TRANSMOUNTAIN

CELEBRATING 60 YEARS OF SERVICE 1953 to 2013

Trans Mountain Pipeline ULC

Trans Mountain Expansion Project

An Application Pursuant to Section 52 of the National Energy Board Act

December 2013

Volume 6b — Pipeline Environmental Protection Plan

KINDER MORGAN CANADA

NATIONAL ENERGY BOARD

IN THE MATTER OF

the *National Energy Board Act*,
R.S.C. 1985, c. N-7, as amended, ("*NEB Act*")
and the Regulations made thereunder;

AND IN THE MATTER OF

the *Canadian Environmental Assessment Act*, 2012,
S.C. 2012, c. 37, as amended,
and the Regulations made thereunder;

AND IN THE MATTER OF

an application by Trans Mountain Pipeline ULC
as General Partner of Trans Mountain Pipeline L.P.
(collectively "Trans Mountain")
for a Certificate of Public Convenience and Necessity and
other related approvals pursuant to Part III of the *NEB Act*

APPLICATION BY TRANS MOUNTAIN FOR APPROVAL OF THE TRANS MOUNTAIN EXPANSION PROJECT

December 2013

To: The Secretary
The National Energy Board
444 — 7th Avenue SW
Calgary, AB T2P 0X8

Trans Mountain Expansion Project
Application Pursuant to Section 52 of the *National Energy Board Act*

Guide to the Application

Application	
Transmittal - Letter to the National Energy Board	
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Volume 3B	Aboriginal Engagement
Volume 3C	Landowner Relations
Volume 4A	Project Design and Execution – Engineering
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Volume 4C	Project Design and Execution – Operations and Maintenance
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This volume contains:

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Section 5.0	Environmental Overview
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NEB FILING MANUAL CHECKLIST

CHAPTER 3 – COMMON INFORMATION REQUIREMENTS

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
3.1 Action Sought by Applicant			
1.	Requirements of s.15 of the Rules.	Volume 1 Section 1.1	---
3.2 Application or Project Purpose			
1.	Purpose of the proposed project.	Volume 2 Section 1.1	---
3.4 Consultation		Volumes 3A, 3B, 3C; Volumes 5A, 5B Section 3; Volume 8A Section 3	--
3.4.1 Principles and Goals of Consultation			
1.	The corporate policy or vision.	Volume 3A Section 1.2.1 Volume 3B Section 1.2.1	--
2.	The principles and goals of consultation for the project.	Volume 3A Section 1.2.2 Volume 3B Section 1.2.2 Volume 5A Section 3.2.1 Volume 5B Section 3.2.1	--
3.	A copy of the Aboriginal protocol and copies of policies and principles for collecting traditional use information, if available.	Volume 3B Section 1.3.5	--
3.4.2 Design of Consultation Program			
1.	The design of the consultation program and the factors that influenced the design.	Volume 3A Section 1.3 Volume 3B Section 1.3 Volume 5A Section 3.1.1, 3.2.2 Volume 5B Section 3.1.1, 3.2.2	--
3.4.3 Implementing a Consultation Program			
1.	The outcomes of the consultation program for the project.	Volume 3A Section 1.7 Volume 3B Section 1.5 Table 1.5.1 Volume 5A Section 3.1.5, 3.2.4 Volume 5B Section 3.1.5, 3.2.4	--
3.4.4 Justification for Not Undertaking a Consultation Program			
2.	The application provides justification for why the applicant has determined that a consultation program is not required for the project.	N/A	N/A
3.5 Notification of Commercial Third Parties			
1.	Confirm that third parties were notified.	Volume 2 Section 3.2.2	--
2.	Details regarding the concerns of third parties.	Volume 2 Section 3.2.2	--
3.	List the self-identified interested third parties and confirm they have been notified.	N/A	N/A
4.	If notification of third parties is considered unnecessary, an explanation to this effect.	N/A	N/A

CHAPTER 4 – SECTIONS 4.1 AND 4.2: COMMON REQUIREMENTS FOR PHYSICAL PROJECTS

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
4.1 Description of the Project			--
1.	The project components, activities and related undertakings.	Volume 2 Section 2.0; Volume 4A	--
2.	The project location and criteria used to determine the route or site.	Volume 2 Section 4.0; Volume 4A	--
3.	How and when the project will be carried out.	Volume 2 Section 2.3; Volume 4B Section 2.0	--
4.	Description of any facilities, to be constructed by others, required to accommodate the proposed facilities.	N/A	N/A
5.	An estimate of the total capital costs and incremental operating costs, and changes to abandonment cost estimates.	Volume 2 Section 2.9	--
6.	The expected in-service date.	Volume 2 Section 1.1; Volume 4B Section 2.1	--
4.2 Economic Feasibility, Alternatives and Justification			
4.2.1 Economic Feasibility			
1.	Describe the economic feasibility of the project.	Volume 2 Section 3.5	--
4.2.2 Alternatives			
1.	Describe the need for the project, other economically-feasible alternatives to the project examined, along with the rationale for selecting the applied for project over these other possible options.	Volume 2 Section 3.0; Volume 8A Section 2.2	--
2.	Describe and justify the selection of the proposed route and site including a comparison of the options evaluated using appropriate selection criteria.	Volume 2 Section 4.0; Volume 8A Section 2.2	--
3.	Describe the rationale for the chosen design and construction methods. Where appropriate, describe any alternative designs and methods evaluated and explain why these other options were eliminated.	Volume 2 Section 4.0; Volume 8A Section 2.2	--
4.2.3 Justification			
1.	Provide a justification for the proposed project	Volume 2 Section 3.4	--

GUIDE A – A.1 ENGINEERING

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
A.1.1 Engineering Design Details			
1.	Fluid type and chemical composition.	Volume 4A Section 3.1.1	--
2.	Line pipe specifications.	Volume 4A Section 3.2.8	--
3.	Pigging facilities specifications.	Volume 4A Section 3.3.1, 3.3.2	--
4.	Compressor or pump facilities specifications.	Volume 4A Section 3.4	--
5.	Pressure regulating or metering facilities specifications.	Volume 4A Section 3.5	--
6.	Liquid tank specifications, or other commodity storage facilities.	Volume 4A Section 3.4	--
7.	New control system facilities specifications.	Volume 4A Section 3.3	--
8.	Gas processing, sulphur or LNG plant facilities specifications.	N/A	N/A
9.	Technical description of other facilities not mentioned above.	N/A	N/A
10.	Building dimensions and uses.	Volume 4A Section 3.3, 3.4, 3.5	--
11.	If project is a new system that is a critical source of energy supply, a description of the impact to the new system capabilities following loss of critical component.	N/A	N/A
A.1.2 Engineering Design Principles			
1.	Confirmation project activities will follow the requirements of the latest version of CSA Z662.	Volume 4A Section 2.2	--
2.	Provide a statement indicating which Annex is being used and for what purpose	Volume 4A Section 2.3	--
3.	Statement confirming compliance with OPR or PPR.	Volume 4A Section 2.1	--
4.	Listing of all primary codes and standards, including version and date of issue.	Volume 4A Section 2, Table 5.1.1	--
5.	Confirmation that the project will comply with company manuals and confirm manuals comply with OPR/PPR and codes and standards.	Volume 4A Section 2.6, Table 5.1.2	--
6.	Any portion of the project a non-hydrocarbon commodity pipeline system? Provide a QA program to ensure the materials are appropriate for their intended service.	N/A – all hydrocarbons	N/A
7.	If facility subject to conditions not addressed in CSA Z662: • Written statement by qualified professional engineer • Description of the designs and measures required to safeguard the pipeline	Volume 4A Section 2.9	--
8.	If directional drilling involved: • Preliminary feasibility report • Description of the contingency plan	Volume 4A Section 2.12	--
9.	If the proposed project involves the reuse of materials, provide an engineering assessment in accordance with CSA Z662 that indicates its suitability for the intended service.	Volume 4A, Section 2.7	--
10.	If new materials are involved, provide material supply chain information, in tabular format.	Volume 4A Section 2.7	
11.	If reuse of material is involved, provide an engineering assessment in accordance with CSA Z662 that indicates its suitability for the intended service.	Volume 4A, Section 2.7	--
A.1.3 Onshore Pipeline Regulations			
1.	Designs, specifications programs, manuals, procedures, measures or plans for which no standard is set out in the OPR or PPR.	--	Existing standards will be followed
2.	A quality assurance program if project non-routine or incorporates unique challenges due to geographical location.	--	No unique challenges
3.	If welding performed on a liquid-filled pipeline that has a carbon equivalent of 0.50% or greater and is a permanent installation: • Welding specifications and procedures • Results of procedure qualification tests	--	Welding on liquid filled pipe will not be conducted

GUIDE A – A.2 ENVIRONMENTAL AND SOCIO-ECONOMIC ASSESSMENT

The following table identifies where information requested in the National Energy Board (NEB) Filing Manual Guide A – A.2 Environmental and Socio-economic Assessment checklist may be found in the various volumes of the Application for the Trans Mountain Expansion Project.

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
A.2.5 Description of the Environmental and Socio-Economic Setting				
1.	Identify and describe the current biophysical and socio-economic setting of each element (*i.e.*, baseline information) in the area where the project is to be carried out.	Volume 5A: ESA - Biophysical • Sections 5.0 and 6.0 Volume 5B: ESA - Socio-Economic • Sections 5.0 and 6.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation • Section 4.2 Volume 8B: Technical Reports	---
2.	Describe which biophysical or socio-economic elements in the study area are of ecological, economic, or human importance and require more detailed analysis taking into account the results of consultation (see Table A-1 for examples). Where circumstances require more detailed information in an ESA see: i. Table A-2 – Filing Requirements for Biophysical Elements; or ii. Table A-3 – Filing Requirements for Socio-economic Elements.	Volume 5A: ESA - Biophysical • Sections 5.0 and 6.0 Volume 5B: ESA - Socio-Economic • Sections 5.0 and 6.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation • Section 4.2 Volume 8B: Technical Reports	---
3.	Provide supporting evidence (*e.g.*, references to scientific literature, field studies, local and traditional knowledge, previous environmental assessment and monitoring reports) for: • information and data collected; • analysis completed; • conclusions reached; and • the extent of professional judgment or experience relied upon in meeting these information requirements, and the rationale for that extent of reliance.	Volume 5A: ESA - Biophysical • Sections 5.0 and 6.0 Volume 5B: ESA - Socio-Economic • Sections 5.0 and 6.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation • Section 4.2 Volume 8B: Technical Reports	---
4.	Describe and substantiate the methods used for any surveys, such as those pertaining to wildlife, fisheries, plants, species at risk or species of special status, soils, heritage resources or traditional land use, and for establishing the baseline setting for the atmospheric and acoustic environment.	Volume 5A: ESA - Biophysical • Sections 5.0 and 6.0 Volume 5B: ESA - Socio-Economic • Sections 5.0 and 6.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation • Section 4.2 Volume 8B: Technical Reports	---
5.	Applicants must consult with other expert federal, provincial or territorial departments and other relevant authorities on requirements for baseline information and methods.	Volume 5A: ESA - Biophysical • Sections 3.0, 5.0 and 6.0 Volume 5B: ESA - Socio-Economic • Sections 3.0, 5.0 and 6.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation • Sections 3.0 and 4.2 Volume 8B: Technical Reports	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
A.2.6 Effects Assessment				
Identification and Analysis of Effects				
1.	Describe the methods used to predict the effects of the project on the biophysical and socio-economic elements, and the effects of the environment on the project (*i.e.*, changes to the Project caused by the environment).	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Technical Reports	Volume 8A: Marine Transportation • Sections 4.3, 5.5 and 5.6	---
2.	Predict the effects associated with the proposed project, including those that could be caused by construction, operations, decommissioning or abandonment, as well as accidents and malfunctions. Also include effects the environment could have on the project. For those biophysical and socio-economic elements or their valued components that require further analysis (see Table A-1), provide the detailed information outlined in Tables A-2 and A-3.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Technical Reports	Volume 8A: Marine Transportation • Sections 4.3, 5.6 and 5.7 Volume 8B: Technical Reports	---
Mitigation Measures for Effects				
1.	Describe the standard and project specific mitigation measures and their adequacy for addressing the project effects, or clearly reference specific sections of company manuals that provide mitigation measures. Ensure that referenced manuals are current and filed with the NEB.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports Volume 6B: Pipeline Environmental Protection Plan (EPP) Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP Volume 6E: Environmental Alignment Sheets Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 2.0, 3.0, 4.0, 6.0, 7.0, and 8.0 • Technical Reports	Volume 8A: Marine Transportation • Sections 4.3, 5.1, 5.3, 5.6 and 5.7 Volume 8B: Technical Reports	---
2.	Ensure that commitments about mitigative measures will be communicated to field staff for implementation through an Environmental Protection Plan.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 6A: Environmental Compliance Volume 6B: Pipeline EPP Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP Volume 6E: Environmental Alignment Sheets Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 2.0, 3.0, 4.0, 6.0, 7.0 and 8.0	Volume 8A: Marine Transportation • Sections 4.3, 5.1, 5.3, 5.6 and 5.7	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
3.	Describe plans and measures to address potential effects of accidents and malfunctions during construction and operation of the project.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 6B: Pipeline EPP Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 2.0, 4.0, 6.0, 7.0 and 8.0	Volume 8A: Marine Transportation • Sections 4.3, 5.1, 5.3, 5.6 and 5.7	---
Evaluation of Significance				
1.	After taking into account any appropriate mitigation measures, identify any remaining residual effects from the project.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0	Volume 8A: Marine Transportation • Section 4.3	---
2.	Describe the methods and criteria used to determine the significance of remaining adverse effects, including defining the point at which any particular effect on a valued component is considered “significant”.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0	Volume 8A: Marine Transportation • Section 4.3	---
3.	Evaluate significance of residual adverse environmental and socio-economic effects against the defined criteria.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0	Volume 8A: Marine Transportation • Section 4.3	---
4.	Evaluate the likelihood of significant, residual adverse environmental and socio-economic effects occurring and substantiate the conclusions made.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0	Volume 8A: Marine Transportation • Section 4.3	---
A.2.7 Cumulative Effects Assessment				
Scoping and Analysis of Cumulative Effects				
1.	Identify the valued components for which residual effects are predicted, and describe and justify the methods used to predict any residual results.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
2.	For each valued component where residual effects have been identified, describe and justify the spatial and temporal boundaries used to assess the potential cumulative effects.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
3.	Identify other physical works or activities that have been or will be carried out within the identified spatial and temporal boundaries for the cumulative effects assessment.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
4.	Identify whether the effects of those physical works or activities that have been or will be carried out would be likely to produce effects on the valued components within the identified spatial and temporal boundaries.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
5.	Where other physical works or activities may affect the valued components for which residual effects from the applicant's proposed project are predicted, continue the cumulative effects assessment, as follows: • consider the various components, phases and activities associated with the applicant's project that could interact with other physical work or activities; • provide a description of the extent of the cumulative effects on valued components; and • where professional knowledge or experience is cited, explain the extent to which professional knowledge or experience was relied upon and justify how the resulting conclusions or decisions were reached.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
Mitigation Measures for Cumulative Effects				
1.	Describe the general and specific mitigation measures, beyond project-specific mitigation already considered, that are technically and economically feasible to address any cumulative effects.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
Applicant's Evaluation of Significance of Cumulative Effects				
1.	After taking into account any appropriate mitigation measures for cumulative effects, identify any remaining residual cumulative effects.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
2.	Describe the methods and criteria used to determine the significance of remaining adverse cumulative effects, including defining the point at which each identified cumulative effect on a valued component is considered "significant".	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
3.	Evaluate the significance of adverse residual cumulative effects against the defined criteria.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
4.	Evaluate the likelihood of significant, residual adverse cumulative environmental and socio-economic effects occurring and substantiate the conclusions made.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
A.2.8 Inspection, Monitoring and Follow-up				
1.	Describe inspection plans to ensure compliance with biophysical and socio-economic commitments, consistent with Sections 48, 53 and 54 of the *NEB Onshore Pipeline Regulations (OPR)*.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 6A: Environmental Compliance Volume 6B: Pipeline EPP Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP	Volume 8A: Marine Transportation • Section 4.3	---
2.	Describe the surveillance and monitoring program for the protection of the pipeline, the public and the environment, as required by Section 39 of the *NEB OPR*.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 6A: Environmental Compliance Volume 6B: Pipeline EPP Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP	Volume 8A: Marine Transportation • Section 4.3	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
3.	Consider any particular elements in the Application that are of greater concern and evaluate the need for a more in-depth monitoring program for those elements.	Volume 5A: ESA - Biophysical • Sections 9.0 and 10.0 Volume 5B: ESA - Socio-Economic • Sections 9.0 and 10.0 Volume 6A: Environmental Compliance Volume 6B: Pipeline EPP (Socio-Economic Management Plan of Appendix C)	Volume 8A: Marine Transportation • Section 4.5	---
4.	For *Canadian Environmental Assessment (CEA) Act, 2012* designated projects, identify which elements and monitoring procedures would constitute follow-up under the *CEA Act, 2012*.	Volume 5A: ESA - Biophysical • Section 10.0 Volume 5B: ESA - Socio-economic • Section 10.0	N/A	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
Table A-1 Circumstances and Interactions Requiring Detailed Biophysical and Socio-Economic Information				
Physical and meteorological environment		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0 and 7.0	N/A	---
Soil and soil productivity		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Soil Assessment Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Section 5.3, 6.0 and 7.0	N/A	---
Water quality and quantity (onshore and marine)		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Groundwater Technical Report • Fisheries (Alberta) Technical Report • Fisheries (British Columbia) Technical Report • Wetland Evaluation Technical Report • Marine Sediment and Water Quality – Westridge Marine Terminal Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Section 7.0 • Quality Ecological Risk Assessment of Pipeline Spills Technical Report	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Ecological Risk Assessment of Marine Transportation Spills Technical Report	---
Air emissions (onshore and marine)		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Marine Air Quality and Greenhouse Gas – Marine Transportation Technical Report • Air Quality and Greenhouse Gas Emissions Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Section 7.0	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Air Quality and Greenhouse Gas Emissions	---
Greenhouse gas emissions (onshore and marine)		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0 and 7.0 Volume 5C: ESA - Biophysical Technical Reports • Air Quality and Greenhouse Gas Emissions Technical Report	Volume 8A: Marine Transportation • Sections 4.2 and 4.3 Volume 8B: Technical Reports • Marine Air Quality and Greenhouse Gas Emissions	---
Acoustic environment (onshore and marine)		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0, and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Acoustic Environment Technical Report	Volume 8A: Marine Transportation • Sections 4.2, 4.3 and 4.4 Volume 8B: Technical Reports • Marine Noise (Atmospheric)	---
Fish and fish habitat (onshore and marine), including any fish habitat compensation required		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Fisheries (Alberta) Technical Report • Fisheries (British Columbia) Technical Report • Marine Resources - Westridge Marine Terminal Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Resources – Marine Transportation Technical Report • Ecological Risk Assessment of Westridge Marine Terminal Spills	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
Wetlands		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Wetland Evaluation Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	N/A	---
Vegetation		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Vegetation Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	N/A	---
Wildlife and wildlife habitat (onshore and marine)		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Wildlife and Wildlife Habitat Technical Report • Wildlife Modeling and Species Accounts Report • Marine Resources –Westridge Marine Terminal Technical Report • Marine Birds – Westridge Marine Terminal Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	Volume 8A: Marine Transportation • Sections 4.2. 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Resources – Marine Transportation Technical Report • Marine Birds – Marine Transportation Technical Report • Ecological Risk Assessment of Westridge Marine Terminal Spills	---
Species at Risk or Species of Special Status and related habitat (onshore and marine)		Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Fisheries (Alberta) Technical Report • Fisheries (British Columbia) Technical Report • Vegetation Technical Report • Wildlife and Wildlife Habitat Technical Report • Wildlife Modeling and Species Accounts Report • Marine Resources –Westridge Marine Terminal Technical Report • Marine Birds – Westridge Marine Terminal Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	Volume 8A: Marine Transportation • Sections 4.2. 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Resources – Marine Transportation Technical Report • Marine Birds – Marine Transportation Technical Report • Marine Transportation Spills Ecological Risk Assessment Technical Report	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
	Human occupancy and resource use (onshore and marine)	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D: ESA - Socio-Economic Technical Reports • Socio-Economic Technical Report • Managed Forest Areas Technical Report • Agricultural Assessment Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Commercial, Recreational and Tourism Use – Marine Transportation Technical Report	---
	Heritage resources	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0 and 7.0 Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Section 6.3.3	N/A	---
	Navigation and navigation safety	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0 and 7.0 Volume 5D: ESA - Socio-Economic Technical Reports • Socio-Economic Technical Report	Volume 8A: Marine Transportation • Section 5.2	---
	Traditional land and resource use	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D: ESA - Socio-Economic Technical Reports • Traditional Land and Resource Use Report • Pipeline and Facilities Human Health Risk Assessment Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Traditional Marine Use Report for Marine Transportation • Marine Transportation Human Health Risk Assessment Technical Report	---
	Social and cultural well-being	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D: ESA - Socio-Economic Technical Reports • Socio-Economic Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0	N/A	---
	Human health and aesthetics	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D: ESA - Socio-Economic Technical Reports • Socio-Economic Technical Report • Community Health Technical Report • Viewshed Modelling Analysis Technical Report • Pipeline and Facilities Human Health Risk Assessment Technical Report Volume 7 Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Qualitative Human Health Risk Assessment of Westridge Marine Terminal Technical Report Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Transportation Human Health Risk Assessment Technical Report • Marine Transportation Spills Human Health Risk Assessment Technical Report	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
	Infrastructure and services	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D: ESA - Socio-Economic Technical Reports • Socio-Economic Technical Report • Community Health Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Commercial, Recreational and Tourism Use – Marine Transportation Technical Report	---
	Employment and economy	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D: ESA - Socio-Economic Technical Reports • Socio-Economic Technical Report • Worker Expenditures Analysis Technical Report	N/A	---

