on site-specific conditions (such as restricted workspace, side slopes, etc.).
2. In areas requiring grading, remove surface material from the entire area of disturbance.
3. Flatten down surface material piles if wind erosion is a concern.
4. Excavate trench subsoil and store on spoil side adjacent to the trench. Maintain a minimum of 1 meter separation between the spoil pile and the trench.
5. Leave breaks in surface material piles at obvious drainage courses.
6. Maintain sufficient separation where feasible between surface material and subsoil piles (Profile A).
7. In restricted space, subsoil material may overlap up to 30% of the surface material but must be separated during clean-up (Profile B).
8. After the pipe is lowered in, return trench spoil to trench and compact. Feather out excess spill over stripped area leaving a low roach centered over the trench.
9. Return surface material evenly over the stripped area.