GUIDE A – A.3 ECONOMICS

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
A.3.1 Supply			
1.	A description of each commodity.	Volume 2 Section 3.1.1	--
2.	A discussion of all potential supply sources.	Volume 2 Section 3.3.2	--
3.	Forecast of productive capacity over the economic life of the facility.	Volume 2 Sections 3.3.1, 3.4.1	
4.	For pipelines with contracted capacity, a discussion of the contractual arrangements underpinning supply.	Volume 2 Section 3.3.2	--
A.3.2 Transportation Matters			
Pipeline Capacity			
1.	In the case of expansion provide: • Pipeline capacity before and after and size of increment • Justification that size of expansion is appropriate	Volume 2 Sections 1.1, 2.1, 3.5	--
2.	In case of new pipeline, justification that size of expansion is appropriate given available supply.	N/A – expansion	N/A
Throughput			
1.	For pipelines with contracted capacity, information on contractual arrangements.	Volume 2 Section 3.2.1	--
2.	For non-contract carrier pipelines, forecast of annual throughput volumes by commodity type, receipt location and delivery destination over facility life.	N/A	N/A
3.	If project results in an increase in throughput: • theoretical and sustainable capabilities of the existing and proposed facilities versus the forecasted requirements • flow formulae and flow calculations used to determine the capabilities of the proposed facilities and the underlying assumptions and parameters	Volume 2 Section 3.1	--
4.	If more than one type of commodity transported, a discussion pertaining to segregation of commodities including potential contamination issues or cost impacts.	N/A	N/A
A.3.3 Markets			
1.	Provide an analysis of the market in which each commodity is expected to be used or consumed.	Volume 2 Section 3.4.2	--
2.	Provide a discussion of the physical capability of upstream and downstream facilities to accept the incremental volumes that would be received and delivered.	Volume 2 Section 3.4.2	--
A.3.4 Financing			
1.	Evidence that the applicant has the ability to finance the proposed facilities.	Volume 2 Section 3.2.2	--
2.	Estimated toll impact for the first full year that facilities are expected to be in service.	Volume 2 Section 3.2.1	--
3.	Confirmation that shippers have been apprised of the project and toll impact, their concerns and plans to address them.	Volume 2 Section 3.2.1	--
4.	Additional toll details for applications with significant toll impacts.	Volume 2 Section 3.2.1	
A.3.5 Non-NEB Regulatory Approvals			
1.	Confirm that all non-NEB regulatory approvals required to allow the applicant to meet its construction schedule, planned in-service date and to allow the facilities to be used and useful are or will be in place.	Volume 2 Section 1.5	--
2.	If any of the approvals referred to in #1 may be delayed, describe the status of those approval(s) and provide an estimation of when the approval is anticipated.	Volume 2 Section 1.5	--

GUIDE A – A.4 LANDS INFORMATION

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
A.4.1 Land Areas			
1.	• Width of right-of-way and locations of any changes to width • Locations and dimensions of known temporary work space and drawings of typical dimensions • Locations and dimensions of any new lands for facilities	Volume 2 Section 5.2	--
A.4.2 Land Rights			
1.	The type of lands rights proposed to be acquired for the project.	Volume 2 Section 5.3	--
2.	The relative proportions of land ownership along the route of the project.	Volume 2 Section 5.3.2	--
3.	Any existing land rights that will be required for the project.	Volume 2 Section 5.4	--
A.4.3 Lands Acquisition Process			
1.	The process for acquiring lands.	Volume 2 Section 5.4.1, 5.4.2	--
2.	The timing of acquisition and current status.	Volume 2 Section 5.4.3	--
3.	The status of service of section 87(1) notices.	Volume 2 Section 5.4.4	--
A.4.4 Land Acquisition Agreements			
1.	A sample copy of each form of agreement proposed to be used pursuant to section 86(2) of the NEB Act.	Volume 2 Section 5.4.2	--
2.	A sample copy of any proposed fee simple, work space, access or other land agreement.	Volume 2 Section 5.5.2	--
A.4.5 Section 87 Notices			
1.	A sample copy of the notice proposed to be served on all landowners pursuant to section 87(1) of the NEB Act.	Volume 2 Section 5.4.4, Appendix D	--
2.	Confirmation that all notices include a copy of Pipeline Regulation in Canada: A Guide for Landowners and the Public.	Volume 2 Section 5.4.4	--
A.4.6 Section 58 Application to Address a Complaint			
1.	The details of the complaint and describe how the proposed work will address the complaint.	N/A	N/A

CONCORDANCE TABLE WITH THE *CEA ACT, 2012*

***CEA Act, 2012* Requirement**	**Section in *CEA Act, 2012***	**Application Volume and Section**
The environmental effects of the designated project, including:		
the environmental effects of malfunctions or accidents that may occur in connection with the designated project;	s.19.1(a)	Volume 5A ESA - Biophysical: • Section 7.0 Volume 5B ESA - Socio-economic: • Section 7.0 Volume 7 Risk Assessment and Management of Pipeline and Facility Spills Volume 8A Marine Transportation: • Sections 4.3 and 5.0
any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out;	s.19.1(a)	Volume 5A ESA - Biophysical: • Section 8.0 Volume 5B ESA - Socio-economic: • Section 8.0 Volume 8A Marine Transportation: • Section 4.4
the significance of the effects referred to in paragraph (a);	s.19.1(b)	Volume 5A ESA - Biophysical: • Sections 7.0 and 8.0 Volume 5B ESA - Socio-economic: • Sections 7.0 and 8.0 Volume 8A Marine Transportation: • Sections 4.3 and 4.4
comments from the public – or, with respect to a designated project that requires that a certificate be issued in accordance with an order made under section 54 of the *National Energy Board Act*, any interested party – that are received in accordance with this *act*;	s.19.1(c)	Volume 3A Public Consultation Volume 3B Aboriginal Engagement Volume 3C Landowner Relations Volume 5A ESA - Biophysical: • Section 3.0 Volume 5B ESA - Socio-economic: • Section 3.0 Volume 8A Marine Transportation: • Section 3.0
mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project;	s.19.1(d)	Volume 5A ESA - Biophysical: • Sections 7.0 and 8.0 Volume 5B ESA - Socio-economic: • Sections 7.0 and 8.0 Volume 5C ESA – Biophysical Technical Reports Volume 5D ESA - Socio-economic Technical Reports Volume 6B Pipeline Environmental Protection Plan Volume 6C Facilities Environmental Protection Plan Volume 6D Westridge Marine Terminal Environmental Protection Plan Volume 6E Environmental Alignment Sheets Volume 8A Marine Transportation: • Sections 4.3, 4.4 and 5.0 Volume 8B Technical Reports
the requirements of the follow-up program in respect of the designated project;	s.19.1(e)	Volume 5A ESA - Biophysical: • Section 10.0 Volume 5B ESA - Socio-economic: • Section 10.0
the purpose of the designated project;	s.19.1(f)	Volume 5A ESA - Biophysical: • Section 2.0 Volume 5B ESA - Socio-economic: • Section 2.0 Volume 8A Marine Transportation: • Section 1.1

CONCORDANCE TABLE WITH THE *CEA ACT, 2012*

***CEA Act, 2012* Requirement**	**Section in *CEA Act, 2012***	**Application Volume and Section**
alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alterative means;	s.19.1(g)	Volume 5A ESA - Biophysical: • Sections 2.0 and 4.0 Volume 5B ESA - Socio-economic: • Sections 2.0 and 4.0 Volume 8A Marine Transportation: • Section 2.2
any change to the designated project that may be caused by the environment;	s.19.1(h)	Volume 5A ESA - Biophysical: • Section 7.10 Volume 8A Marine Transportation: • Section 4.3
the results of any relevant study conducted by a committee established under section 73 or 74; and	s.19.1(i)	N/A
any other matter relevant to the environmental assessment that the responsible authority, or, – if the environmental assessment is referred to a review panel – the Minister, requires to be taken into account.	s.19.1(j)	Volume 8A Marine Transportation Volume 8B Technical Reports Volume 8C TERMPOL Reports These volumes take into consideration the *Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities, Trans Mountain Expansion Project* (September 10, 2013) (NEB 2013)
The environmental assessment of a designated project may take into account community knowledge and Aboriginal traditional knowledge.	s 19.3	Volume 5A ESA - Biophysical: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5B ESA - Socio-economic: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C ESA - Biophysical Technical Reports Volume 5D ESA - Socio-economic Technical Reports Volume 8A Marine Transportation: • Sections 4.2, 4.3 and 4.4 Volume 8B Technical Reports
Subsection 5(1) of *CEA Act, 2012* defines environmental effects as a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:		
fish as defined in section 2 of the *Fisheries Act* and fish habitat as defined in subsection 34(1) of that *Act*;	s.5(1)(a)(i)	Volume 5A ESA - Biophysical: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C ESA - Biophysical Technical Reports Volume 8A Marine Transportation: • Sections 4.2, 4.3, 4.4 and 5.0 Volume 8B Technical Reports
aquatic species as defined in subsection 2(1) of the *Species at Risk Act;*	s.5(1)(a)(ii)	Volume 5A ESA - Biophysical: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C ESA - Biophysical Technical Reports Volume 8A Marine Transportation: • Sections 4.2, 4.3, 4.4 and 5.0 Volume 8B Technical Reports
migratory birds as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*, and	s.5(1)(a)(iii)	Volume 5A ESA - Biophysical: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C ESA - Biophysical Technical Reports Volume 8A Marine Transportation: • Sections 4.2, 4.3, 4.4 and 5.0 Volume 8B Technical Reports
any other component of the environment that is set out in Schedule 2.	s.5(1)(a)(iv)	N/A
Subsection 5(1) of the *CEA Act, 2012* defines environmental effects as (b) a change that may be caused to the environment that would occur		
on federal lands,	s.5(1)(b)(i)	Volume 5A ESA - Biophysical: • Section 7.0 Volume 5B ESA - Socio-economic: • Section 7.0
in a province other than the one in which the *act* or thing is done or where the physical activity, the designated project or the project is being carried out, or	s.5(1)(b)(ii)	N/A No changes are anticipated in provinces other than Alberta and BC in relation to the ESA.
outside Canada.	s.5(1)(b)(iii)	Volume 8A Marine Transportation: • Sections 4.3, 4.4 and 5.0
Subsection 5(1) of the *CEA Act, 2012* defines environmental effects as (c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on:		

CONCORDANCE TABLE WITH THE *CEA ACT, 2012*

***CEA Act, 2012* Requirement**	**Section in *CEA Act, 2012***	**Application Volume and Section**
health and socio-economic conditions;	s.5(1)(c)(i)	Volume 5B ESA - Socio-economic: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D ESA - Socio-economic Technical Reports Volume 8A Marine Transportation: • Sections 4.3 and 4.4 Volume 8B Technical Reports
physical and cultural heritage;	s.5(1)(c)(ii)	Volume 5B ESA - Socio-economic: • Sections 5.0, 6.0 and 7.0
the current use of lands and resources for traditional purposes; or	s.5(1)(c)(iii)	Volume 5B ESA - Socio-economic: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D ESA - Socio-economic Technical Reports Volume 8A Marine Transportation: • Sections 4.3 and 4.4 Volume 8B Technical Reports
any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	s.5(1)(c)(iv)	Volume 5B ESA - Socio-economic: • Sections 5.0, 6.0 and 7.0

PIPELINE ENVIRONMENTAL PROTECTION PLAN FOR THE TRANS MOUNTAIN PIPELINE ULC TRANS MOUNTAIN EXPANSION PROJECT

December 2013

ESA-NEB-TERA-00006B

Prepared for:

TRANSMOUNTAIN

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BACKGROUND

Trans Mountain Pipeline ULC (Trans Mountain) is a Canadian corporation with its head office located in Calgary, Alberta. Trans Mountain is a general partner of Trans Mountain Pipeline L.P., which is operated by Kinder Morgan Canada Inc. (KMC), and is fully owned by Kinder Morgan Energy Partners, L.P. Trans Mountain is the holder of the National Energy Board (NEB) certificates for the Trans Mountain pipeline system (TMPL system).

The TMPL system commenced operations 60 years ago and now transports a range of crude oil and petroleum products from Western Canada to locations in central and southwestern British Columbia (BC), Washington State and offshore. The TMPL system currently supplies much of the crude oil and refined products used in BC. The TMPL system is operated and maintained by staff located at Trans Mountain's regional and local offices in Alberta (Edmonton, Edson, and Jasper) and BC (Clearwater, Kamloops, Hope, Abbotsford and Burnaby).

The TMPL system has an operating capacity of approximately 47,690 m^3/d (300,000 bbl/d) using 23 active pump stations and 40 petroleum storage tanks. The expansion will increase the capacity to 141,500 m^3/d (890,000 bbl/d).

The proposed expansion will comprise the following:

- Pipeline segments that complete a twinning (or "looping") of the pipeline in Alberta and BC with about 987 km of new buried pipeline;
- New and modified facilities, including pump stations and tanks; and
- Three new berths at the Westridge Marine Terminal in Burnaby, BC, each capable of handling Aframax class vessels.

The expansion has been developed in response to requests from Western Canadian oil producers and West Coast refiners for increased pipeline capacity in support of growing oil production and access to growing West Coast and offshore markets. NEB decision RH-001-2012 reinforces market support for the expansion and provides Trans Mountain the necessary economic conditions to proceed with design, consultation and regulatory applications.

Application is being made pursuant to Section 52 of the *National Energy Board Act* (*NEB Act*) for the proposed Trans Mountain Expansion Project (referred to as "TMEP" or "the Project"). The NEB will undertake a detailed review and hold a public hearing to determine if it is in the public interest to recommend a Certificate of Public Convenience & Necessity (CPCN) for construction and operation of the Project. Subject to the outcome of the NEB hearing process, Trans Mountain plans to begin construction in the fourth quarter (Q4) of 2015 and go into service in late 2017.

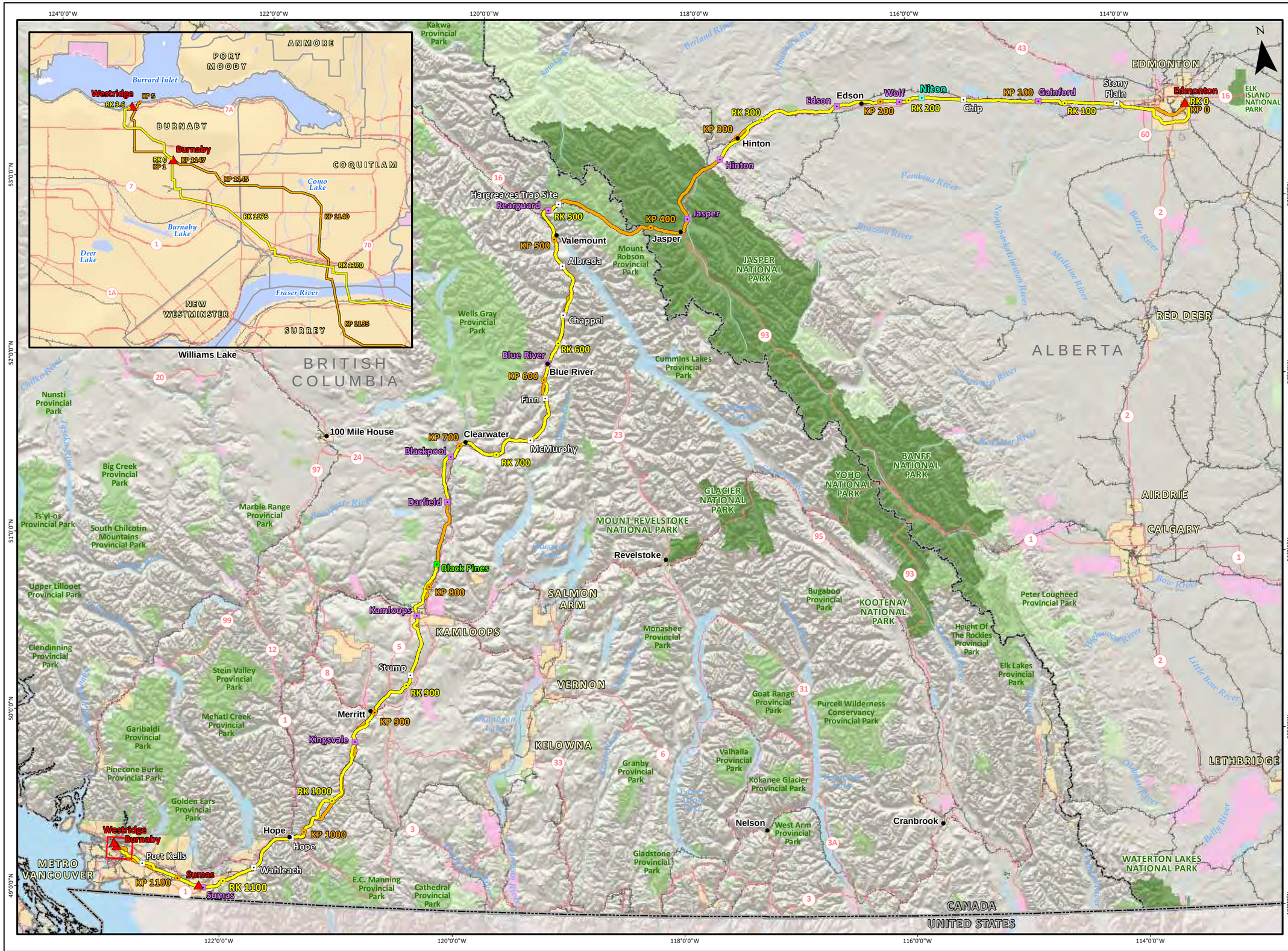
Trans Mountain has embarked on an extensive program to engage Aboriginal communities and to consult with landowners, regulatory authorities (*e.g.*, municipalities), stakeholders and the general public. Information on the Project is also available at www.transmountain.com.

The scope of the Project will involve:

- using existing active 610 mm (NPS 24) and 762 mm (NPS 30) OD buried pipeline segments;
- constructing three new 914 mm (NPS 36) OD buried pipeline segments totalling approximately 987 km:
  - Edmonton to Hinton – 339.4 km;
  - Hargreaves to Darfield – 279.4 km;
  - Black Pines to Burnaby – 367.9 km;

- reactivating two 610 mm (NPS 24) OD buried pipeline segments that have been maintained in a deactivated state:
  - Hinton to Hargreaves – 150 km;
  - Darfield to Black Pines – 43 km;
- constructing two 3.6 km long 762 mm (NPS 30) OD buried delivery lines from Burnaby Terminal to Westridge Marine Terminal (the Westridge delivery lines).

Figure B-1 illustrates the regional location of the TMEP and the existing TMPL system in Alberta and BC.



TRANS MOUNTAIN

FIGURE B-1

PROJECT OVERVIEW
ALBERTA AND BRITISH COLUMBIA

TRANS MOUNTAIN
EXPANSION PROJECT

- Kilometre Post (KP)
- Reference Kilometre Post (RK)
- Trans Mountain Pipeline (TMPL)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Terminal
- Pump Station (Pump Additions, Station Modifications and/or Scraper Facilities)
- New Pump Station (Proposed)
- Pump Station (Reactivated)
- Existing Pump Station
- Highway
- Railway
- City / Town / District Municipality
- Indian Reserve / Métis Settlement
- National Park
- Provincial Park
- Protected Area / Natural Area / Provincial Recreation Area / Wilderness Provincial Park / Conservancy Area
- Provincial Boundary
- International Boundary

Projection: LCC Modified. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: IHS Inc., 2013, BC Forests, Lands and Natural Resource Operations, 2012 & Natural Resources Canada, 2012; Geopolitical Boundaries: Natural Resources Canada, 2003, AltaLIS, 2013, IHS Inc., 2011, BC FLNRO, 2007 & ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010 & IHS Inc., 2011; Hydrology: Natural Resources Canada, 2007 & BC Crown Registry and Geographic Base Branch, 2008; Parks and Protected Areas: Natural Resources Canada, 2012, AltaLIS, 2012 & BC FLNRO, 2008; ATS Grid: AltaLIS, 2009; Edmonton TUC: Alberta Infrastructure, 2011; Canadian Hillshade: TERA Environmental Consultants, 2008; US Hillshade: Copyright:© 2013 Esri

tera ENVIRONMENTAL CONSULTANTS

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

MAP NUMBER 201312_MAP_TERA_ESA_00503_REV0			PAGE SHEET 1 OF 1
DATE December 2013	TERA REF. 7894		REVISION 0
SCALE 1:2,250,000	PAGE SIZE 11x17		DISCIPLINE ESA
DRAWN AJS	CHECKED TGG		DESIGN TGG

0 25 50 75 100 km

ALL LOCATIONS APPROXIMATE

201312_MAP_TERA_ESA_00503_Rev0.mxd

Pipeline

The proposed route of the new pipeline segments is identified along an approximately 150 m wide corridor. Although the proposed pipeline will generally require a construction right-of-way of 45 m, the corridor width varies along the route depending on land use and potential engineering and environmental constraints.

The proposed pipeline corridor will parallel the existing TMPL system right-of-way to the greatest extent feasible considering, among other factors, present land uses and terrain adjacent to the existing TMPL system right-of-way. To further reduce the area of new disturbance, the proposed pipeline corridor will parallel other existing linear disturbances, where feasible.

Information pertaining to the alignment of the proposed pipeline corridor and the location and rationale for deviations is provided in Section 4.0 of Volumes 5A or 5B and Volume 4A.

Approximately 86 automated mainline block valves (MLBVs) will be installed at locations along the pipeline for emergency shutdown and isolation of pipeline segments. Automated MLBVs will be constructed within the operating pipeline right-of-way and most will be sited adjacent to TMPL valves. Many automated MLBVs will be accessed by existing access tracks. However, permanent access roads may be required at yet unspecified locations. Automated MLBVs will require a permanent power source, such as power lines or solar panels. Typically, power lines will only be used when there is a source nearby, thereby reducing disturbance. Otherwise, alternative energy sources such as solar panels, battery banks, thermal-exchange generators and/or nitrogen bottles will be used. Each automated MLBV installation will require a fenced and gravelled operating area of approximately 5 m x 12 m (60 m^2). The exact location of MLBVs and power sources utilized will be determined during detailed engineering design phase of the Project.

Table B-1 summarizes the technical details for the proposed pipeline corridor. Technical details specific to pipeline segments, including the Westridge delivery lines and reactivated pipeline segments, are provided in the following subsections. An overview map of the TMPL system and the proposed pipeline corridor route is shown in Figure B-1 of this EPP.

TABLE B-1

TECHNICAL DETAILS – ALL PIPELINE SEGMENTS

Total Length:	Approximately 987 km	
Length Parallel to TMPL system:	661.6 km (66.8%)	
Length Deviating from TMPL system:	328.9 km (33.2%)	
Total Length Parallel to Existing Rights-of-Way:	221.2 km (22.3%)	
Total Length Deviating from Existing Rights-of-Way:	107.8 km (10.9%)	
Product:	Heavy, synthetic crude oil and diluted bitumen (also be capable of transporting light crude oil and light synthetic oil, if necessary)	
Source Point:	Existing Edmonton Terminal at SW 5-53-23 W4M (RK 0.0)	
Delivery Point:	Existing Burnaby Terminal at a-025-D/092-G-07 (RK 1180.2) and Westridge Marine Terminal at 46-D / 092-G-7 (RK 0.0 [Burnaby Terminal] to RK 3.6)	
Pipe Size:	Edmonton to Hinton Segment	914 mm OD (NPS 36)
	Hargreaves to Darfield Segment	914 mm OD (NPS 36)
	Black Pines to Hope Segment	914 mm OD (NPS 36)
	Hope to Burnaby Segment	914 mm OD (NPS 36)
	Burnaby to Westridge Segment	Two pipelines at 762 mm OD (NPS 30) each
Construction Footprint (typical) (construction right-of-way):	The construction right-of-way will typically be 45 m wide, including an approximately 18 m wide permanent easement. The remainder of the construction right-of-way width will be used as temporary workspace.	
	The construction right-of-way will be narrowed to 15 m or less where specific constraints or limitations are identified, such as parks and sensitive areas, confined valleys, urban areas, adjacent infrastructure or land features and when in proximity to the TMPL system right-of-way.	
Temporary Workspace:	Additional temporary workspace will be necessary at select locations to accommodate construction activities (*e.g.*, road, rail, buried utility line and water crossings; sharp sidebends; tie-ins; and locations where extra depth of cover, deep topsoil, three-lift handling or heavy grading is necessary). Trans Mountain will also acquire temporary workspace for Project construction needs such as stockpile sites, equipment storage sites, shoo-flies, Contractor staging areas, borrow pits and construction work camps.	

TABLE B-1 Cont'd

Minimum Depth of Cover:	0.9 m
Typical Trench Width:	Approximately 2 m
Test Medium:	Water
New Above Ground Line Facilities:	Includes approximately 86 automated MLBVs, scraper traps and a Pressure Regulating Station (pending results of detailed hydraulic studies).

ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Full Name
AARD	Alberta Agriculture and Rural Development
ACIMS	Alberta Conservation Information Management System
AENV	Alberta Environment
AESRD	Alberta Environment and Sustainable Resource Development
AIA	Archaeological Impact Assessment
ALR	Agricultural Land Reserve
ATV	all-terrain vehicle
bbl	barrel
bbl/d	barrels per day
BC	British Columbia
BC CDC	British Columbia Conservation Data Centre
BC MOE	British Columbia Ministry of Environment
BC OGC	British Columbia Oil and Gas Commission
CAP	controlled access point
CAPP	Canadian Association of Petroleum Producers
CAZ	controlled access zone
CCME	Canadian Council of Ministers of the Environment
COP	Code of Practice
CPCN	Certificate of Public Convenience and Necessity
DFO	Fisheries and Oceans Canada
EAP	Enhanced Approval Process
EHS	KMC's Environmental, Health and Safety Management System, as adopted by Trans Mountain for the TMEP
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
ESA	Environmental and Socio-Economic Assessment
HDD	Horizontal Directional Drill
HRIA	Historical Resources Impact Assessment
HSMP	Health and Safety Management Plan
IVM	Integrated Vegetation Management
KMC	Kinder Morgan Canada Inc.
MOC	Management of Change
MSDS	Material Safety Data Sheet
NEB	National Energy Board
NEB Act	*National Energy Board Act*
NEB OPR	*National Energy Board Onshore Pipeline Regulations*
NTZ	No Treatment Zone
OD	outside diameter
PCEM	Post-Construction Environmental Monitoring
PFZ	Pesticide Free Zone
Project	Trans Mountain Expansion Project
QAES	Qualified Aquatic Environmental Specialist
QEP	Qualified Environmental Professional
RAP	restricted activity period
RAZ	restricted access zone
RK	Reference Kilometre Post
SARA	*Species at Risk Act*
SEMP	Socio-Economic Management Plan
TDL	temporary diversion licence
TERA	TERA Environmental Consultants
TMEP	Trans Mountain Expansion Project
TMPL system	Trans Mountain pipeline system
Trans Mountain	Trans Mountain Pipeline ULC
TSS	total suspended solid
TWS	temporary workspace
UTM	Universal Transverse Mercator coordinate system
WQM	Water Quality Monitoring

Abbreviation/Acronym	Full Name
WVMP	Weed and Vegetation Management Plan
ZOI	zone of influence

GLOSSARY

Term	Definition
air quality	A measure of the chemical pollutant loading in the atmosphere. As a measure or metric, it is generally related to human health endpoints, odour thresholds or environmental effects that are developed and regulated by municipal, provincial or federal regulatory authorities. Ambient air quality objectives or standards have been developed to reflect the more stringent effect and measured or predicted levels are commonly compared to these values as a gauge of compliance as well as the degree of quality of the air.
Agricultural Land Reserve	Administered by the Agricultural Land Commission, the Agricultural Land Reserve is a provincial zone in which agriculture is recognized as the priority use and non-agricultural uses are controlled.
Application Pipeline Corridor	The study area to be used to determine the most appropriate area for construction of the proposed right-of-way.
appropriate regulatory authority	The regulator(s) that will be consulted prior to and during construction regarding approvals, notifications, constraints and the direction of activities.
Automated Mainline Block Valves	Enable remotely operated automatic emergency shut-down and isolation of the pipeline along a given segment.
borrow material	Imported, non-native soil, aggregate or consolidated materials that are used during pipeline construction.
Construction Right-of-Way	Right-of-way area comprised of temporary workspace and the permanent easement that is disturbed during construction. Consists of four newly constructed 914 mm OD (NPS 36) pipeline segments from Edmonton to Hinton, Alberta, Hargreaves to Darfield, BC, Black Pines to Hope, BC, and Hope to Burnaby, BC, and one (1) newly constructed pipeline segment containing two pipelines at 762 mm OD (NPS 30) from Burnaby to Westridge.
development zone	The non-vegetated, gravel padded or paved area located within the boundaries of a facility footprint.
droughty soils	Soils with low plant available soil moisture due to light texture or high soil moisture diffusivity that contributes to low sod strength, high soil pulverization and erosion potential.
Environmental Alignment Sheets	A series of maps noting the locations of select environmental features that are encountered by the proposed corridor, associated potential issues and recommended mitigation measures.
Environmental Education Program	A training system that identifies regulations, and Valuable Environmental Components (VEC) that might be encountered throughout TMEP activities. VEC recommendations are discussed, as well as public relations and communication with regard to TMEP activities and the surrounding environment.
Existing Line	Consists of existing and currently active 610 mm (NPS 24) OD pipeline segments from Edmonton to Edson, Alberta, Hargreaves to Darfield, BC and Kamloops to Burnaby, BC and the 762 mm (NPS 30) OD pipeline segment from Black Pines to Kamloops, BC. The Existing Line will also include two deactivated segments from 610 mm (NPS 24) OD segments from Edson, Alberta to Hargreaves, BC and Darfield to Black Pines, BC that will be reactivated.
feasible	Capable of being reasonably accomplished or brought about, given environmental and economic consideration.
Forest District	Subregions or forest land governed by the BC Ministry of Forests, Lands and Natural Resource Operations.
frac-out	A surficial release of drilling fluid during the Horizontal Directional Drilling operation.
Environment, Health and Safety Policy	KMC's EHS Management System which has been adopted by Trans Mountain. This is the formalization of Trans Mountain's commitment to conduct business in a safe and environmentally responsible manner supported through a series of commitments.
Horizontal Directional Drill	A trenchless crossing method allowing for guided installation of a pipeline along a prescribed bore path by using a surface-launched drilling rig having minimal effect on the surrounding area. Commonly used for watercourse or dense infrastructure crossing.
hydrostatic testing	The use of water for pressure testing a pipeline to a pressure of at least 25% greater than the planned operating pressure in order to confirm integrity of the pipeline.
Integrity Dig	Excavations conducted to visually inspect sections of pipe and repair defects, if present.
Kinder Morgan Canada Inc.	Kinder Morgan Canada Inc. is a corporation owned by Kinder Morgan Energy Partners. KMC operates Trans Mountain Pipeline L.P., a general partner of Trans Mountain Pipeline ULC (Trans Mountain).
Lower Mainland Region	Geographic area located approximately west of Hope, BC to Vancouver, BC.
merchantable timber	Timber that will be sold to a timber processor.
Mitigation measures	Measures for the elimination, reduction or control of a project's adverse environmental effects, including restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.
National Energy Board	An independent federal agency established in 1959 by the Parliament of Canada to regulate international and interprovincial pipelines and associated facilities.
non-salvageable timber	Timber and woody debris that will not be used during and after pipeline construction that is disposed of.
Noxious weeds	A plant designated in accordance with the regulations as a Noxious weed and includes the plant's seeds. A person shall control a Noxious weed that is on land the person owns or occupies (*Weed Control Act*).
Pit Development Plan	A plan that specifies the site preparation, excavation and environmental protection measures that would be implemented when developing a new borrow site or extracting material (*e.g.*, gravel, sand) from an existing borrow site.
practical	Capable of or suitable to being put into effect, given environmental and economic consideration.
Prime Contractor	Main company contracted for the coordination, supervision and completion of the Trans Mountain Expansion Project.
Prohibited Noxious weeds	A plant designated in accordance with the regulations as a Prohibited Noxious weed and includes the plant's seeds. A person shall destroy a Prohibited Noxious weed that is on land the person owns or occupies (*Weed Control Act*).
right-of-way	A legally defined strip of land with defined boundaries in which the pipeline runs through properties owned by others.
root zone material	L-H and Ae horizon material and includes Bm and Bf horizons in British Columbia (the upper 15-20 cm of material).

Term	Definition
salvageable timber	Merchantable timber without a market or non-merchantable timber salvaged for use during and after pipeline construction.
shoo-flies	Vehicle and equipment access to the construction right-of-way from each side of a watercourse crossing where vehicle and equipment crossing of the watercourse on the right-of-way is not practical.
topsoil	Ah, Ahe or Ap horizons and in some cases when the B is cultivated, a Bp horizon.
warranted	Justify or necessitate a course of action.

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1.0 INTRODUCTION

Trans Mountain Pipeline ULC (Trans Mountain) is a Canadian corporation with its head office located in Calgary, Alberta. Trans Mountain is a general partner of Trans Mountain Pipeline L.P., which is operated by Kinder Morgan Canada Inc. (KMC), and fully owned by Kinder Morgan Energy Partners, L.P. Trans Mountain is the holder of the National Energy Board (NEB) certificates for the Trans Mountain pipeline system (TMPL system).

The TMPL system commenced operations 60 years ago and now transports a range of crude oil and petroleum products from Western Canada to locations in central and southwestern British Columbia (BC), Washington state and offshore. Trans Mountain currently supplies much of the crude oil and refined products used in BC. The TMPL system is operated and maintained by staff located at Trans Mountain's regional and local offices in Alberta (Edmonton, Edson, and Jasper) and BC (Clearwater, Kamloops, Hope, Abbotsford and Burnaby).

The TMPL system has an operating capacity of approximately 47,690 m^3/d (300,000 bbl/d) using 23 active pump stations and 40 petroleum storage tanks. The expansion will increase the capacity to 141,500 m^3/d (890,000 bbl/d).

The proposed expansion will comprise the following:

- pipeline segments that complete a twinning (or "looping") of the pipeline in Alberta and BC with about 987 km of new buried pipeline;
- new and modified facilities, including pump stations and tanks; and
- three new berths at the Westridge Marine Terminal in Burnaby, BC each capable of handling Aframax and Panamax class vessels.

The expansion has been developed in response to requests from Western Canadian oil producers and West Coast refiners for increased pipeline capacity in support of growing oil production and access to growing West Coast and offshore markets. NEB decision RH-001-2012 reinforces market support for the expansion and provides Trans Mountain the necessary economic conditions to proceed with design, consultation and regulatory applications.

Application is being made pursuant to Section 52 of the *National Energy Board Act* (*NEB Act*) for the proposed Trans Mountain Expansion Project (referred to as "TMEP" or "the Project"). The NEB will undertake a detailed review and hold a public hearing to determine if it is in the public interest to recommend a Certificate of Public Convenience and Necessity (CPCN) for construction and operation of the Project. Subject to the outcome of the NEB hearing process, Trans Mountain plans to begin construction in the fourth quarter (Q4) of 2015 and go into service in late 2017.

Trans Mountain has embarked on an extensive program to engage Aboriginal communities and to consult with landowners, regulatory authorities (*e.g.*, regulatory authorities, and municipalities), stakeholders and the general public. Information on the Project is also available at www.transmountain.com.

The scope of the Project will involve:

- using existing active 610 mm (NPS 24) and 762 mm (NPS 30) OD buried pipeline segments;
- constructing three new 914 mm (NPS 36) OD buried pipeline segments totalling approximately 987 km:
  - Edmonton to Hinton – 339.4 km;
  - Hargreaves to Darfield – 279.4 km; and
  - Black Pines to Burnaby – 367.9 km.

- reactivating two 610 mm (NPS 24) OD buried pipeline segments that have been maintained in a deactivated state:
  - Hinton to Hargreaves – 150 km; and
  - Darfield to Black Pines – 43 km.
- constructing two, 3.6 km long 762 mm (NPS 30) OD buried delivery lines from the Burnaby Terminal to the Westridge Marine Terminal (the Westridge delivery line).

The Pipeline Environmental Protection Plan (EPP) is based on:

- KMC's Environment, Health and Safety (EHS) Management System, as adopted by Trans Mountain (KMC 2012a);
- the Environmental and Socio-Economic Assessment (ESA) - ESA Volumes 5A and 5B of the Project;
- results of the biophysical and engineering field programs completed to date;
- feedback obtained through engagement;
- Trans Mountain's commitments made in the ESA, to regulatory authorities and to the public;
- industry standard/best management documents (*e.g.,* Pipeline Associated Watercourse Crossings (Canadian Association of Petroleum Producers [CAPP] *et al.* 2005), Environmental Handbook for Pipeline Construction (Alberta Environment [AENV] 1988), Environmental Protection and Management Guide (British Columbia Oil and Gas Commission [BC OGC] 2013), etc.; and
- professional experience based upon over 30 years of pipeline planning in western Canada.

Trans Mountain expects that a decision to proceed with construction will lead to the finalization of detailed engineering plans (plans, profiles, books of reference, to be submitted for approval of the NEB) and pre-construction activities, including clearing and infrastructure development up to one year in advance of construction. Pipeline construction will occur over two years, during both summer and winter seasons. The respective season of construction for the various pipeline spreads will depend on terrain conditions and other considerations and will be provided in the final Pipeline EPP. Clean-up and reclamation will proceed as construction spreads are completed. A summary of the construction spreads, season of construction, location and length is provided in Table 1.1-1.

TABLE 1.1-1

PROPOSED PIPELINE CONSTRUCTION SCHEDULE

Pipeline Spread	From (RK)	To (RK)	2016												2017											
			J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Alberta																										
A1	0	49.0																								
A2	49.0	339.4																								
BC																										
BC1	489.6	769.0																								
BC2	811.8	1018.0																								
BC3	1018.0	1078.1																								
BC4	1078.1	1148.0																								
BC5	1148.0	1179.8																								

TABLE 1.1-1 Cont'd

Pipeline Spread	From (RK)	To (RK)	2016												2017											
			J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Special Works																										
Lower Fraser River Crossing (RK 1168)																										
Ledgeview Golf Course Crossing (RK 1119)																										
Burnaby Terminal to Westridge Marine Terminal (RK 0 to RK 3.6)																										

Note: Access and clearing activities may start as early as January 2016 at any given location.

1.1 Purpose

The purpose of the Pipeline EPP is to communicate to field/construction personnel in a clear, concise and user friendly format Trans Mountain's environmental procedures and mitigation measures to be implemented during construction of the pipeline and associated components to mitigate, avoid or reduce potential adverse environmental effects.

Specifically, the Pipeline EPP:

- identifies mitigation measures to be implemented during pipeline and associated components construction activities;
- provides instructions for carrying out construction activities in a manner that will avoid or reduce adverse environmental effects; and
- serves as reference information for the environmental inspection staff to support decision-making and provides direction to more detailed information (*i.e.*, resource-specific mitigation, management and contingency plans, etc.).

1.2 Roles and Responsibilities for Environmental Compliance

The construction and commissioning of the Project is the responsibility of Trans Mountain's Major Projects Group. The Major Projects Group has been assembled to oversee the design and execution of large expansion projects. The roles and responsibilities of the relevant personnel related to environmental compliance are provided below. These roles and responsibilities will be refined once construction plans are further developed.

An organization chart for environmental compliance is provided in Figure 1.2-1 while Table 1.2-1 provides a description of environmental roles and responsibilities.

Figure 1.2-1
Preliminary Environmental Compliance
Organizational Chart for the Construction Right-of-Way

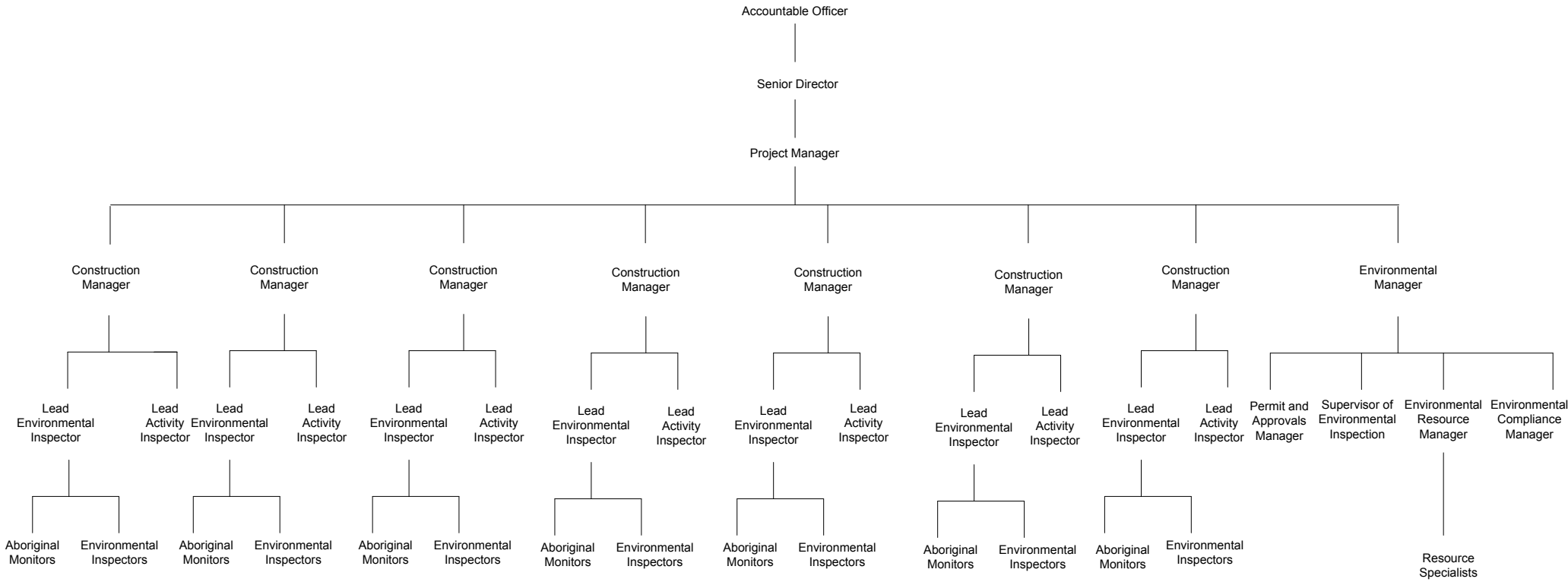

TABLE 1.2-1

ROLES AND RESPONSIBILITIES

Role	Responsibilities
Accountable Officer	• Ensure Trans Mountain has documented polices and goals and continues to be committed to ongoing use of the KMC EHS Management System. • Demonstrate leadership and direction to the environmental program. • Ensure all Trans Mountain and Contractor staff are aware of the Environmental Inspector's environmental responsibilities and receive training appropriate to their roles on the Project. • In coordination with legal services, responsible for the NEB application for "Leave to Open" prior to putting the TMEP pipeline and facilities into service. • Responsible for ensuring applicable conditions of the NEB CPCN are approved.
Senior Director	• Provide leadership and direction to the environmental programs for the Major Projects Group. • Assume ultimate authority for environmental performance for the Major Projects Group. • Ensure there are sufficient, qualified and trained personnel to conduct the Project in an environmentally responsible manner to ensure environmental compliance. • Ensure that NEB CPCN conditions have been met and appropriate environmental authorizations are in place. • Ensure suitable environmental programs (Inspection and Compliance) are in place to ensure commitments are met. • Ensure EPPs, Environmental Alignment Sheets, Environmental Facility Drawings and permits are included in contract bid documents. • Ensure that Contractors have an opportunity to tour environmentally sensitive areas during the bid process. • Ensure environmental compliance audits are implemented and action items for the Project are followed through. • Report on environmental performance to Executives and the Director of EHS. • Ensure Management of Change (MOC) procedures are in place and followed.
Project Manager	• Ensure Contractors understand the EPPs and environmental sensitivities of the Project during contracting process. • Resolve conflicts between construction management and environmental considerations. • Review environmental compliance reports including incident reports and follow-up actions. • Ensure environmental performance and compliance of the Contractors is a topic of discussion at their regularly scheduled meetings. • Ensure environmental responsibilities are integrated in all levels of the Project organization.
Environmental Manager	• Report to the Project Manager on environmental compliance. • Work closely with the Environmental Compliance Manager in implementing the Environmental Compliance Program and Environmental Compliance Plan to ensure environmental approvals and permits for construction are acquired and environmental commitments are met. • Provide overall environmental coordination and communication for the Project. • Work with Senior Directors and Project Manager to ensure sufficient, qualified and trained personnel are in place to implement the Environmental Compliance Program and Environmental Compliance Plan. • Ensure KMC policies and Environmental Manual that have been adopted by Trans Mountain are available and adhered to. • Review Environmental Inspection reports from the Supervisor of Environmental Inspection to evaluate Project resource needs and compliance issues. • Develop and oversee Environmental Education Program for the Project. • Conduct ongoing consultation with regulatory authorities. • Oversee the work of the Environmental Compliance Manager, Permit and Approvals Manager, and Environmental Resource Manager. • Work closely with the Environmental Compliance Manager to evaluate processes to ensure they are working effectively to ensure compliance. • Help to resolve conflicts between construction activities and environmental considerations. • Conduct site visits to ensure inspection and compliance programs are effective. • Assist with training of Environmental Inspector(s) on communications, reporting requirements and permit conditions. • Review weekly compliance report from the Environmental Compliance Manager.

TABLE 1.2-1 Cont'd

Role	Responsibilities
Environmental Compliance Manager	• Report to the Environmental Manager regarding environmental compliance issues. • Develop, maintain and ensure understanding and implementation of the Environmental Compliance Plan. • Coordinate and facilitate environmental compliance audits. • Develop and maintain the environmental commitment tracking table that will be used to develop an issue tracking list that will be used in the environmental as-built report. • Accompany regulatory authorities representatives on field reviews/inspections, where warranted. • Provide advice on interpreting environmental compliance requirements and ensuring compliance with Project specifications and environmental permits. • Use the MOC procedures to approve or deny requests for environmental changes generated in the field. • Receive environmental non-compliance reports and relay information and response actions to internal parties. • Work with KMC's Emergency Response Line to ensure agency notifications are made in cases of reportable incidents (*e.g.*, releases). • Ensure spill reports are completed. • Communicate and address environmental issues raised by regulatory authorities. • Prepare the weekly compliance report for the Environmental Manager and Supervisor of Environmental Inspection. • Report non-compliances and spills to regulatory authorities.
Permit and Approvals Manager	• Oversee all elements of environment permit acquisition and compliance. • Confirm understanding of permit requirements with regulatory authorities and handle any permit-related issues. • Determine if regulatory approval is necessary for substantial changes to mitigation measures. • Work with construction and engineering teams to determine and gather the information necessary to resolve environmental issues and acquire new permits or permit revisions. • Ensure permit binders are kept up-to-date in field offices.
Environmental Resource Manager	• Coordinate the work of the Resource Specialists to handle specific environmental sensitivities. • Plan environmental specialist participation in the construction program. • Ensure schedule windows for fish and wildlife are met. • Ensure appropriate equipment and materials are onsite to assess compliance with commitments.
Supervisor of Environmental Inspection	• Coordinate with Lead Activity Inspector(s) on a daily basis. • Work with Construction manager to resolve onsite conflicts that may occur from time to time between Contractors, technical Inspector(s) and Environmental Inspection on environmental issues. • Communicate clearly and on a timely basis with the Environmental Manager and Environmental Compliance Manager regarding major environmental issues including serious non-compliance events. • Coordinate with the Environmental Manager to ensure appropriate environmental resources are onsite. • Provide a daily summary report to the Project Manager, Environmental Manager and Environmental Compliance Manager on Contractor compliance with Project mitigation requirements, permit conditions and environmental specifications on a daily basis.
Lead Activity Inspector	• Assign environmental inspection activities on a daily basis. • Ensure the construction right-of-way is marked and flagged, as required, prior to construction progressing through sensitive areas. • Liaise with regulatory authorities to address concerns, maintain positive and effective communications with regulatory authority representatives and facilitate agreement in the field. • Communicate clearly and on a timely basis with the Supervisor of Environmental Inspection regarding major environmental issues and non-compliance events. • Have the authority, in consultation with the Environmental Inspector(s), to halt construction during specific non-compliance activities that have potential to have adverse effects on the environment. • Communicate with the Environmental Resource Manager on Resource Specialists, as required, for specific activities and environmentally sensitive areas. • Coordinate with the Environmental Compliance Manager, as needed, on interpretation of permits and compliance issues throughout the Project. • Inspect and document Contractor compliance with project mitigation requirements, permit conditions and environmental specifications on a daily basis. • Oversee environmental training activities for the construction spread. At the daily construction meeting, discuss issues or trends noted in the weekly Environmental Compliance Report prepared by the Environmental Compliance Manager.

TABLE 1.2-1 Cont'd

Role	Responsibilities
Environmental Inspector	• Document environmental compliance and environmental activities on a daily basis and maintain a photographic record. • Responsible for environmental issues resolution, field decision making and reporting. • Coordination with the Construction Manager(s), Lead Activity Inspector(s), construction Contractor representatives and Environmental Inspector(s). • Ensure the Project is constructed in compliance with environmental conditions and requirements contained with the Project Application, environmental specifications, standards and permits through inspection and documentation/photographs. • Have the authority, in consultation with the Lead Activity Inspector(s), to halt construction during specific non-compliance activities that have potential to have adverse effects on the environment. • Inform Lead Activity Inspector(s) daily of the environmental issues in their area. • Work closely with construction Contractor representatives to discuss environmental sensitivities and commitments that must be met. • Assess work areas ahead of construction noting concerns and site-specific issues, site conditions and provide advance notice to the Construction Manager and Lead Activity Inspector(s) to allow proactive planning of the work to avoid adverse effects. • Enforce compliance with environmental legislation, commitments, approvals and permits. • Keep track of issues not immediately resolved by entering them into the Issues Tracking List. • Provide listed issues to the Contractors to resolve in an agreed timeline before they escalate into a non-compliance.
Aboriginal Monitor	• Work with the Environmental Inspector to provide Traditional Knowledge (TK) to the construction program to ensure protection of the environment. • Discuss upcoming traditional and western science elements with the Environmental Inspector to ensure protection and monitoring. • Monitor mitigation success in protecting the environment.
Environment, Health and Safety Department	• Review environment performance. • Ensure maintenance and implementation of the Environmental Management System. • Participate in monthly safety and environmental stewardship meetings to facilitate timely discussion of joint environmental issues and expectations. • The KMC Legal Department will commission environmental compliance audits, which will be coordinated by the EHS Department using the services of a third-party consulting firm to provide the Lead Auditor. Ancillary auditors will be provided by KMC.
Construction Manager	• Ensure compliance with company specifications, permit conditions, construction contracts and applicable codes. • Notify Project Manager and Environmental Manager of changes to Project work schedule as defined in the application or permit using the MOC process. • Actively participate with the Environmental Manager and Environmental Compliance Manager to evaluate and improve environmental compliance. • Coordinate with Lead Activity Inspector(s) on work schedules, environmental sensitivities, environmental resource needs and permit conditions. • Conduct ongoing consultation with regulatory authorities. • Read and understand the Environmental Compliance Plan and provide written acknowledgement. • Conduct Project construction meetings to ensure environmental compliance requirements are coordinated in daily activities.
Technical Inspector	• Understand the environmental commitments associated with construction operations they are tasked with supervising. • Provide support in inspecting for and ensuring compliance with the environmental requirements of their construction activity. • Verify that environmental requirements and requests from Environmental Inspector(s) are carried out by their assigned crews. • Read and understand the Environmental Compliance Plan and provide written acknowledgement.
Engineering Manager	• Ensure construction plans and modifications to Project activities, schedules and issues are communicated in a timely manner to the appropriate personnel within the environment team by using the project MOC process. • Ensure compliance with specifications, permit conditions and construction contracts and applicable codes.
Contractor Supervisors and Foreman	• Review and understand the environmental requirements prior to establishment of contracts and during all phases of construction. • Responsible for conducting the Project in an environmentally responsible manner and incorporating all Project environmental requirements into daily construction activities. • Verify all construction personnel attend environmental orientation prior to work on the construction right-of-way. • Attend environmental education sessions designed for onsite supervisors. • Implement EPP mitigation measures during construction. • Respond to Environmental and Lead Activity Inspector requests during construction to ensure compliance with Project environmental requirements. • Ensure work is performed in compliance with company specifications, contract documents, environmental permit/approval conditions, landowner line lists and applicable codes. • Read and understand the Environmental Compliance Plan and provide written acknowledgement.

TABLE 1.2-1 Cont'd

Role	Responsibilities
Resource Specialist	• Confirm if mitigation objectives have been met and provide feedback to Supervisor of Environmental Inspection and Construction Manager. • Provide input to work plans of specific activities such as watercourse crossings, deterring wildlife from work area and soil handling (handling of specific environmental sensitivities). • Provide input in the event of an unanticipated discovery of valued resources such as a cultural resource site that was not previously mapped. • Assist the Environmental Inspector(s) as needed.

1.2.1 Accountability

The Construction Manager - the Construction Manager hired for the Project will be required to have experience in pipeline planning and construction. The Construction Manager will have an understanding of issues which may be encountered during construction and take a preventative approach rather than a reactive approach to environmental issues. The Construction Manager must have a demonstrated positive attitude toward environmental protection and a track record of successful environmental issue resolution.

The Environmental Manager – is responsible for directing the development and implementation of the environmental components of the Project, including the reinforcement of KMC's EHS Management System as adopted by Trans Mountain, Trans Mountain's environmental management objectives as well as ensuring that environmental commitments are integrated into contract documents and enforced during all phases of construction. The Environmental Manager will: oversee the commitment to attain high standards of environmental compliance; maintain regulatory authority contacts; undertake inspections; and direct environmental inspection services. Incidents including spills, permit infractions and corrective actions will also be monitored by the Environmental Manager.

The Permit and Approvals Manager - will oversee the acquisition and compliance of necessary environmental permits during all phases of construction. The Permit and Approvals Manager will report to the Environmental Manager, and work with the construction and engineering teams to determine the regulatory approvals, new permits, and/or permit revisions that may be necessary in order to resolve environmental issues, or accommodate substantial changes to the mitigation measure.

The Environmental Compliance Manager – is accountable for ensuring environmental compliance during construction of the Project and undertakes periodic audits. All incidents that qualify as being in non-compliance of applicable laws, commitments made by Trans Mountain and/or specific approval conditions by regulatory authorities, will be reported to the Environmental Compliance Manager. The Environmental Compliance Manager will take necessary steps to rectify the situation through appropriate notification of regulatory authorities, implementation of suitable mitigation measures and record keeping of the circumstances that resulted in the non-compliance, remedial measures taken and any recommendations for future monitoring.

The Environmental Inspector(s) – are accountable for inspection and monitoring duties that ensure compliance with local, provincial and federal environmental legislation and regulations, and compliance with permit/approval conditions and the Pipeline EPP. All of the Environmental Inspector(s) will have the authority, in consultation with the Lead Environmental Inspector, to halt construction activities during specific non-compliance activities that have the potential to have adverse effects on the environment. However, the Environmental Inspector(s) will establish a co-operative working relationship with the Construction Manager and provide support in the decision to suspend work in conjunction with the Construction Manager. Regular liaison with appropriate regulatory authorities during construction will be the responsibility of the Environmental Inspector(s).

Responsibilities of the Environmental Inspector(s) will be to ensure that construction activities are conducted in a manner consistent with the Pipeline EPP, environmental commitments and applicable regulations and legislation during all phases of construction. The Environmental Inspector(s) will communicate environmental requirements to field construction management regarding how to comply with these commitments, legislation and regulations within the context of construction activities and

environmental conditions. In the Lower Mainland Region of BC, the Environmental Inspector(s) will have a Professional Agrologist designation with a specialization in soils or have direct access to a Soils Science Professional to ensure soils handling and management mitigation are effectively implemented.

The Environmental Inspector(s) will travel the construction right-of-way to monitor construction activities, record the implementation of mitigation measures and advise the Lead Activity Inspector of the measures the Contractor is to implement to limit environmental disturbance. The Environmental Inspector(s) will keep ahead of construction activities to ensure that all resource-specific environmental features are clearly marked and construction inspection personnel are aware of upcoming issues (*e.g.*, soil conditions, drainages, weeds, rare plant communities, etc.). In addition, the Environmental Inspector(s) will, where warranted, visit sensitive sites with the applicable Lead Activity inspector, Contractor personnel and Resource Specialists to plan construction activities at these sites, ensure Resource Specialists are present, when warranted, and to monitor activities during key construction events/environmental sensitive periods.

To document the environmental inspection process, the Environmental Inspector(s) will generate a daily report that provides a synopsis of the day's activities. The daily reports will record where environmental mitigation measures were successful, recommendations and actions taken on major decisions such as wet conditions shut-down, procedures implemented in the case of unforeseen environmental issues or discoveries, non-compliance and conflicting permit/approval requirements. Unresolved issues or items identified for future follow-up will be documented/recorded. The daily reports will allow pertinent environmental information from the field to be provided to the Project management team at the corporate level to allow for prompt responses by Trans Mountain when warranted (*e.g.*, non-compliance issues). At the completion of the Project, the Environmental Inspector(s) will be responsible for contributing to the completion of an as-built report.

The Lead Activity Inspector – is in charge of all Activity Inspector(s) and providing them direction and supervision throughout the pipeline construction work. The duties and responsibilities of the Lead Activity Inspector requires knowledge and experience in all phases of pipeline inspection. The Lead Activity Inspector acts as a client representative to monitor compliance with all provisions of various permits from regulatory authorities, including personal contact with designated officials from the appropriate regulatory authority. The Lead Activity Inspector will supervise all phases of the field quality control and technical staff assigned to the project to observe adherence to client company's construction contract drawings and specifications. Furthermore, the Lead Activity Inspector will delegate responsibilities and define limits of authority to each Activity Inspector. The Lead Activity Inspector will ensure all members of the inspection team know their respective duties.

The Resource Specialists – are responsible to ensure that the mitigation objectives are met. The Resource Specialist will report to the Supervisor of Environmental Inspection, and assist the Environmental Inspector(s) as requested. The Resource Specialist will provide input to activity work plans that may affect specific resources, or in the event of an unanticipated discovery of a valued resource.

1.2.2 Decision-Making Process

The Environmental Inspector(s) will work with others to collectively consider the following criteria when deciding which protection measures and/or procedures to implement during construction of the pipeline and, where warranted, implement the MOC process outlined in Section 3.0:

- site conditions at the time of construction (*e.g.,* slope gradient and aspect, soil texture, frozen/non-frozen soil conditions, etc.);
- weather conditions at the time of construction (*e.g.,* wind, precipitation forecast, air temperature, etc.);
- permit/approval conditions;
- options available as identified in the Pipeline EPP;
- equipment and/or materials availability at the time of construction;

- consultation with geotechnical and civil engineers, drainage specialists and soils specialists;
- Contractor experience with conducting specific construction techniques;
- inspection staff experience with implementing applicable protection measures and/or procedures; and
- applicable EHS management system.

1.2.3 Emergency Response Plans

To comply with the systematic Safety Management Program approach as from Section 47 of the *National Energy Board Onshore Pipeline Regulations* (*NEB OPR*), an Emergency Response Plan (ERP) will be developed and implemented for TMEP construction. The TMEP ERP for construction will be separate from, and complementary to, the Trans Mountain operations ERP and will lay out the guidelines for the development of the prime contractors' detailed Site Specific ERPs. The TMEP ERP for construction will address legislative requirements and be based on recognized industry standards of practice.

The Site-Specific ERPs will address potential construction emergency situations requiring response by TMEP construction resources (as supplied by the Prime Contractors), Trans Mountain operations resources, or external resources, in keeping with the philosophy of using the most immediately available resources. It is expected that the Site-Specific ERPs will address personal injury or health incidents, environmental damage, fires, floods, earthquakes, rock slides, avalanches, sabotage, trespass, and other emergency situations that may arise in the context of construction. The Site-Specific ERPs will consider the contractors' risk assessments (Section 5.1.2 of Volume 4B) completed as part of an employer's duty to ensure that the health and safety of every employee is protected required by Section 124 of the *Canada Labour Code.* The Site-Specific ERPs will identify emergency response roles and responsibilities and the detailed procedures, including notifications, to be followed in the event of various types of emergencies.

Regular audits will be conducted on the Site-Specific ERPs to provide assurance that they will function effectively in case of emergencies.

2.0 ENVIRONMENTAL PROTECTION PLAN ORGANIZATION

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

2.1 Organization

The Pipeline EPP identifies the potential and reclamation measures that may be implemented during detailed design, pre-construction, construction, and post-construction activities on the pipeline and contingency plans to address potential effects, events or conditions that may arise during construction. Management plans (see Appendix C) will describe the specific environmental management procedures that may apply to ongoing, planned events associated with construction. In addition, the Pipeline EPP outlines environmental inspection and construction inspection roles and responsibilities during and following construction.

The Pipeline EPP applies to the construction right-of-way, temporary workspace (TWS), temporary access roads and shoo-flies, pipe storage areas, staging areas, construction yards, construction camps and borrow sites.

Potential environmental mitigation measures are identified under the heading "Potential Mitigation Measures" by "Activity/Concern" in accordance with the progression of construction activities, and are intended to be read in conjunction with the Environmental Alignment Sheets. The Environmental Alignment Sheets (provided in Volume 6E) and resource-specific mitigation tables for environmental resources and issues, as provided in Appendices E through Q, identify specific locations where mitigation measures are to be implemented during pipeline construction.

The Pipeline EPP provides Trans Mountain, its Contractors and personnel with an understanding of the general environmental and socio-economic (see Socio-Economic Management Plan [SEMP] in Appendix C) background of the construction right-of-way, the extent and limitations of the EPP, information to identify specific or unique mitigation measures to be implemented to address environmental and socio-economic issues associated with pipeline construction and general mitigation measures or industry-accepted standards and procedures that are typically applied to a pipeline project. These measures are generally provided in accordance with the sequence of construction of the pipeline or grouped by Project component.

Section 1.0 Introduction provides an introduction to the Project, outlines the purpose of the Pipeline EPP and provides an overview of roles and responsibilities.

Section 2.0 Environmental Protection Plan Organization provides details on the layout and general scope and limitations of the Pipeline EPP.

Section 3.0 Environmental Compliance provides information regarding the tools, decision-making processes and documentation to facilitate compliance with all legislation, regulatory approvals, permits, commitments and the specific requirements set forth in the Pipeline EPP.

Section 4.0 Notification of Interested Parties provides details pertaining to specific activities to be followed to ensure all relevant regulatory authorities, Aboriginal communities, landowners and applicable interested parties are properly notified prior to commencing pipeline construction activities or, as warranted, during the construction period.

Section 5.0 Environmental Overview provides a brief overview of the environmental setting of the construction right-of-way, unique environmental concerns that require specific and unique mitigation measures, and permits and authorizations that may be necessary prior to commencing pipeline construction.

Section 6.0 Pre-Construction Activities outlines the mitigation measures that may be implemented prior to commencement of construction activities of the pipeline and associated components. These measures include: delineations of the pipeline construction right-of-way; TWS and all access including shoo-flies; identification and marking of environmental resources; underground utilities; and pre-construction vegetation management of weed infested lands.

Section 7.0 General Pipeline Construction Mitigation Measures provides an overview of the general measures that may be implemented during the construction phase of the pipeline in all work areas.

Section 8.0 Pipeline Activity-Specific Construction Mitigation Measures outlines the potential mitigation measures that may be implemented during each activity phase of pipeline construction. This section includes: clearing and disposal; topsoil/root zone materials handling and grading; stringing, welding, trenching and lowering-in; backfilling; hydrostatic testing; construction clean-up and reclamation and water crossings.

Section 9.0 Access Roads outlines the specific mitigation measures associated with access roads (including shoo-flies), vehicle crossings, snow/ice roads, drainage and erosion control, access closure and culverts, and construction clean-up that will be implemented during and immediately following construction.

Section 10.0 Temporary Construction Camps outlines the specific mitigation measures associated with construction camps, camp waste, camp facilities, fuel storage facilities and construction clean-up that will be implemented during and immediately following construction.

Section 11.0 Borrow Sites outlines the specific mitigation measures associated with borrow sites including site preparation, excavation, dust control and construction clean-up that will be implemented during and immediately following construction.

Section 12.0 Ancillary Sites outlines the specific mitigation measures associated with ancillary sites such as pipe storage areas and Contractor yards (*e.g.*, construction staging, material storage, equipment rig-up and marshalling areas, setting up temporary construction trailers, fabrication work, safety and environmental training).

Section 13.0 References lists the sources and reference material used to create the mitigation measures and strategies cited in the Pipeline EPP.

Appendices to the Pipeline EPP include the following:

- Checklist (Appendix A) tracks commitments and approval conditions within the Pipeline EPP for construction.
- Contingency Plans (Appendix B) provides measures to mitigate potential environmental effects that are not anticipated to occur during construction activities.
- Management Plans (Appendix C) provides additional description to measures outlined in the EPP that are anticipated to occur during construction activities.
- Contacts (Appendix D) provides the contact information of the appropriate regulatory authorities that will be consulted during planning and construction of the pipeline.
- Resource-Specific Mitigation Tables provide site-specific mitigation for:
  - Terrain Features (Appendix E);
  - Soils (Appendix F);
  - Hydrology (Appendix G);
  - Water Quality (Appendix H);
  - Aquatic Resources (Appendix I);
  - Vegetation (Appendix J);
  - Wetlands (Appendix K);

  - Wildlife and Wildlife Habitat Features (Appendix L);
  - Heritage Resources (Appendix M);
  - Socio-Economic and Agricultural (Appendix N);
  - Air Quality (Appendix O);
  - Noise (Appendix P);
  - Traditional Land Use (Appendix Q);
- Drawings (Appendix R) illustrate and describe general mitigation outlined in the EPP.
- Details (Appendix S) describe site-specific mitigation to be implemented during Pipeline construction.

Environmental alignment sheets are provided in Volume 6E. Information provided in the appendices is designed to support the specific mitigation measures identified throughout the Pipeline EPP and provide guidance to decision-making processes, should conditions arise that warrant implementation of remedial or contingency measures. Note the resource-specific mitigation provided in these appendices is outlined in the technical reports developed by the respective Resource Specialists in support of the ESA.

2.2 Limitations of the Pipeline Environmental Protection Plan

The Pipeline EPP has been prepared to address construction activities during frozen and non-frozen soil conditions. There may be a need to revise specific measures as a result of ongoing regulatory consultation and Aboriginal engagement, revisions to the scope of pipeline construction as determined through detailed engineering or to address unforeseen resource-specific conditions that may arise during construction. If this were to occur, Trans Mountain will resolve the issue with the Construction Manager, Lead Environmental Inspector, Lead Activity Inspector and the Environmental Inspector(s) in consultation with the appropriate regulatory authority and resource specialists (*e.g.,* wildlife biologist) in accordance with the process outlined in Section 3.0. The resolution and/or revision will be documented using the MOC Process and approved by the appropriate parties.

3.0 ENVIRONMENTAL COMPLIANCE

Introduction

Environmental compliance is facilitated through sharing of information, providing orientations/training, hiring qualified staff, and providing onsite inspection of activities through a proactive and adaptive inspection program. The following measures will be implemented to ensure environmental compliance during construction of the pipeline and associated components (*e.g.*, access roads, temporary construction camp, borrow sites and ancillary sites).

Objective

The objective of environmental compliance management is to ensure that:

- plans, procedures and appropriately trained personnel are in place to facilitate construction of the pipeline and associated components by implementing industry-accepted standards and procedures suitable for the conditions and in accordance with applicable laws and approval/permit conditions;
- systems and processes are in place that allow Trans Mountain and its Contractors to access Project environmental information to aid in decision-making at the field level; and
- the Environmental Inspector(s) and Resource Specialists hired for the Project are qualified and properly trained.

Company Measures

The following measures are the responsibility of Trans Mountain.

Activity/Concern		Preparation Measures
EPP and Contract	1.	The Pipeline EPP will form part of the contract documents. Should any conflict in contract and EPP requirements arise, the more stringent condition will apply.
EPP and Distribution	2.	Controlled copies of the terrestrial EPP and associated environmental documents will be required to be reviewed by key construction and Contractor personnel prior to construction and will be available to all key facilities construction and Contractor staff members during construction.
	3.	The EPP will be a controlled document in accordance with Trans Mountain's document control procedures. Trans Mountain will create a master document register for the EPP that identifies the controlled copy number, ownership of the document and the current version number. Send revisions, if warranted, to the controlled copy holders (*e.g.,* regulatory authorities) with instructions on replacement and destruction of previous versions. The EPP will be controlled by section, which will facilitate the insertion and replacement of updated materials.
Environmental Alignment Sheets	4.	The Environmental Alignment Sheets will provide additional background information regarding environmental requirements and will be complementary to and will be used in conjunction with the Construction Alignment Sheets.

Activity/Concern	Preparation Measures
Communication	5. The Environmental Inspector(s) will facilitate the transfer of environmental information and information updates to all identified Trans Mountain field staff and the Contractor in a timely manner. 6. Communication with environmental regulatory authority representatives, should any issues arise, will be the responsibility of the Environmental Inspector(s) and the Construction Manager or the Project Environmental Manager. 7. Keep a complete set of environmental documents for each pipeline construction spread at Trans Mountain's construction field office. 8. Assign individuals to prepare and deliver environmental orientation presentations to appropriate regulatory authorities and Contractor staff, as directed by the Construction Managers and the Project Environmental Manager. 9. Facilitate the transfer of environmental information and information updates (*e.g.,* construction schedule changes), as warranted, immediately to landowners, Aboriginal communities and stakeholder groups.
Consequence of Worker Non-Compliance	10. Those who show careless or wanton neglect of the environment or disregard the mitigation measures outlined in the Pipeline EPP will be subjected to appropriate disciplinary measures including, if appropriate, removal from the work site and/or dismissal.
Approvals, Licenses and Permits	11. Trans Mountain will work with regulatory authorities to determine the necessary approvals, licences and permits needed for construction of the pipeline or associated components prior to the commencement of the permitted activity on any given pipeline spread. The Contractor(s), subcontractors and the Environmental Inspector(s) will be provided with copies of all approvals/licenses and permits including the most recent updates and revisions, and will comply with all conditions presented to Trans Mountain. Trans Mountain will resolve any inconsistencies between approval/permit conditions and contract documents prior to commencement of the construction activity.
Listed or Sensitive Species	12. Where listed or sensitive species are discovered during future vegetation and wildlife habitat studies conducted along the construction right-of-way, TWS, access roads, ancillary sites, construction camps and borrow sites or during construction of pipeline and associated components, implement the Rare Ecological Community and Rare Plant Population Management Plan (see Appendix C) or the Wildlife Species of Concern Discovery Contingency Plan (see Appendix B). 13. Report sightings of sensitive species or species at risk to the Environmental Inspector(s) and Construction Manager. Trans Mountain will implement specific protection measures and report sightings and mitigation in daily reports. 14. Refer to the environmental resource-specific mitigation tables for vegetation and wildlife and wildlife habitat sensitive resource features provided in Appendices J and L, respectively.

Activity/Concern	Preparation Measures
Pre-Job Meeting	15. Prior to the commencement of construction on each pipeline construction spread, a pre-job meeting will be held with the engineering, environmental, community relations staff, the Environmental Inspector(s) and the Contractor. Key regulatory authority and Aboriginal community representatives will be invited. The objectives of the pre-job meeting will be to: • review environmental and socio-economic issues at the site and surrounding area; • review key mitigation measures and contingency plans; • review Trans Mountain's commitments; • review approvals, licenses and permits; • review rules, legislation, regulations and Project policies; and • address any outstanding concerns.
Environmental Inspector(s) - Qualifications	16. Trans Mountain will hire Environmental Inspector(s) with experience in pipeline construction and/or environmental inspection. The Environmental Inspector(s) will have an understanding of pipeline construction techniques and take a preventative approach rather than a reactive approach to environmental issues. The Environmental Inspector(s) must have a demonstrated positive attitude toward environmental protection and a track record of successful environmental issue resolution. In addition, the Environmental Inspector(s) will be supported by appropriate Resource Specialists, as needed, who will have expertise in a particular resource feature associated with the Project (*e.g.,* geotechnical engineer, fisheries biologist, botanist, wildlife biologist, reclamation specialist, soils and drainage specialists).
Lead Environmental Inspector and Environmental Inspector(s) Responsibilities	17. The Environmental Inspector(s) are responsible to ensure that all environmental and socio-economic commitments, undertakings and conditions of permits/approvals are met and that work is completed in compliance with applicable environmental legislation, Trans Mountain's policies, procedures, industry-accepted standards, procedures and specifications in the most efficient and effective manner feasible. 18. Prior to the commencement of construction, the Environmental Inspector(s) will review the Contractor's preliminary grade plan to ensure environmental resources (*e.g.,* rare plants, archaeological sites, etc.) are not compromised as a result of construction right-of-way preparation activities. 19. The Environmental Inspector(s) will provide advice on decisions or courses of action to deal with unexpected environmental matters (*e.g.,* a decision to shut-down construction due to wet/thawed soils). 20. The Environmental Inspector(s) will have the authority, in consultation with the Lead Environmental Inspector, to halt construction activities during specific non-compliance activities that have the potential to have a negative effect on the environment. 21. The Environmental Inspector(s) will prepare, collect, organize and disseminate all environmentally-related information and documentation that arises during construction and will be responsible for the preparation of daily reports. 22. The Environmental Inspector(s) will liaise with appropriate regulatory authorities, the Aboriginal Monitors assigned to the Project in co-operation with the Construction Manager and the Project Environmental Manager.

Activity/Concern	Preparation Measures
Lead Environmental Inspector and Environmental Inspector(s) Responsibilities (cont'd)	23. The Environmental Inspector(s) will supervise environmental Resource Specialists that may be required to support the Project. 24. The Environmental Inspector(s) will organize onsite meetings as requested by the Construction Manager and as the need arises, to address resource-specific issues as well as review construction methodologies with the Construction Manager.
Environmental Training and Orientation Program	25. An Environmental Education Program (Level ll and lll training) will be developed and implemented by the Trans Mountain Environmental Team to ensure that all Trans Mountain staff and Contractors will be informed of the environmental and socio-economic requirements and sensitivities regarding the Project prior to arrival on the pipeline construction right-of-way, ancillary sites or associated component sites. Environmental training will include, at a minimum, the following: • the identification of sensitive features and valuable environmental components; • the process to follow should a sensitive environmental feature be located and/or disturbed during construction; • initial response should a spill of any controlled substance occur; • the expectation that speed limits and signage, flagging and/or fences delineating the environmental features shall be respected at all times; and • the established protocol for wildlife encounters. 26. An Environmental Orientation will be developed and presented to ensure compliance with Trans Mountain requirements to ensure that all Trans Mountain staff and Contractors and visitors working at or visiting sites will be informed of environmental, socio-economic and community relation requirements and sensitivities regarding the Project prior to arrival on the pipeline construction right-of-way, ancillary sites or associated component sites. 27. This Environmental Orientation will be integrated with other Project policies/measures designed to manage potential Project-related socio-economic effects, particularly those related to worker interactions at the community level (see Sections 4.2, 4.3 and 4.4 of the SEMP for discussion of these mitigation measures, code of conduct and expectations for behaviour). 28. The Project Environmental Manager will ensure the Environmental Education Program/Project Orientation presentations are consistent in all areas with respect to policies, agreements, and applicable legislation and regulations. 29. Prior to the commencement of construction on each spread, environmental training sessions (as part of the Environmental Education Program) will be held to address various environmental conditions to be dealt with during construction (*e.g.,* frozen/non-frozen soils) in biophysical regions (*e.g.,* parkland, mountainous, urban). 30. Multiple environmental training sessions may be required as different Contractor personnel arrive on the Project site (*e.g.,* earth works, testing). 31. The Lead Environmental Inspector and Environmental Inspector(s) will be hired prior to the commencement of construction with sufficient lead time to enable training and participation in the orientation of other construction staff and in time to allow full review and understanding of the Pipeline EPP.

Activity/Concern	Preparation Measures
Environmental Training and Orientation Program (cont'd)	32. The Lead Environmental Inspector and Environmental Inspector(s) will complete a Level II and Level III of the Environmental Education Program. 33. During Level III training, the Environmental Inspector(s) will be briefed by the Project Environmental Manager and/or the Environmental Compliance Manager, as well as environmental consultants, on the environmental processes, decisions and agreements that have taken place to date. 34. The Environmental Inspector(s) will review all Project-related environmental information. 35. Additional training and tailgate meetings will be held on an ongoing basis.
Contractor Supervisory and Inspection Staff Environmental Training	36. A Level II Environmental Education Program will be delivered to the Contractor supervisory and inspection staff by Tran Mountain's Environmental Inspection Team prior to construction.
Contractor General Staff Orientation	37. An Environmental Orientation will be developed and presented to ensure compliance with Trans Mountain requirements to ensure that all Trans Mountain staff and Contractors and visitors working at or visiting sites will be informed of environmental, socio-economic and community relation requirements and sensitivities regarding the Project prior to arrival on the pipeline construction right-of-way, ancillary sites or associated component sites.
Regulatory and Aboriginal Community Representatives	38. Regulatory representatives and Aboriginal community representatives will be invited to attend the Level II training sessions or, if necessary or requested, separate presentations will be provided.
Resource Specialists	39. The Resource Specialists will provide advice on mitigation measures for field issues and environmental resource features based on their specific areas of expertise. These areas of expertise include, but are not limited to: geohazards, soils, fish, watercourse crossings, archaeology, palaeontology, rare plants, reclamation and wildlife.
Non-Compliances and Resolution	40. The Environmental Inspector(s) will be notified by the Lead Activity Inspector or equivalent responsible person onsite when a non-compliance is identified and will contact the Construction Manager. If the Construction Manager is not available during a non-compliance situation, the Environmental Inspector(s) will investigate the non-compliance, provide corrective direction or, where warranted, initiate work stoppage. 41. The Construction Manager will make a determination to either modify the work practice or shut the activity down until conditions improve. The Environmental Inspector(s) will assist in this decision-making process. 42. If the work is shut-down, it will resume only when conditions improve. Once approved by Trans Mountain, the Contractor will inform the work crew and work will proceed following the corrective action plan. 43. All non-compliances will be documented on the appropriate non-compliance forms and, if appropriate, the report will be supplemented with photographs. The Environmental Inspector(s) will be responsible for documenting all environmental non-compliances and reporting to the Environmental Manager within 24 hours.

Activity/Concern	Preparation Measures
Decision-Making Criteria	44. The Environmental Inspection Team and the Contractor will consider the following criteria when deciding which protection measure(s) and/or procedures to implement during the construction of the pipeline and associated components: • site conditions at the time of construction (*e.g.,* slope gradient and aspect, soil texture, soil moisture, frozen/non-frozen soil, 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. 45. In the event that an unforeseen environmental issue arises during construction for which no mitigation measures have been approved, Trans Mountains' Construction Manager or designate, the Environment Manager and the Environmental Inspector(s) will formulate a plan of action in consultation with the appropriate regulatory authorities.

Management of Change

During the course of construction, it may be necessary to modify or create new procedures to address site conditions not previously identified in the Pipeline EPP. The following measures outline the process for the development or modification of procedures.

Activity/Concerns	Preparation Measures
Change Management	46. The Lead Environmental Inspector, the Environmental Inspector(s), the Lead Activity Inspector and the Construction Manager will be contacted if site conditions warrant a change in procedure that may have environmental implications. 47. The Construction Manager and the Project management team including engineering, Resource Specialists, and/or other expertise, as appropriate, will modify procedure(s) where warranted. 48. The modification to the procedure(s) may include one or more of the following: • change to specific procedure (*e.g.,* soil handling, etc.); • location (*e.g.,* site description); • rationale for change; • environmental criteria reviewed as part of modification request; • consideration of environmental objectives; • equivalent or approved standard of mitigation; • additional environmental mitigation measures required; • contract extra cost as a result of procedure change; • site sketch; and • approval by the Construction Manager and a representative of the Project management team.

Activity/Concerns	Preparation Measures
Change Management (cont'd)	49. Changes to an existing procedure will be discussed with the appropriate regulatory authorities, stakeholders and Aboriginal community representatives and the appropriate authorization will be acquired, should the revised procedures require further regulatory approval. 50. The resolution and/or revision will be documented and communicated to the appropriate parties.
Post-Construction Documentation	51. Environmental information (*e.g.,* erosion concerns or natural drainage patterns) will be collected throughout construction for post-construction documentation and assessment of the effectiveness of the procedures/measures used which can aid or inform the decision-making process.

4.0 NOTIFICATION OF INTERESTED PARTIES

Introduction

Notification of the construction schedule and timing of specific construction activities will facilitate awareness of upcoming activities, and allow appropriate regulatory authorities, municipal/regional authorities, Aboriginal communities, landowners and other applicable interested parties to plan as appropriate for construction activities in the area of interest. The following measures will be implemented to ensure notification of interested parties for construction of the pipeline and associated components (*e.g.,* access roads, temporary construction camps, borrow sites ancillary sites).

Objective

The objective of notification of interested parties is to ensure:

- interruptions to other land use activities are limited during construction of pipeline and associated components;
- applicable interested parties are aware of pipeline and pipeline-related construction activities; and
- appropriate regulatory authority representatives are kept informed throughout construction of the pipeline and associated components.

Company Measures

The following measures are the responsibility of Trans Mountain.

Contacts		Notification Measures
Municipal Authorities	1.	Notify the appropriate municipal regulatory authority prior to the anticipated construction schedule a minimum of 30 working days prior to construction (see Appendix D). Contact will be maintained until Project completion.
	2.	Inform all appropriate municipal resource agencies of the Project developments, as warranted.
Provincial Authorities	3.	Notify the appropriate provincial regulatory authority of the anticipated construction schedule a minimum of 15 working days prior to construction (see Contacts provided in Appendix D). Contact will be maintained until Project completion.
	4.	Notify Alberta Environment and Sustainable Resource Development (AESRD) upon entry to Crown lands to acquire confirmation numbers prior to conducting activities on Crown lands, as required by Crown disposition approval conditions.
	5.	Notify the Fisheries and Oceans Canada (DFO) Federal authority (see Appendix D) if instream blasting at water crossings to determine if approval is necessary.
	6.	Notify the Director a minimum of 14 days prior to any work on a water crossing in Alberta, in accordance with the *Code of Practice for Watercourse Crossings* (Government of Alberta 2013a) and the *Water (Ministerial) Regulation*. Notify the Regional Director within 24 hours in the event of a contravention of the above Code of Practice (COP).
	7.	Notify the District Approvals Manager a minimum of 14 days prior to commencement of water crossing construction in Alberta. Notify the Director within 24 hours in the event of a contravention of the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (Government of Alberta 2013b).

Contacts		Notification Measures
Provincial Authorities (cont'd)	8.	Determine if a temporary diversion licence (TDL) is necessary from AESRD or appropriate authority if water withdrawal for pressure testing will exceed 30,000 m^3, in Alberta (Government of Alberta 1999). Adhere to all conditions of the TDL.
	9.	Inform all appropriate provincial resource agencies, including Crown land authorities of the Project developments, as warranted.
Federal Authorities	10.	Notify the NEB prior to the anticipated construction schedule a minimum of 14 working days prior to construction (see Appendix D). Contact will be maintained until Project completion.
	11.	Notify the DFO Impact Assessment Biologists a minimum of 14 days prior to the commencement of water crossing construction, in accordance with the applicable Operational Statements (DFO 2008a,b,c,d). Refer to the Letters of Advice or Authorization, if applicable, to determine the advance notice required by DFO.
	12.	Notify DFO 14 days prior to the installation of watercourse crossings as per the applicable Operational Statements (*i.e.,* Clear-Span Bridges, Ice Bridges and Snowfills [DFO 2008e,f,g,h]).
	13.	Notify the Canadian Wildlife Service if clearing of complex habitat (*e.g.*, forests) is scheduled to occur during the migratory bird nesting period; May 7 to August 20 (wetlands April 20 to August 25) in Alberta; March 15 to August 15 in BC (Gregoire pers. comm.).
	14.	Inform all appropriate federal resource agencies (*e.g.,* Health Canada, Industry Canada, Environment Canada) of the Project developments, as warranted.
Regulatory Authority Liaison	15.	Regular liaison with regulatory authority field representatives during construction will be the responsibility of the Environmental Inspector(s) in co-operation with the Construction Manager, the Environmental Manager and the Environmental Compliance Manager.
Aboriginal Communities	16.	Provide Aboriginal communities with the anticipated construction schedule and pipeline route maps, a minimum of two weeks prior to the commencement of construction in the vicinity of their respective communities.
	17.	Install signage notifying of construction activities in the area.
	18.	Work with Aboriginal communities to develop strategies to most effectively communicate the construction schedule and work areas to its members.
Landowners and Lessees	19.	Inform landowners and lessees of the route location, and construction schedule to allow sufficient time to plan and implement alternative land use decisions. Particular attention will be paid to specialized agricultural production systems (*e.g.,* poultry, nursery or berry crop operations).
Water Users	20.	Notify appropriate authorities and licensees, if required by COP (in Alberta) or Section 8 of the *Water Act* (in BC) requirements, prior to the commencement of water crossing construction and prior to withdrawing water for hydrostatic testing.
	21.	Notify agricultural water users to allow them to arrange for alternative water sources for irrigation and livestock use, as warranted.
Guides and Outfitters	22.	Notify guides and outfitters in the project area 30 days prior to the commencement of construction.

Contacts	Notification Measures
Snowmobile Clubs	23. Notify local club(s) a minimum of 2 weeks prior to construction. Clubs shall be informed of the Project's potential hazards and construction schedule.
Project Notice	24. Contact stakeholders, trappers, guides and outfitters prior to clearing and construction activities a minimum of 30 days prior to the commencement of construction. Provide maps and schedules of the construction activities to enable them to select alternate areas for activity. Ensure any notable changes in the construction schedule are communicated. 25. Provide notification to residents of construction within urban areas through newspapers, newsletters, radio advertisements, on-line method, and/or other methods determined in collaboration with municipal and regional authorities. 26. Place an announcement in local papers notifying domestic hunters, trappers, fishermen, recreation users, guides and outfitters of the location and timing of clearing, construction and clean-up activities at least 30 days prior to the commencement of construction activities.
Resource Companies	27. Notify applicable companies for road, power line and foreign pipeline crossings, if required, by crossing and road use agreements. 28. Notify pipeline and utility companies with lines that cross the construction right-of-way prior to commencing mainline pressure testing.
Navigable Waters	29. Notify recreational boaters of the hazards associated with instream construction in accordance with NEB guidelines or approval conditions for navigable waters. Place warning signs (*e.g.,* Warning – Pipeline Construction Ahead) up and downstream of all the navigable crossings. The signs are to be legible at a distance recommended by the conditions of necessary permit approval(s) granted by the NEB, if applicable.
Construction Schedule Change	30. Review the individuals and groups that were initially notified of the construction schedule and notify of any changes in the construction schedule.

Contractor Measures

The following measures are to be implemented by the Contractor.

Contacts	Notification Measures
Municipal Authorities	31. Notify Bylaw Officers, if required, prior to conducting any burning. 32. Notify Utility Officers, if required, by road crossing agreements, prior to construction. 33. Inform the community fire protection service of any hazardous material used or stored on the Trans Mountain construction right-of-way. In addition, the service will also be given a general description of the type of work being completed (*e.g.,* welding), the emergency and fire equipment on the right-of-way, the type of emergency equipment and services that may be required from the department in the event of a fire or accident and a list of medically trained personnel (*e.g.,* medic), if warranted. See Appendix B for the Fire Contingency Plan. 34. Provide a list of emergency equipment at the construction site, a list of medically trained personnel on the construction right-of-way (*e.g.,* medic), and a list of emergency equipment and services that may be required from the community.
Irrigation/Diking Districts	35. Notify Irrigation/Diking Districts prior to commencement of irrigation canal/ditch crossing construction.

Contacts	Notification Measures
Rail Companies	36. Notify rail companies prior to construction and pressure testing if required by rail crossing agreement.
Timber Haulers and Timber Mill	37. Notify timber haulers and timber mills prior to commencing clearing to inform them of anticipated volumes and delivery schedule (as determined through Contractor contractual arrangements).
Post Signs	38. Install signs at recreation access points notifying users of construction activities in the vicinity. 39. Install signs at secondary road access points and within the vicinity of construction activities on secondary roads and highways to notify Forest Management Agreement holders (in Alberta) and Forest License holders (in BC) and dispositions holders of construction of the pipeline and associated components. 40. Install signs at facilities that are under a biosecurity mandate to limit entry, and mandate vehicle washing and disinfection.

Note: See Appendix D for a complete list of persons to contact.

5.0 ENVIRONMENTAL OVERVIEW

Introduction

Environmental features and resources encountered during environmental surveys conducted along the construction right-of-way and associated component sites require mitigation measures, including those within the SEMP (see Appendix C), to address both routine construction activities and to identify and address environmental issues or features that may not be routinely encountered.

Objective

The purpose of this section is to provide the Contractor with a brief overview of the environmental issues and features associated with pipeline and associated component construction.

This environmental overview includes:

- the general environmental setting of the construction right-of-way; and
- a listing of potential permits and authorizations that may be necessary for construction of the pipeline and associated components.

5.1 Environmental Setting

The Project will consist of approximately 987 km of new 914 mm (NPS 36) OD buried crude oil pipeline. The pipeline will commence at the Edmonton Terminal, a tank terminal located near Edmonton, Alberta and will terminate at the Burnaby Terminal (Burnaby Tank Farm). Two 3.6 km long 762 mm (NPS 30) OD buried pipelines will connect the Burnaby Terminal to the Westridge Marine Terminal.

Approximately 340 km of the total construction right-of-way is located within Alberta and approximately 651 km is located within BC. The pipeline route crosses both provincial Crown, Federal reserve land, municipal and private lands in Alberta and BC and generally traverses flat to gently rolling terrain in Alberta, rolling, variable steep to very steep mountainous terrain in interior BC and level to nearly level terrain in the Lower Mainland Region of BC. Industrial, municipal, agricultural (cultivated and non-cultivated) and tree/shrub land uses are encountered in Alberta, tree/shrub, agricultural (non-cultivated), native grassland, municipal and industrial land uses are encountered in interior BC; and tree/shrub, agricultural (cultivated), municipal and industrial land uses are encountered in the Lower Mainland Region of BC.

Detailed soils surveys have been conducted along the construction right-of-way and the Environmental Alignment Sheets identify the soils units, recommended topsoil salvage width and depth, as well as any special soils-related issues. Variably textured soils developed on till deposits and fine textured soils developed on localized lacustrine deposits are encountered in Alberta and interior BC. Fine textured soils have developed on alluvium deposited within the Fraser River flood plain in the Lower Mainland Region of BC. Fine textured soils located in Alberta and BC are prone to rutting and compaction during moist soil conditions.

Historical records indicate that releases have occurred on the TMPL system right-of-way. To address the releases, various remedial methods were employed to the standards of the time. A Contamination Discovery Contingency Plan has been developed (see Appendix B) to provide mitigation should any residual or new contamination be encountered during construction of the pipeline or associated components.

The pipeline route crosses 88 defined watercourses in Alberta (approximately 25 navigable) with an instream restricted activity period (RAP), 112 water features (non-classified drainages and wetlands), and approximately 350 defined and 65 potential watercourses in BC (42 navigable and 64 potentially navigable), some with timing constraints, as well as numerous non-classified drainages and wetlands.

Fish and fish habitat studies have been conducted at watercourse crossings along the route. Information gathered during these studies has been used to determine the appropriate water and vehicle crossing methods, as well as general bank and approach slope reclamation measures. Appendix I provides a

summary of the watercourse crossings along the route including the primary and contingency crossing methods, vehicle crossing methods and other general measures.

The construction right-of-way encounters many land uses with a high potential for rare plants and rare plant communities. Rare plant surveys along the route indicate the presence of several rare plant species where mitigation will be warranted during the construction of the pipeline and associated components. The location of these plants and the respective mitigation measures are provided in Appendix J.

Weed surveys conducted along the construction right-of-way have indicated the presence of weeds that will require, at some locations, cleaning of clearing and topsoil handling equipment or other mitigation during the construction of the pipeline. The locations where weeds of concern are encountered and the mitigation to be implemented are provided in Appendix J.

Numerous wetlands are encountered along the construction right-of-way (see Appendix K). However, the size and characteristics of the wetlands are expected to vary depending on the time of the year that crossing construction is to occur and recent weather conditions.

The pipeline route encounters numerous aquifers in Alberta and BC, and particularly in the Lower Mainland Region of BC while intersecting well field capture zones for community water supplies in some locations. Locations where specific mitigation may be implemented prior to and during construction of the pipeline and associated components is provided in Appendix G.

The construction right-of-way encounters lands that may contain suitable habitat for wildlife species with special conservation status. Several provincially identified wildlife areas are encountered by the construction right-of-way. Wildlife surveys along the construction right-of-way indicate the presence of several wildlife features (*e.g.*, mineral licks). Site-specific mitigation measures, timing constraints and/or buffers apply to activities in proximity to provincially identified wildlife areas and wildlife features; these locations are identified in Appendix L.

Traditional Ecological Knowledge (TEK) collected during environmental field surveys and Traditional Land Use (TLU) studies have been conducted and have identified locations where specific mitigation is to be implemented prior to and during construction to reduce effects on environmental resources and traditional land and resource use.

Historical Resources Impact Assessments (HRIAs) (Alberta) and Archaeological Impact Assessments (AIA) (BC) and mitigation excavations have been conducted, where warranted, along the construction right-of-way. Appendix M identifies the locations where specific mitigation is to be approved and implemented prior to and during construction of the pipeline to reduce effects on heritage resources.

The construction right-of-way encounters some locations where a combination of environmental and land use issues necessitated the development of specific plans to ensure that environmental effects are avoided or reduced during the construction of the pipeline and associated components.

Known reference points along the TMPL system are commonly referred to as a Kilometre Post or “KP”. KP 0.0 is located at the Edmonton Terminal where the existing Trans Mountain system originates. KPs are approximately 1 km apart and are primarily used to describe features along the pipeline for operations and maintenance purposes. To delineate features along the construction right-of-way the symbol “RK” or Reference Kilometre has been applied throughout the EPP. In locations where the TMPL system and the construction right-of-way parallel one another, the symbol “KP/RK” has been used to clearly indicate to the reader that the two route alignments abut one another. Where the construction right-of-way diverges away from the TMPL system, the RK system is used on its own.

5.2 Non-Routine Mitigation

Most of the environmental and land use issues encountered by the construction right-of-way are those that are routinely encountered during pipeline construction in Parkland, Boreal and Foothills areas of Alberta and Southern Interior Mountains, Southern Interior and Coast Mountains regions of BC. The mitigation measures to be implemented to address those issues are also considered to be routine since they are commonly employed during pipeline construction projects in this region.

Unique features or issues that are encountered by the construction right-of-way as well as the corresponding non-routine mitigation that will be implemented to address each unique issue are provided in Table 5.2-1.

TABLE 5.2-1

UNIQUE ISSUES REQUIRING NON-ROUTINE MITIGATION

Issue	Mitigation
Temporary Access	Record locations where swamp mats, matting, geotextiles or subsoil ramps are installed and review prior to removal.
Rare plant populations on the construction right-of-way	Site-specific mitigation will include avoidance, narrowing the construction right-of-way, fencing or protecting and/or transplanting (see Appendix J).
Potential to infect soils with clubroot disease or other crop disease	Power wash and misting stations will be established, where required, to clean equipment used during clearing and topsoil handling activities (see Appendix F). Basic shovel and sweep cleaning will be conducted on clearing and topsoil handling equipment before moving equipment off of cultivated fields. In addition, shovel and compressed air cleaning stations for topsoil handling equipment will be established at selected locations to prevent the spread of weeds (see Appendix J).
Potential to infect livestock with diseases	Power wash and misting stations will be established to clean and disinfect equipment used during construction in areas frequented by livestock or near certain livestock facilities. In addition, the Project Environmental Education Program will outline that personnel arriving from outside Canada will be required to have clothing and footwear disinfected, or have an appropriate period of non-farm visits prior to be allowed on livestock facilities. Equipment directly transported in from Alberta must be cleaned and disinfected prior to use on BC livestock yards (see Agricultural Management Plan in Appendix C).
Weed Introduction	Shovel and compressed air cleaning stations for clearing and topsoil handling equipment will be established at several locations to prevent the spread of weeds (see Appendix J).
Problem lower subsoils	Conduct three-lift soils handling at locations identified on the Environmental Alignment Sheets (see Section 8.0).
Wet soils	Conduct full right-of-way topsoil salvage on agricultural lands that have been identified with a high water table.
Construction on lands with drainage tile, irrigation, organic status, certified or other unique farming issues	A summary of mitigation measures has been developed to direct construction activities on these lands with uncommon farming issues (see Agricultural Management Plan in Appendix C).
Landowner requests - ornamental trees, windbreaks, hedgerows, shelterbelts and yards	Measures such as narrowing down of the construction right-of-way, extending road bores, fencing off and/or salvaging trees with a tree spade may be necessary to avoid or reduce effects to ornamental trees, high value horticultural crops, windbreaks, hedgerows, shelterbelts and yards, as specified on the Line List.
Water Crossings	Watercourses may require temporary bridges or the use of existing bridges for equipment and vehicle crossing. Pipeline installation methods include open, trenchless (Horizontal Directional Drill [HDD], bore or punch) or isolated (dam and pump or flume) techniques when not dry or frozen to the bottom.
Wetlands	Salvage of 40 cm of upper surface material will be conducted at wetlands (see Appendix K). The width and depth of soil salvage will be influenced by the soil moisture at the time of construction as well as class of wetland encountered. This salvaged soil material will be replaced following backfilling.
Willow Salvage/Planting	Salvage live dormant shrubs (*e.g.,* willow or dogwood) from the banks of watercourses/wetlands/lakes, if present, where bank disturbance is anticipated when plants are dormant. Store salvaged dormant shrubs on the side of the construction right-of-way in a manner such that they will not dry out before replanting while dormant. Select wetlands where willow salvage is recommended are shown on the Environmental Alignment Sheets.
Traffic, Human Occupancy and Resource Use, Navigation and Navigation Safety, etc.	Refer to the SEMP (see Appendix C).

5.3 Permits, Approvals and Authorizations

Trans Mountain will work with the appropriate regulatory authorities to determine which environmental permits, approvals and authorizations are necessary prior to the commencement of construction activities. A list of the potential permits, approvals and authorizations are provided in Tables 5.3-1 and 5.3-2. While these tables are comprehensive, they are not exhaustive and additional permits may be required.

TABLE 5.3-1

POTENTIAL FEDERAL ENVIRONMENTAL PERMITS/APPROVALS/AUTHORIZATIONS

Regulatory Authority	Legislation	Permit, Approval, Authorization and/or Notification	Activity/Trigger
Aboriginal Affairs and Northern Development Canada	*Indian Act*	Section 28 Approval to cross an Indian Reserve	As required, approval for the construction right-of-way to cross reserve lands.
	First Nations Land Management Act	Section 20 Approval to cross an Indian Reserve	As required, approval for the construction right-of-way to cross reserve lands.
Canadian Transportation Agency	*Railway Relocation and Crossing Act*	Crossing Permit	Approval to cross railways with access roads and power lines.
Environment Canada	*Canadian Environmental Protection Act, 1999;* Disposal at Sea Regulations; Regulations Respecting Applications for Permits for Disposal at Sea	Section 127: Disposal at Sea Permit (previously called Ocean Dumping Permit)	Approval to dispose of materials at sea (*e.g.,* dredge spoil from the Westridge Marine Terminal expansion).
	Species at Risk Act (*SARA*)	Permit pursuant to Section 73 of *SARA* - Species at Risk Permit	Activities that affect a listed species (including fish species), its critical habitat or residence.
DFO[1]	*Fisheries Act. Section 32(2)*	Case-specific request for review	Authorization required if fish will be destroyed during construction.
	Fisheries Act. Section 35(2)	Case-specific request for review	Authorization required if construction will serious harm to fish or any permanent alteration to, or destruction of, fish habitat
	Operational Statements	Notification as per the applicable Operational Statements	As required, notifications for watercourse crossings that comply with DFO Operational Statements. Marine Communications and Traffic Services (MCTS) oversight of marine traffic within Canadian jurisdiction.
	Section 52 of *Fishery (General) Regulation*	Authorization of Fish Collection for Scientific, Experimental, Educational or Public Display Purposes	Approval to collect salmon or *SARA* listed species during scientific studies.
	SARA	Permit pursuant to Schedule 1 Aquatic Species of *SARA* - Species at Risk Permit	Activities that may affect a listed fish species, its critical habitat or residence.
Industry Canada	*Radiocommunication Act*	Radio Licence	Radio communication.
Natural Resources Canada	*Explosives Act*	Ammonium Nitrate Fuel Oil (ANFO) Permit	Blending of ammonium nitrate and fuel oil.
		Sections 6 and 7: Explosives Transportation Permit	Approval to transport explosives.
		Temporary Magazine Licence	Approval for any storage place of explosives in amounts that exceed the regulations. If a factory is required to make explosives near the site, additional permits may be required. Additional permits may also be required, depending on the type of explosives (*e.g.,* an Ammonium Nitrate Fuel Oil Permission) and whether they are blended.
		Temporary Blaster's License or Blaster's Permit	Approval for the use of explosives.
Parks Canada	*Canada National Parks Act*	Special Activity Permits	Approval to conduct activities such as valve work in Jasper National Park.
Port Metro Vancouver (PMV)	*Canada Marine Act*	Project Permit Building Permit Water Lease Expansion	Approval for new structures on water or land including modifications to existing structures.
Transport Canada	*Canada Shipping Act*	An act respecting shipping and navigation	Ensures compliance of vessels with relevant marine regulations.

Note: 1 As a result of the passage of the *Jobs, Growth and Long-term Prosperity Act* (Bill C-38), regulation requirements of some federal legislation are evolving and actual triggers and permitting requirements will be confirmed prior to construction.

TABLE 5.3-2

POTENTIAL PROVINCIAL ENVIRONMENTAL PERMITS/APPROVALS/AUTHORIZATIONS

Regulatory Authority	Permit, Approval, Authorization and/or Notification
ALBERTA	
Alberta Culture	• *Historical Resources Act* clearance
AESRD	• Public Land Agreement (Pipeline Land Agreement) on Crown land. • Fish Research License for fish rescue at isolated crossings. • Temporary Field Authorization for access roads on Crown land. • Damage control permits for beaver, lodge and beaver dam removal. • *Water Act* approval for construction within a waterbody. • Notification under the *Code of Practice for Watercourse Crossings*. • Notification under the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body*. • Notification under the *Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines*. • Registration under the *Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines*. • Timber, under the Alberta *Forests Act*. • Master Land Withdrawal and Consent Agreement.
Alberta Energy Regulator (AER)	• Environmental Field Report (EFR) for Pipeline Licence or Approval under the Alberta *Public Lands Act*.
Alberta Tourism, Parks and Recreation	• Research and Collection Permit.
Alberta Transportation and Infrastructure	• Roadside Development Permit. • Several other items (dangerous goods, overweight permit, etc).
BRITISH COLUMBIA	
BC OGC	• NEB Pipeline Provincial Authorization Application for: – temporary occupation of Crown land for the pipeline right-of-way and for ancillary land uses (*e.g.*, camps, access, workspaces, etc.); – authorizations under Section 9 of the *Water Act* (changes in and about a stream) for stream or waterbody crossings; – cutting permits under Section 47.4 of the *Forest Act* to harvest Crown timber; – road use permits under Section 117 of the *Forest Act*; and – Agricultural Land Reserve (ALR) authorizations for constructing a pipeline or facility, and for importing/removing soil from ALR lands. • Road permits under Section 14 of the *Land Act*. • Temporary Crown land access approval under Section 14 of the *Land Act*. • Section 8 *Water Act* Approval for short-term diversion or use of water. • Aggregate Operations and Borrow Pit Permit.
BC Parks	• Park Use Permit.
BC Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRO)	• Authorization under Section 40 of the BC *Wildlife Act* (temporary closure to hunting, trapping and guide outfitting if necessary during a construction activity). • General wildlife permit under the *Wildlife Act* and Approval or Notification for Changes In and About a Stream under Section 9 of the *Water Act* and Section 40 of the *Water* Regulations for beaver dam removal. • Scientific Fish Collection Permit. • *Heritage Conservation Act* permit. • Road use permits. • Special Use Permit. • Burning Permit.
BC Ministry of Transportation and Infrastructure	• Road Use and Highway Crossing Permit. • Several other items (overweight, highway access, land closure request).
BC Ministry of Environment (BC MOE)	• Section 44 Notification under the BC *Water Regulation* (minor work near a stream). • Section 14 Permit under the BC *Environmental Management Act* for the introduction of waste into the environment. • Section 7 Waste Discharge Permit under the *Oil and Gas Waste Regulation* for testing and disposing of test water with additives.

Trans Mountain will work with municipal authorities to determine which permits and approvals are necessary and required to carry out TMEP activities.

6.0 PRE-CONSTRUCTION ACTIVITIES

Introduction

This section describes the potential mitigation measures that may be implemented prior to pipeline construction to ensure protection of environmental resource features, delineation of boundaries of the pipeline construction right-of-way, TWS and associated facilities, as well as marking buried and overhead utilities. The following mitigation measures, as well as mitigation outlined in the SEMP (see Appendix C), will be implemented, as warranted, by Trans Mountain, its Contractors and subcontractors prior to the commencement of construction activities.

Objectives

The objectives of these mitigation measures are to ensure:

- all identified environmental resources occurring on or immediately adjacent to the construction right-of-way, are properly identified and marked in the field prior to construction to avoid or reduce potential Project-related adverse environmental effects;
- the pipeline construction right-of-way TWS, ancillary sites, construction camp sites and borrow sites are properly delineated to prevent inadvertent trespass; and
- all approved access to and from the work sites is properly and clearly marked.

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern	Potential Mitigation Measures
Workspace	1. Identify the need for TWS prior to clearing and construction. Take extra workspace at the following locations: • sharp sidebends as well as foreign line, rail and road crossings to ensure sufficient separation (min. 1 m) between topsoil/root zone material and spoil piles, sidehills and on rugged terrain to ensure sufficient storage space for graded material; • locations where deep topsoils are identified (*i.e.,* over 25 cm); • locations where rollback storage or a slash berm is necessary; and • water crossings to ensure sufficient space to allow storage of topsoil/root zone material and spoil (min. 3 m) back from the top of the bank. Note that a vegetative buffer is to be left in place at watercourse crossings unless otherwise approved by the Environmental Inspector(s). 2. Ensure TWS does not encroach within the vegetated buffers at watercourses/wetlands/lakes, unless approved by the appropriate regulatory authority. Ensure adequate TWS is acquired at watercourses/wetlands/lakes to be horizontally directionally drilled to allow for monitoring, containment and clean-up in the event of an inadvertent release (frac-out) of drilling mud. 3. Locate all additional work areas (such as staging areas, grade/borrow areas for ramping, additional spoil storage areas) a minimum of 10 m from wetland boundaries except where adjacent upland is cultivated or hay land, or disturbed land, unless otherwise approved. Ensure landowner/Crown land authority approvals are in place for all additional TWS prior to use, where warranted.

Activity/Concern		Potential Mitigation Measures
Construction Documentation	4.	Provide the Contractor and the Environmental Inspector(s) with the Pipeline EPP, Environmental Alignment Sheets and copies of all environmental approvals and permits including the most recent updates and revisions. A complete set of construction documents including the EPP, Environmental Alignment Sheets and copies of environmental approvals and permits will be kept at the construction field office for each spread.
Approvals, Licences, Permits	5.	Work with regulatory authorities to determine the necessary approvals, licences and permits needed for a particular activity or construction site prior to the commencement of the applicable activity or construction at that site (see Appendix D). Conditions of applicable permits (including *NEB Act* approval, *Historical Resources Act* [Alberta] clearance approval, Alberta *Water Act* approval and DFO, AESRD lands permits, road crossing agreements, rail crossing agreements, burning permits and irrigation canal crossing agreements) will be met. Inconsistencies between conditions of different permits will be rectified prior to construction.
Notification/ Approvals	6.	Review notification requirements identified in Section 4.0 and ensure notification(s) have been completed.
Pre-Job Meeting	7.	Prior to the commencement of pipeline construction on any given spread, an invitation will be extended to key regulatory authority and Aboriginal community representatives to participate in a pre-job meeting with Trans Mountain's engineering and environmental and community relations staff, the Environmental Inspector(s) and the pipeline Contractor. This meeting is designed to make supervisory construction personnel aware of the key environmental and socio-economic issues, key mitigation measures and contingency plans, Trans Mountain's commitments, policies, approvals, licenses and permits, rules, legislation and any outstanding concerns applicable to the construction area.
Environmental Inspection	8.	The Environmental Inspector(s) will ensure the implementation of the Pipeline EPP during all phases of pipeline construction (*i.e.,* flagging/staking, clearing, topsoil/root zone material salvage, grading, clean-up and revegetation, sedimentation control, water withdrawal and watercourse/wetland crossings).
	9.	Prior to the commencement of construction, the Environmental Inspector(s) will review the Contractor's Execution Plan, if applicable, to ensure environmental resources (*e.g.,* rare plants, archaeological sites, etc.) will not be compromised as a result of right-of-way preparation activities.
Pre-Construction Surveys	10.	Complete all environmental surveys that are required prior to the commencement of overall construction or construction at specific locations and provide the key results of the surveys and any associated mitigation to Project inspection personnel and the Contractor. Provide the above personnel and the NEB with updated resource-specific summary tables and, if warranted, updated Environmental Alignment Sheets. Identify any resource-specific locations in the field where mitigation is necessary and mark the locations accordingly (see Appendices E through Q).
Grade Plan	11.	Establish pre-construction profiles (grades) along the construction right-of-way for use during backfilling. In particular, establish pre-construction profiles on all irrigated lands.
Weeds	12.	Conduct a pre-construction weed survey of agricultural lands within the pipeline route.

Activity/Concern	Potential Mitigation Measures
Hydrogeology	13. During Project field studies, the Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Locate and flag or fence registered or known water wells in the immediate vicinity of the construction right-of-way. Known water wells within the construction right-of-way are identified in the environmental resource-specific mitigation tables for Hydrology in Appendix G.
Monitoring	14. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (*e.g.,* blasting). Monitoring may be necessary prior to, during and following construction or a specific construction activity in the vicinity of water wells or springs. At some locations, monitoring will be necessary to assess the effects on resource-specific environmental features (*e.g.,* archaeological monitoring, rare plant, nesting birds, etc.). If required, determine the permits/approvals that may be necessary and ensure they are in place to allow monitoring to be conducted.
Staking/Flagging/ Fencing	15. Stake all boundaries of the construction right-of-way, additional TWS and ancillary sites (*e.g.,* staging and storage areas). Clearly flag or stake the boundaries of temporary access roads and shoo-flies, and construction camps and borrow sites. Use short stakes/lathe where cattle are present. 16. Flag or fence-off resource-specific environmental features (*e.g.,* archaeological site, rare plant species, wildlife habitat features, etc.) prior to commencing construction in the vicinity of the resource site. Clearly mark all sensitive environmental resources identified on the Environmental Alignment Sheets within the immediate vicinity of construction activities prior to clearing. Posts and rope and/or snow fencing may be necessary to delineate sensitive environmental resources on and adjacent to the construction right-of-way, additional TWS, access roads, ancillary sites, constructions camps and borrow sites. 17. Flag or fence-off any shrubs or trees to be salvaged and replaced at wetlands and other water crossings prior to construction. 18. Ensure that pipeline and vehicle crossing alignment only crosses watercourses at straight sections and perpendicular to the banks, to the extent feasible. Avoid crossings at meander bends and unstable banks. 19. Confirm the accuracy of all environmentally sensitive resource locations and ensure flagging is maintained during construction. 20. Delay final staking until after clearing and immediately prior to the commencement of construction activities. 21. Stake drainage ways during the fall or prior to heavy snowfall in high snowfall areas, if feasible, to assist in locating gaps in the trench crown and topsoil/root zone material windrow, as well as to avoid flooding or erosion problems during spring break-up. 22. Stake low lying areas that are prone to saturated soil conditions when constructing during non-frozen soil conditions.
Flood Irrigated Lands	23. Prepare a detailed elevation survey of the eventual construction right-of-way on flood irrigated lands prior to construction.

Activity/Concern	Potential Mitigation Measures
Signage	24. Post signs in the vicinity of sensitive environmental features. Use site identification numbers to ensure confidentiality and protection of resources, where warranted, to alert workers of their presence and ensure their protection of sensitive environmental features. Alert contractors that work will take place near sensitive features. 25. Post signs, stake, or flag (including name, number and RK) 100 m from each watercourse/wetland/lake or at the top of the approach slope (whichever is greater) following clearing to alert the Contractor of the upcoming watercourse/wetland/lake. 26. Install signs to notify construction personnel of key traffic restrictions, cleaning requirements, refuelling/servicing restrictions and prohibited materials pertaining to construction activities on organic fields (see Agricultural Management Plan in Appendix C). 27. Post signs, stake, flag and/or posts and rope to clearly identify the identified riparian buffer area on both sides of watercourse, wetland and lake crossings.
Environmental Resource Delineation	28. Resource-specific protection measures will be provided on the Environmental Alignment Sheets and in the resource-specific mitigation tables (see Appendices E through Q). The tables will be used to track mitigation measures implemented for environmental resource features and will become part of the Pipeline environmental as-built report.

Contractor Measures

The following activity-specific mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Construction Documents	29. Maintain the Pipeline EPP, Environmental Alignment Sheets and copies of environmental approvals and permits at the Contractor's construction field office for each spread.
Pre-Job Meeting	30. Require key Contractor personnel to attend the pre-job meeting for each pipeline construction spread.
Approvals, Licenses Permits	31. Ensure that any approvals, licenses and permits that may be necessary are in place prior to commencing applicable construction activities.
Grade Plan	32. Prepare a Grade Plan and submit the preliminary Grade Plan to the Construction Manager, the Lead Activity Inspector, the Lead Environmental Inspector and the Environmental Inspector(s) for review to ensure that all the mitigation measures and protection to be implemented for resource-specific environmental features (*e.g.,* rare plants, archaeological sites, etc.) during pipeline construction activities are addressed. Revise the preliminary Grade Plan, if warranted.
Workspace	33. Obtain approval from the Construction Manager and determine if approval from applicable regulatory authorities is necessary prior to taking additional workspace in the field.
Scheduling	34. Delay final staking until immediately prior to the commencement of clearing and construction.
Survey Slash Lines	35. Fell all timber within the staked construction boundaries during survey line clearing. No fallen or leaning trees will be permitted outside of the staked construction boundaries or into watercourses/wetlands/lakes.

Activity/Concern	Potential Mitigation Measures
Weeds	36. Follow recommendations made in the pre-construction weed survey to limit the risk of spreading weed seeds (see Section 7.0 for general weed mitigation). 37. Implement weed management (*i.e.,* using proper application of chemical, mechanical or manual measures, or a combination of all) at locations identified within the pre-construction weed survey to a level that is consistent with weed management observed adjacent to the eventual construction right-of-way to reduce the potential for weed infestations following construction. Refer to the Weed and Vegetation Management Plan (WVMP) provided in Appendix C. 38. Restrict all vehicular traffic to the approved and staked construction right-of-way, workspace and access roads.
Bedrock Disposal and Importation of Materials	39. Determine prior to construction disposal options for excess bedrock, as well as plans for bedding, padding and importation of backfill.

7.0 GENERAL PIPELINE CONSTRUCTION MITIGATION MEASURES

Introduction

The general potential mitigation measures provided in this section, including mitigation outlined in the SEMP (see Appendix C), may be applicable to the pipeline and associated facilities throughout all phases of construction. These general mitigation measures will be implemented, as warranted, by Trans Mountain, its Contractors and subcontractors prior to and during construction and will be followed by detailed specifications for each construction phase of pipeline, access road, temporary construction camp, borrow site and ancillary site.

Objective

The objective of the following potential mitigation measures is to avoid or reduce potential adverse environmental effects associated with general pipeline construction activities including: TWS; ancillary sites; access roads; construction camps; and borrow sites. Construction will be completed in a manner that avoids or reduces adverse effects on residents in the area, land users and socio-economic and environmental resources.

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern	Potential Mitigation Measures
Discipline	1. Those who show careless or wanton neglect of the environment or disregard for the Pipeline EPP or any Trans Mountain or Project policies will be removed from the work.
Modifications of the EPP Measures	2. Develop new or alternative mitigation measures if the measures identified in the Pipeline EPP prove to be ineffective at avoiding, reducing or eliminating environmental effects. Develop alternative or new measures in co-operation with the Environmental Inspector(s), the Environmental Compliance Manager, the Environmental Manager and the NEB, if warranted, the applicable Resource Specialist(s). Ensure adequate time is allowed to determine if NEB approval is necessary. Use the MOC process to obtain the necessary approvals outlined in Section 3.0. 3. Discuss the planned changes in mitigation to be implemented with the appropriate regulatory authority and, if required, determine if the appropriate approval is necessary prior to implementing the new measure(s). If the planned change in mitigation measures meets the environmental objectives and there are no specific regulatory approvals required for the change, no additional discussions with regulatory authorities are necessary. 4. Document the change in mitigation and communicate the change to applicable construction personnel including the Construction Manager. The use of the MOC process will inform key personnel of the change. If warranted, monitor the effectiveness of the new/alternative mitigation.
Review Mitigation Measures for Sensitive Features	5. Review with the Contractor the mitigation to be implemented to avoid or reduce effects on rare plants, rare ecological communities, wildlife species of concern, archaeological features, resource-specific traditional land use sites and any other sensitive environmental or cultural features along or in proximity to the eventual construction right-of-way. Conduct this review in advance of construction at known locations where any of the above features are known to be present to ensure that the Contractor has a full understanding of the procedures to be implemented (see Appendices E through Q and the Environmental Alignment Sheets).

Activity/Concern	Potential Mitigation Measures
Species at Risk/Sensitive Species	6. Ensure that mitigation measures concerning fish, wildlife or plant species at risk are communicated to employees, Contractor and subcontractors and are enforced by the Environmental Inspector(s). 7. Suspend activity if previously unidentified rare plants or rare ecological communities are encountered on or within 10 m of the construction right-of-way during construction where harmful effects to the plants and/or communities are anticipated as a result of construction, as determined by a Vegetation Resource Specialist. Implement the Rare Ecological Community and Rare Plant Population Management Plan (see Appendix C).
Wildlife	8. Direct that a breeding bird nest survey be conducted by a qualified avian biologist prior to initiating activities in areas where pre-clearing or clearing activities have not been completed prior to the start of the migratory bird nesting period; May 7 to August 20 (wetlands April 20 to August 25) in Alberta; March 15 to August 15 in BC (Gregoire pers. comm.). If an active nest is identified, it will be subject to site-specific mitigation measures (*e.g.*, protective buffer or non-intrusive monitoring). The appropriate mitigation strategy will be selected by the Environmental Inspector(s) or Wildlife Resource Specialist from the Wildlife Species of Concern Discovery Contingency Plan (see Appendix B). 9. In Alberta, determine if an AESRD Wildlife Damage Control License is necessary to remove a beaver, dam or lodge. Notify DFO through the submission of an Alberta Operational Statement notification form 14 days prior to beaver dam removal to ensure that removals are conducted in accordance with conditions of DFO's Alberta *Operational Statement for Beaver Dam Removal* (DFO 2008i). 10. In BC, submit a notification to the appropriate regional Habitat Officer of the Ministry of Forests, Lands and Natural Resource Operations at least 45 days prior to beaver dam removal, as per Section 40 of the *Water Regulation*. Following this notification, determine if a Ministry of Forests and Natural Resource Operations Wildlife Sundry Permit is necessary to remove a beaver dam.
Heritage Resources	11. Suspend work in proximity (*i.e.,* within 30 m) to archaeological sites (*e.g.,* arrow heads, modified bone, pottery fragments, fossils) discovered during construction. No work at that particular location shall continue until permission is granted by the appropriate regulatory authority. Follow the contingency measures identified in the Heritage Resources Discovery Contingency Plan (see Appendix B). 12. Arrange for emergency archaeological excavation of previously unidentified sites encountered by pipeline construction wherever such sites warrant attention and timings of these excavations will be decided with input of the Archaeological Resource Specialist, regulatory authorities, and the Lead Environmental Inspector. Following discussions with the regulatory authorities, any work that can proceed following construction will be mapped and suitably flagged for later investigation. 13. Where a geodetic monument is disturbed during construction of the pipeline or associated components, the Environmental Inspector(s) will immediately report such disturbance to the appropriate regulatory authority. 14. Prohibit the collection of any historical, archaeological or palaeontological resources by Project personnel.

Activity/Concern	Potential Mitigation Measures
Traditional Land and Resource Use	15. Implement the contingency measures identified in the Traditional Land Use Sites Discovery Contingency Plan (see Appendix B) in the event traditional land use sites not previously identified are found during pipeline and associated component construction. 16. Refer to the environmental resource-specific mitigation tables in Appendix Q for traditional land use features.
Noise Emissions	17. Schedule intermittent noise-producing events to avoid, where feasible, important habitat of wildlife species at risk/sensitive species/livestock during sensitive periods, where feasible. 18. Schedule construction activities occurring within wildlife setback distances to take place within least risk windows, timing windows, or outside of wildlife RAPs or proceed with the approval of the appropriate regulatory authority.
Air Emissions	19. Consult with and inform landowners of the potential to be affected by emissions from construction activities 30 days prior to commencement of these activities in proximity to the respective landowners.
Weed Monitoring	20. Monitor the topsoil and other soil piles for weed growth frequently during the growing season. Direct the Contractor when warranted to take proactive measures to control weed growth.
Buried Utility Lines	21. Locate and flag all existing buried utility lines and cables to be crossed by the pipeline prior to the commencement of ground disturbance activities by using "one call" services in addition to direct contact with utility owners.
Water Wells	22. Re-establish or replace a potable water supply as required should a registered or known water well located within 30 m of the construction right-of-way be damaged (*i.e.,* diminishment in quantity and/or quality) during pipeline installation.
Contaminated Sediments	23. Avoid known areas of contaminated sediments. Implement the Contamination Discovery Contingency Plan (see Appendix B) in the event that contaminated sediments are discovered during construction. Adhere to applicable measures provided in the Waste Management Standard (see Appendix C) for handling of contaminated material.

Contractor Measures

The following activity-specific mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Scheduling	24. Avoid activity in early to mid-winter (*i.e.,* November 1 to January 15) in the Wells Gray (RK 550.0 to RK 602.7) and Groundhog (RK 629.8 to RK 649.4) caribou ranges, to the extent feasible. 25. Complete all construction activities prior to the expiration of applicable permits and approvals. In the event that a permit or approval is likely to expire prior to the completion of the applicable construction activities, take steps well in advance of the expiration date to obtain renewal or extension of the permit/approval. 26. Schedule construction activities to be conducted within 300 m of residences, cabins, campgrounds or parks where feasible and in accordance with applicable municipal noise bylaws or approval conditions.

Activity/Concern	Potential Mitigation Measures
Scheduling (cont'd)	27. Schedule construction to avoid the irrigation season, if feasible, unless otherwise approved by Trans Mountain and the landowner, where warranted. 28. Maintain a tight construction spread (*i.e.,* interval between front end activities such as clearing and grading, and back end activities such as clean-up) to reduce the duration of activities and effects on land use and wildlife.
Workspace	29. Obtain approval from the Construction Manager or designate and determine if approval from applicable regulatory authorities is necessary prior to taking additional workspace in the field.
Modifications to the EPP Measures	30. Notify the Environmental Inspector(s) in the event that mitigation measures identified in the Pipeline EPP are ineffective at avoiding or reducing environmental effects or if alternative measures to address environmental issues are warranted due to site or weather conditions.
Contingency Plans and Contact List	31. Ensure all key personnel working on the construction right-of-way review the contingency plans, management plans and the contacts list prior to commencement of pipeline construction (see Appendices B, C and D, respectively).
Extreme Weather	32. Monitor weather patterns daily to allow for schedule changes and contingency planning. 33. Install additional erosion and sediment control measures prior to or during wet conditions and extreme weather events, to ensure the protection of sensitive environments. The Lead Activity Inspector, the Lead Environmental Inspector and the Environmental Inspector(s) in consultation with the Construction Manager, will determine if and when to suspend work if an extreme weather event occurs onsite that may pose risks to the environment or environmental protection measures.
Seismic Events	34. Suspend work immediately in the event of a seismic event. Refer to Volume 4C for the Emergency Response Plan for further response measures to be taken in the event of seismic activity occurring during construction.
Roads Access and Shoo-Flies	35. Install shoo-flies at locations approved by the Lead Environmental Inspector and Environmental Inspector(s) and all appropriate regulatory authorities and/or landowners, where warranted. 36. Confine construction activities to the allotted construction right-of-way and approved TWS. Restrict construction traffic to existing roads and approved shoo-flies and temporary access roads.
Construction Traffic	37. Review the Traffic and Access Control Management Plan (see Appendix C) for procedures developed to manage public access to areas with valued ecological resources and Crown and private grazing lands in interior BC. 38. Report all wildlife collisions to the Environmental Inspector(s). The Environmental Inspector(s) will further notify the appropriate regulatory authorities and the police, if required. 39. Establish speed limits, approved by Trans Mountain, on the construction right-of-way and access roads. Post signs stating the applicable speed limits for construction traffic to avoid wildlife injury and mortality, maintain soil structure and reduce dust.

Activity/Concern	Potential Mitigation Measures
Construction Traffic (cont'd)	40. Transport construction personnel to and from the construction right-of-way by bus or van, to the extent practical, to limit the potential for vehicle/wildlife interactions, as outlined in the Traffic and Access Control Management Plan (see Appendix C). 41. Restrict construction traffic within the staked construction boundaries where and when the potential for pulverization of the soil or sod is high (see Soil/Sod Pulverization Contingency Plan in Appendix B). 42. Restrict traffic on organic farm/registered/certified seed grower lands to equipment/vehicles actively involved in construction on those lands (see Agricultural Management Plan in Appendix C). 43. Limit traffic on organic farm lands, nurseries and near poultry facilities to one-way travel to limit, where practical, the number of cleaning stations and inspection personnel needed (see Agricultural Management Plan in Appendix C). 44. Limit construction traffic to the trench area or work side of the construction right-of-way during non-frozen soil conditions to reduce the area subjected to potential soil compaction. 45. Conduct dust suppression measures near berry farms and other agricultural crops susceptible to dust damage. 46. Install temporary erosion/sediment control measures on sloped approaches to roads and rail crossings where the vegetative mat has been disturbed. 47. Shovel and sweep clean as quickly as practical any mud tracked onto roads following equipment crossings.
Public Access	48. Use signs and access barriers where appropriate to limit the potential sensory disturbance of wildlife and to avoid destruction to environmental features, soils and wildlife habitat along the construction right-of-way, shooflies or access roads during construction in accordance with the Traffic and Access Control Management Plan (see Appendix C and Environmental Alignment Sheets in Volume 6E).
Trappers	49. Prohibit the vandalism or theft on trapper equipment or trapped animals if they are observed on the construction right-of-way or the construction site prior to clearing.
Fishing	50. Prohibit recreational fishing by Project personnel on or in the vicinity of the construction right-of-way. The use of the construction right-of-way to access fishing sites is prohibited.
Livestock	51. Report livestock encountered on the construction right-of-way to the Environmental Inspector(s) who will inform the Project's Land Department to contact the applicable landowner, lessee or regulatory authorities, when warranted. 52. Provide a temporary water supply if livestock are cut off from water and will not cross the right-of-way.

Activity/Concern	Potential Mitigation Measures
Wildlife	53. Discuss wildlife issues that are identified during construction between the Environmental Inspector(s), Wildlife Resource Specialists and the appropriate regulatory authority representatives as directed in the Wildlife Encounter Contingency Plan and the Wildlife Species of Concern Discovery Contingency Plan (see Appendix B). 54. Adhere to applicable setback distances (see Appendix L) and associated timing constraints, to the extent feasible, during construction activities (*e.g.,* clearing, topsoil/root zone material salvage, pipe installation) to avoid noise-related disturbances during sensitive periods, unless otherwise approved by the appropriate regulatory authority. 55. Wildlife discovered in the trench, or in association with any other pipeline construction activity, will be reported to the Environmental Inspector(s) who will contact the appropriate regulatory authorities, when warranted. 56. Maintain a tight construction spread and construct the pipeline facility in a well-organized and efficient manner to limit the duration of sensory disturbance to wildlife. 57. In the event that potentially rare and endangered wildlife species or their potential habitats are discovered during construction, implement the Wildlife Species of Concern Discovery Contingency Plan (see Appendix B). 58. Implement the Wildlife Encounter Contingency Plan (see Appendix B) in the event of an encounter with wildlife during construction, either at the site or on the commute to or from the construction site. 59. Ensure that Contractors do not harass or feed wildlife. 60. Prohibit Project and Contractor personnel from having pets on the construction right-of-way, access roads, borrow sites or ancillary sites. 61. Prohibit the recreational use of all-terrain vehicles (ATVs) or snowmobiles by construction personnel on the construction right-of-way or at a construction site. 62. Report any incidents with nuisance wildlife or collisions to the appropriate authority and the local police detachment, if applicable. 63. Store food in air-tight containers in vehicles or equipment or the construction office. Do not store food in pick-up beds of pick-up trucks. 64. Refer to environmental resource-specific mitigation tables for wildlife and wildlife habitat provided in Appendix L and as shown on the Environmental Alignment Sheets.

Activity/Concern	Potential Mitigation Measures
Rare Plants/Rare Ecological Communities	65. Review mitigation of rare plants/rare ecological communities with the Environmental Inspector(s) in advance of construction to ensure there is full understanding of the procedures involved. 66. Suspend activity if previously unidentified rare plants or rare ecological communities are encountered on or within 10 m of the construction right-of-way during construction where harmful effects to the plants and/or communities are anticipated as a result of construction, as determined by a Vegetation Resource Specialist. Implement the Rare Ecological Community and Rare Plant Population Management Plan (see Appendix C). 67. Implement the resource-specific mitigation measures associated with vascular and non-vascular plant species of concern as well as rare and unique plant communities on or adjacent to the staked construction boundaries as outlined in the environmental resource-specific mitigation tables for rare plant/rare ecological communities provided in Appendix J and as shown in the Environmental Alignment Sheets.
Species at Risk/Sensitive Species	68. Report sightings of sensitive species or species at risk immediately to the Environmental Inspector(s), they will record the location in the daily reports and locate and mark sightings on the environmental as-built alignment sheets. Implement the Rare Ecological Community and Rare Plant Population Management Plan (see Appendix C) or Wildlife Species of Concern Discovery Contingency Plan (see Appendix B) as appropriate. 69. Refer to environmental resource-specific mitigation tables for species at risk or their habitats provided in Appendices J and L.
Weeds	70. Ensure equipment arrives at all construction sites clean and free of soil or vegetative debris. Inspect and identify equipment deemed to be acceptable with a suitable marker, such as a sticker. Do not allow any equipment arriving in a dirty condition onsite until it has been cleaned. 71. Consider salvaging topsoil from the full construction right-of-way if localized weed infestations are encountered, as outlined in the WVMP (see Appendix C). 72. Consider placing mats (*i.e.,* construction mats or swamp mats) over infested areas to reduce construction equipment transporting weed seed or plant material. Where mats are used, ensure they are free of soil, vegetation and debris prior to removing from the site. 73. Record immediately any sites where equipment was specifically cleaned due to concerns associated with weeds and communicate to the Environmental Inspector(s). 74. Clean equipment (*i.e.,* shovel and sweep, pressurized water or compressed air) involved in topsoil/root zone material handling at weed-infested sites prior to leaving the location unless full right-of-way topsoil/root zone material salvage has been conducted. Clean equipment involved in topsoil handling at weed-infested sites prior to leaving the location. 75. Clean equipment in accordance with the recommendations provided by the pre-construction weed survey or by agreements in place with the landowner prior to entering organic farm/registered/certified seed grower lands in order to reduce the risk of introducing weeds (see Agricultural Management Plan in Appendix C). 76. Monitor weed growth on topsoil/root zone material piles during the course of construction and conduct corrective measures (*i.e.,* spraying), if warranted.

Activity/Concern	Potential Mitigation Measures
Weeds (cont'd)	77. Additional mitigation to reduce weed growth and spread may be warranted if topsoil/root zone material replacement is delayed due to construction scheduling. 78. Follow mitigation measures for weed control on organic farms (see Agricultural Management Plan in Appendix C). Refer to environmental resource-specific mitigation tables for vegetation provided in Appendix J.
Use of Herbicides	79. Restrict the application of herbicides to licensed applicators. 80. Prohibit the use of herbicides on organic farm lands (see Agricultural Management Plan in Appendix C). 81. Restrict the application of herbicide within 30 m of known rare plant populations or rare plant communities. Spot spraying, wicking, mowing or hand-picking are acceptable weed control measures in proximity to rare plants and rare plant communities. 82. Prohibit the use of herbicides within 30 m of a watercourse/wetland/lake unless otherwise approved by the Environmental Inspector(s). 83. Refer to the WVMP provided in Appendix C.
Clubroot - Alberta	84. Ensure all construction equipment and vehicles, as well as personnel footwear, arrive on the construction right-of-way in a clean condition to reduce the risk of introducing or spreading clubroot disease or other crop disease(s) prior to topsoil salvage activities. Refer to the Agricultural Management Plan (see Appendix C) for specific measures.
Potato Nematode - Alberta	85. Ensure all construction equipment and vehicles, as well as personnel footwear, arrive on the construction right-of-way in a clean condition to reduce the risk of introducing or spreading potato nematode prior to topsoil salvage activities. Refer to the Agricultural Management Plan (see Appendix C) for specific measures.
Phytophthora morum – BC Nurseries	86. Ensure all construction equipment and vehicles (as well as personnel footwear) arrive on the construction right-of-way in a clean condition and adhere to the nursery's Biosecurity Management Plan to reduce the risk of introducing or spreading Phytophthora morum prior to topsoil salvage activities. Refer to the Agricultural Management Plan (see Appendix C) for specific measures.
Agricultural Biosecurity	87. Ensure vehicles and equipment that have been moved from one nursery, poultry or hog barn operation to another of the same kind have been washed and disinfected prior to entering that operation.
Avian Flu – BC Poultry Facilities	88. Ensure that all construction equipment and vehicles (and personnel footwear) arrive on the construction right-of-way in a clean condition and adhere to the facility's Biosecurity Management Plan to reduce the risk of introducing or spreading Avian Flu prior to topsoil salvage activities. Refer to the Agricultural Management Plan (see Appendix C) for specific measures.

Activity/Concern	Potential Mitigation Measures
Watercourses, Wetlands and Lakes	89. Adhere to water crossing requirements provided in environment resource-specific mitigation tables for aquatic resources provided in Appendix I. 90. No construction activity will occur within the RAP or outside the instream work window of least risk for any watercourse unless: it is dry or frozen to the bottom at the time of construction; if trenchless techniques are employed; or work during the RAP or outside the window of least risk receives approval from the appropriate regulatory authorities. 91. Ensure any disturbance of the construction right-of-way on the approach to any watercourse or wetland crossed by the construction right-of-way and associated activities are reduced, stabilized and reclaimed. 92. Implement appropriate precautions to prevent deleterious substances (*e.g.,* gasoline, sediment, oil, cement or concrete residue, etc.) from entering watercourses/wetlands/lakes. Cleaning, fuelling and servicing of equipment are to be conducted in an area, or in a manner, where spills or wash water will not contaminate surface water or groundwater resources. An appropriate emergency spill kit is to be available at all times. 93. Ensure that equipment arrives on site in a clean condition. Equipment should also be cleaned after construction to ensure it does not transfer soil, debris, invasive plants or aquatic pests (*e.g., Myxobolus cerebralis* - the parasite that causes whirling disease in fish) to other locations. 94. Prevent construction materials and debris from entering watercourses. 95. Install and maintain appropriate erosion and sediment control measures to prevent sediments from disturbed areas from being transported into watercourses/wetland/lakes (see Drawings [Erosion Control – Rollback in Riparian Areas] and [Mounding in Riparian Areas] provided in Appendix R). 96. Correspondence from appropriate regulatory authorities (*e.g.,* DFO) may result in additional conditions and measures regarding the proposed works that will be incorporated into the mitigation program. 97. Ensure the following separation distances are maintained between a watercourse/wetland/lake when planning and constructing the pipeline, unless otherwise approved: • fuel or hazardous material storage site - 300 m; • burning site - 100 m; and • oil change and refuelling area - 100 m.
Wetlands	98. Ensure approvals are in place prior to works in and around wetlands. 99. Protect vegetation mat from construction disturbance. Any TWS located within the boundary of a wetland must be approved by the Environmental Inspector(s). 100. Reduce the removal of vegetation in wetlands to the extent practical. Conduct ground level cutting, mowing or mulching or walking-down of wetland vegetation instead of grubbing. The method of removal of wetland vegetation is subject to approval by the Environmental Inspector(s) and Resources Specialists.

Activity/Concern	Potential Mitigation Measures
Wetlands (cont'd)	101. Prevent ground disturbance by using a protective layer such as frost packing, snow, ice or matting between wetland vegetation mat/seedbed and construction equipment. 102. Narrow the proposed area of disturbance and protect the wetland by using fencing. Clearly mark the wetland boundaries using signage, flagging or fencing and limit traffic in the vicinity of the flagged/fenced off area, if feasible. 103. Salvage flagged or fenced live trees or shrubs from the banks of wetlands if requested by the Environmental Inspector(s) or noted on the Environmental Alignment Sheets. Store salvaged trees and shrubs along the side of the construction right-of-way in a manner such that they do not dry out before replanting during final clean-up. 104. Restrict grading to areas adjacent to the wetland boundary to the extent feasible. Direct grading away from wetlands. 105. Install berms and/or cross ditches on approach slopes to wetlands, where warranted. 106. Maintain sediment fences in place at (non-peat) wetland boundaries, where warranted, until a vegetation cover has stabilized the adjacent construction areas. 107. Allow wetlands to recover naturally (*i.e.,* do not seed wetland areas).
Heritage Resources	108. Follow any recommendations identified in the HRIA for Alberta and AIA for BC. Determine if the approvals from the appropriate regulatory authority are necessary prior to commencing any construction activity located within 30 m of a monument, archaeological site or burial ground. 109. Suspend work in proximity (*i.e.,* within 30 m) to archaeological sites (*e.g.,* arrow heads, modified bone, pottery fragments, fossils) discovered during construction. No work at that particular location shall continue until permission is granted by the appropriate regulatory authority. Follow the contingency measures identified in the Heritage Resources Discovery Contingency Plan (see Appendix B). 110. Arrange for emergency archaeological excavation of previously unidentified sites encountered by pipeline construction wherever such sites warrant attention and timings of these excavations will be decided with input of the Archaeological Resource Specialist, regulatory authorities, and the Lead Environmental Inspector. Following discussions with the regulatory authorities, any work that can proceed following construction will be mapped and suitably flagged for later investigation. 111. Refer to environmental resource-specific mitigation tables for archaeological and palaeontological resources provided in Appendix N. 112. Prohibit the collection of any historical, archaeological or palaeontological resources by Project personnel. 113. Avoid disturbance of geodetic or legal survey monuments, to the extent feasible. Where a geodetic monument is disturbed during construction of the pipeline or associated facilities, the Construction Manager will immediately report such disturbance to the appropriate regulatory authority. The Contractor will re-establish the monument, where feasible, in accordance with the instructions of the Dominion Geodesist.

Activity/Concern	Potential Mitigation Measures
Traditional Land and Resource Use	114. Implement the contingency measures identified in the Traditional Land Use Sites Discovery Contingency Plan (see Appendix B) in the event traditional land use sites not previously identified are found during pipeline and associated component construction. 115. Refer to the environmental resource-specific mitigation tables for traditional land use provided in Appendix Q.
Noise Emissions	116. Adhere to all federal (*i.e., Environment Canada, Motor Vehicle Safety Act*, *Oil and Gas Occupational Safety and Health Regulations*, etc.) and provincial (*i.e.,* Directive 038: Noise Control, BC *Noise Control Best Practices Guideline* [BC OGC 2009], Section 7.2 of the *Occupational Health and Safety Regulations*, etc.) guidelines and legislation for noise management. 117. Noise abatement and construction scheduling will be considered at noise-sensitive locations (*i.e.,* neighbouring landowners) and during noise-sensitive periods. 118. Schedule intermittent noise-producing events to avoid, where feasible, important habitat of wildlife species at risk/sensitive species/livestock during sensitive periods, where feasible. 119. Enforce vehicle speed limits and inform Contractor truck drivers and equipment operators that engine retarder braking in urban areas is prohibited. 120. Maintain equipment in good working condition and in accordance with manufacturer guidelines. 121. Use only the size and power of tools necessary to limit noise from power tool operations. Ensure stationary equipment, such as compressors and generators, will be located away from noise receptors, to the extent feasible, and all follow applicable provincial and federal guidelines. 122. Refer to environmental resource-specific mitigation tables for noise provided in Appendix P and as shown on the Environmental Alignment Sheets. 123. Maintain noise suppression equipment (*e.g.,* silencers) on all construction machinery and vehicles. 124. Implement mitigation measures where residences are located within 300 m of the construction right-of-way or facility site as outlined in the Noise Management Plan (see Appendix C). 125. Implement mitigation measures where night-time activity (*e.g.,* HDD) on the construction right-of-way or facility site is located within 500 m of residences as outlined in the Noise Management Plan (see Appendix C). 126. Vary timing and shape of charge based on proximity to noise receptors. 127. Enclose noisy equipment and use baffles such as material storage and subsoil piles, where and when feasible, to limit the transmission of noise beyond the construction site.

Activity/Concern	Potential Mitigation Measures
Air Quality/ Odour/Green House Gas (GHG) Emissions	128. Restrict the duration that vehicles and equipment are allowed to sit and idle to less than one hour, unless air temperature is less than 0°C. 129. Ensure equipment is well-maintained during construction to minimize air emissions and unnecessary noise. 130. Use multi-passenger vehicles for the transportation of crews to and from the job sites, where feasible. 131. Conduct burning in accordance with burning permit requirements and A Smoke Management Framework for BC (BC MOE 2011a), as applicable. Comply with local government bylaws, the *Forest and Prairie Protection Act* (Alberta) and *Open Burning Smoke Control Regulation* (BC) and the *Forest Fire Prevention and Suppression Regulation* (BC) when burning slash. 132. Refer to environmental resource-specific mitigation tables for air quality/GHG emissions provided in Appendix O.
Drainage	133. Maintain drainage across the construction right-of-way during all phases of construction. 134. Ensure the potential for soil erosion by water is reduced during construction activities by avoiding ponding of water or the unintentional channelization of surface water flow. 135. Provide surface drainage of adequate capacity across the construction right-of-way and other pipeline-related facilities. 136. Inspect all water conveyance installations (*e.g.,* ditches and culverts) and ensure they are functioning appropriately. Take appropriate action prior to and during the spring freshet to clear culverts blocked by ice or debris. 137. Re-establish all sub-surface drains following pipeline installation and backfilling (see Agricultural Management Plan in Appendix C).
Wet/Thawed Soil Conditions	138. Adhere to the measures outlined in the Wet/Thawed Soils Contingency Plan (see Appendix B) during wet/thawed soil conditions. 139. In consultation with the Environmental Inspector, postpone construction, suspend equipment travel or utilize construction alternatives in the event of wet or thawed soils in order to reduce terrain disturbance and soil structure damage. 140. Initiate contingency measures once one of the following indicators occurs: excessive rutting of topsoil/root zone material to the extent that admixing may occur; excessive wheelslip; excessive build-up of mud on tires and cleats; formation of puddles; and/or tracking of mud down the road as vehicles leave the construction right-of-way or construction site. 141. Record the UTM coordinates of areas where geotextile, swamp mats, matting or log corduroy is installed for any reason. This information will be used to assist in ensuring that all of these materials used to improve trafficability on the construction right-of-way are removed during clean-up. 142. The wet/thawed soil conditions shut-down decision will be made by the Environmental Inspector(s) in consultation with the Construction Manager. 143. Factors influencing a decision to postpone start-up or shut-down work include: the weather forecast; planned construction activity and/or schedule; and availability of non-problem areas (*i.e.,* frozen or well-drained soil conditions).

Activity/Concern	Potential Mitigation Measures
Erosion and Sedimentation	144. Install erosion and sediment control measures to the satisfaction of the Environmental Inspector(s). Implement structures and materials (*e.g.,* cross ditches and berms) as outlined in the Soil Erosion and Sediment Control Contingency Plan (see Appendix B) to ensure that sediment, in surface water draining from the construction right-of-way does not adversely affect the surrounding terrain or watercourses/wetlands/lakes (see Drawings [Cross Ditches and Diversion Berms] and [Sediment Fence] and [Erosion Control Matting/Blanket] provided in Appendix R). In particular, control erosion on the banks of watercourses, valley slopes, unstable slopes and grade cuts disturbed by construction activities along the construction right-of-way.
	145. Maintain or, when the area is stabilized, remove drainage and erosion control devices and materials, at all sites that are no longer in use including: temporary roads; borrow sites; spoil disposal sites; stock pile sites; and work pads.
Waste Disposal	146. Collect all construction debris (*e.g.,* welding rods, oil cans, ropes, bands, timbers, caps) and other waste materials on a regular basis and dispose of at an approved facility and in accordance with the Waste Management Standard (see Appendix C) and the Spill Contingency Plan (see Appendix B). Ensure wastes are recycled where practical.
	147. Prohibit the installation of waste collection receptacles or portable toilets on organic farm lands (see Agricultural Management Plan in Appendix C). Ensure waste containers accompany each working unit. Prohibit waste disposal in the trench.
	148. Ensure the construction site is left in a tidy and organized condition at the end of each day.
	149. Store all garbage in wildlife-proof containers when potential wildlife/human conflicts may occur.
Waste and Hazardous Material Storage	150. Follow measures outlined in the Waste Management Standard (see Appendix C) for storage of waste or hazardous materials on the work site.
	151. All personnel will be made aware of their responsibilities for proper handling, identification, documentation and storage of hazardous materials and wastes.
	152. Personnel who will be handling hazardous materials and wastes will possess valid Workplace Hazardous Materials Information System (WHMIS) training (Health Canada 2010).
	153. An appropriate number of portable toilets will be made available to ensure each crew has ready access to washroom facilities. The facilities will be serviced and cleaned regularly and will be adequately secured. All site personnel are to use portable toilets as provided.
	154. Bulk hazardous materials will be stored in temporary construction yards or other designated areas except for quantities required for the daily construction activities. Wastes will be stored in temporary construction yards or other designated areas and removed during final clean-up. Fuel, oil or hazardous materials required to be stored onsite will be stored within secondary containment that is to be located greater than 300 m from a wetland, watercourse or lake.

Activity/Concern	Potential Mitigation Measures
Waste and Hazardous Material Storage (cont'd)	155. Store bulk tanks containing hazardous materials (*e.g.,* fuel for construction equipment) in a bermed area lined with an impervious polyethylene liner. Containment berms will be large enough to contain 110% of the largest tank plus 10% of the aggregate tank volume within the containment area or as otherwise specified by regulatory requirements. Note that secondary storage for fuel storage tanks is required as noted above for volumes exceeding 1,000 L. Oversized secondary containment for hydrocarbons will be designed and sized in accordance with appropriate provincial and federal requirements. Remove any rainwater which accumulates within the containment structure if authorized by the Environmental Inspector(s). If there is a visible hydrocarbon sheen, the water in the containment structure will be collected for proper storage and disposal. 156. Visually inspect fuel tanks on a regular basis as well as when the tank is refilled. Maintain inspection records for each tank. Take remedial action as soon as a crack, dent or leak is detected.
Contaminated Soils	157. Implement the Contamination Discovery Contingency Plan (see Appendix B) and applicable measures for the Waste Management Standard (see Appendix C) in the event contaminated soils are encountered during construction.
Spill Prevention	158. Maintain all appropriate spill equipment at all work sites. Assess the risk of resource-specific spills to determine the appropriate type and quantity of spill response equipment and materials to be stored onsite and a suitable location for storage (see Emergency Response Plan in Volume 4C). 159. Store all hazardous substances and fuels in proper containment systems, to prevent release to the environment. Handle all hazardous materials in accordance with applicable WHMIS protocols. 160. Ensure that during construction no fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides, or other chemicals are dumped on the ground or into watercourses/wetlands/lakes. In the event of a spill, implement the Spill Contingency Plan (see Appendix B). 161. Transport, handle, use and dispose of hazardous materials in accordance with provincial and federal regulatory requirements, and as identified in the Waste Management Standard (see Appendix C).
Equipment Refuelling and Servicing	162. Report spills immediately to the Environmental Inspector(s) who will, if warranted, notify the Environmental Compliance Manager for reporting to the appropriate regulatory authorities in accordance with the Spill Contingency Plan (see Appendix B). 163. Do not store fuel, oil or hazardous material within 300 m of a watercourse/wetland/lake. 164. Ensure that operators and onsite construction foremen are trained to contain spills or leakage from equipment. 165. Prohibit refuelling/servicing of equipment/vehicles on organic farm lands unless otherwise approved by the landowner (see Agricultural Management Plan in Appendix C). 166. Place an impervious tarp or drip tray underneath equipment/vehicles when servicing equipment/vehicles with the potential for accidental spills (*e.g.,* oil changes, servicing of hydraulic systems, etc.).

Activity/Concern	Potential Mitigation Measures
Equipment Refuelling and Servicing (cont'd)	167. Ensure that bulk fuel trucks, service vehicles and pick-up trucks equipped with box-mounted fuel tanks carry spill prevention, containment and clean-up materials that are suitable for the volume of fuels or oils carried. Carry spill response supplies on bulk fuel and service vehicles that are suitable for use on land and water (*i.e.,* sorbent pads, sorbent boom and rope). 168. Conduct refuelling a minimum of 100 m (BC Ministry of Water, Land, Air Protection 2002) from any watercourse/wetland/lake unless otherwise approved by the appropriate regulatory authority. 169. Employ the following measures to limit the risk of fuel spills in water. Where equipment refuelling is necessary within 100 m of a watercourse/wetland/lake, ensure that: • all containers, hoses, nozzles are free of leaks; • all fuel nozzles are equipped with automatic shut-offs; • operators are stationed at both ends of the hose during fuelling unless the ends are visible and readily accessible by one operator; and • fuel remaining in the hose is returned to the storage facility. 170. Do not wash equipment or machinery in watercourses/wetlands/lakes. Control wastewater from construction activities, such as equipment washing or cement mixing, to avoid discharge directly into any body of water.
Ornamental Tree/ Shelterbelts/ Windrows/ Hedgerows	171. Save ornamental trees, wind breaks or shelterbelts to the extent practical if requested by the landowner in the Line List. 172. Measures such as narrowing down of the construction right-of-way, extending road bores, fencing off and/or salvaging trees with a tree spade may be necessary to avoid or reduce effects on ornamental trees, windbreaks, hedgerows, shelterbelts and yards, as specified on the Line List.

8.0 PIPELINE-SPECIFIC CONSTRUCTION MITIGATION MEASURES

Introduction

The potential mitigation measures provided in this section are designed to avoid or reduce effects to the environment during the construction of the pipeline and associated facilities. The following potential mitigation measures may be implemented by Trans Mountain, its Contractors and subcontractors during construction activities along all pipeline construction spreads.

Objective

The objective of these potential mitigation measures is to ensure that pipeline construction is conducted in a manner that reduces adverse effects on residents in the area, land users and socio-economic and environmental resources.

8.1 Clearing and Disposal

Introduction

The following potential mitigation measures will be implemented by Trans Mountain, its Contractors and subcontractors during the clearing phase for pipeline construction.

Objective

The objective of these mitigation measures is to:

- delineate the construction right-of-way;
- limit disturbance of vegetation (*i.e.,* merchantable timber and native vegetation) to the extent practical; and
- reduce surface disturbance to the extent practical and promote the natural regeneration of vegetation.

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern	Potential Mitigation Measures
Approvals, Licenses Permits	1. Ensure that any required approvals, licenses and permits that are necessary are in place prior to commencing applicable construction activities. 2. Determine the necessary cutting and timber marking authorizations needed prior to construction. 3. Notify and consult with all affected land owners, timber tenure licensees or other forestry related permit holders prior to construction. This will involve the co-operation of the BC MFLNRO and AESRD. 4. Coordinate timber harvesting and/or land clearing and debris disposal activities according to Provincial legislation or agreements. 5. Complete danger tree assessments and danger tree removals in the forested areas located adjacent to the construction right-of-way, with the agreement of the land owner or the provinces' applicable regulatory authorities.

Activity/Concern	Potential Mitigation Measures
Pre-Clearing	6. Pre-clear or pre-mow areas of native vegetation outside the restricted migratory bird activity period (RAP) to reduce the risk of birds nesting on the construction right-of-way where construction is scheduled to occur during the spring/summer period (see Appendix L, Table L-2). 7. Accommodate landowners/operator requests for plant salvage and plant relocation protocols on intensive crop production lands such as nurseries, blueberry and sod farms, where feasible (see Appendix C – Agricultural Management Plan).
Staking/Flagging/ Fencing	8. Re-stake/flag after pre-clearing and prior to pipeline clearing along the construction right-of-way as well as at identified resource-specific feature locations (*e.g.,* archaeological site, rare plant species, wildlife habitat features, etc.) within the immediate vicinity of the environmental resource to alert workers of their presence. Resource-specific feature locations are identified within the resource-specific mitigation tables (see Appendix E to Q) and on the Environmental Alignment Sheets. 9. Identify locations where gaps in the slash/rollback windrow, if needed, are to be created. Gaps are typically associated with terrain features (*e.g.,* slope changes), crossings (*i.e.,* watercourse, road, pipeline) and bends. To the extent practical, also leave gaps at well-used wildlife trails. Breaks in the slash/rollback windrow will be coincident with gaps in the snow, topsoil/root zone material, spoil windrows and gaps in strung and set-up pipe. 10. Replace signs in the vicinity of sensitive environmental features, where warranted, to alert workers of the presence of environmentally sensitive features and to ensure their protection of these resources. 11. Narrow down the area of disturbance to the extent practical and clearly mark the area to be cleared.
Watercourse/ Wetland Riparian Buffer	12. Restrict root grubbing in wet areas, where practical, to avoid creation of bog holes. 13. Prohibit clearing of extra TWS within the riparian buffer, only the trench and TWS areas will be cleared. Ensure staging areas for watercourse/wetland crossing construction, grade/borrow areas for wetland ramps and spoil storage areas are located a minimum of 10 m from the banks of watercourse/wetland/lake boundaries. This distance may be reduced by the Lead Environmental Inspector and the Environmental Inspector(s) where appropriate controls are in place and where no riparian area is present (*e.g.,* cultivated or disturbed lands that abut the watercourse banks or boundaries of the wetland).
Nests	14. Ensure that a breeding bird nest survey is conducted by a qualified avian biologist prior to initiating activities in areas where pre-clearing or clearing activities have not been completed prior to the start of the migratory bird nesting period (see Appendix L). If an active nest is identified, it will be subject to site-specific mitigation measures (*e.g.*, protective buffer or non-intrusive monitoring). The appropriate mitigation strategy will be selected by the Lead Environmental Inspector and Environmental Inspector(s) or Wildlife Resource Specialist from the Wildlife Species of Concern Discovery Contingency Plan (see Appendix B). 15. Clearing and mowing outside of the appropriate least risk timing window or within the migratory bird season RAP will only be allowed where nest surveys have been completed by a qualified Wildlife Resource Specialist within 7 days of the commencement of clearing and no nesting activity was observed within the applicable setback distance.

Contractor Measures

The following activity-specific mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Workspace	16. Obtain approval from the Construction Manager prior to taking additional workspace in the field. Additional workspace will not be allowed within the riparian buffer at watercourse and wetland crossings.
Schedule	17. Conduct pre-clearing of timber and shrubby vegetation and/or pre-mowing of native grassland and tame pasture where directed by the Environmental Inspector(s), identified within the resource-specific mitigation tables (see Appendices E to Q) outside the restricted migratory bird activity period (RAP) to reduce the risk of birds nesting on the construction right-of-way where construction is scheduled to occur during the spring/summer period (see Appendix L, Table L-2). 18. Schedule hauling of timber potentially infected by a forest parasite (*e.g.,* mountain pine beetle) for the period either before or after the beetle flight period, to the extent feasible, unless otherwise approved by provincial forestry authorities.
Bar Ditch Ramps	19. Facilitate access for clearing and disposal activities by constructing bar ditch ramps with borrow material (not topsoil) unless otherwise determined by the Lead Environmental Inspector and the Environmental Inspector(s) or the appropriate regulatory authority. 20. Ramp bar ditches with snow/ice where the potential for a mid-winter thaw is low. 21. Install culverts in bar ditch ramps to maintain drainage. Culvert specifications will be determined by the Environmental Inspector(s). 22. Re-establish bar ditch ramps where removed following summer and winter pre-clearing to facilitate access to the construction site to complete clearing.
Hotline Exposure/ Hydrovac	23. Ensure that all hydrovac tanks are clean and free of contaminants prior to arriving onsite. 24. Salvage topsoil/root zone material prior to exposing hotlines. Topsoil salvage is not required prior to exposing hotlines for holes less than 1 m in diameter if soil will be removed using a hydrovac during frozen soil conditions or where the area to be exposed will be subsequently subject to topsoil/root zone material salvage as part of construction right-of-way preparation activities. 25. If temporary onsite storage is constructed (*e.g.,* sump or bermed area), salvage topsoil/root zone material, if present, from the area to be used for storage and size the storage area to be able to contain the slurry by preventing off-site migration of the stored slurry. 26. Construct a dike to contain slurry, where required, and compose the dike material of subsoil material to prevent any surface water runoff from contacting the slurry. Ensure that hydrovac slurry will not be pumped into or allowed to flow into a watercourse/wetland/lake.

Activity/Concern	Potential Mitigation Measures
Hotline Exposure/ Hydrovac (cont'd)	27. Assign a tow dozer or tractor to assist the hydrovac through localized wet areas to avoid or reduce rutting. 28. Implement the appropriate measures presented in the Hydrovac Cuttings Handling and Disposal Management Plan (see Appendix C) and in the Contamination Discovery Contingency Plan (see Appendix B) if contaminated or potentially contaminated soils are discovered during hydrovac activities. 29. Trans Mountain will ensure hydrovac slurry that is suspected to be contaminated receives special handling storage and disposal. 30. Empty the hydrovac truck onto subsoil at approved sites. Ensure that hydrovac material is contained within the designated release area (*i.e.,* will not migrate to a watercourse/wetland/lake or onto topsoil/root zone material). 31. Temporarily store hydrovac slurries on the Project footprint in the hydrovac truck, in clean oilfield storage tanks, at a site designed to safely store slurry or in a metal slop bin if other more practical storage options (*i.e.,* temporary pits) are not feasible for the site. 32. Backfill and compact all hydrovac holes during rough clean-up with mineral or organic soil to ensure settling of material does not pose a hazard for wildlife or livestock, or from subsidence/ponding of Lower Mainland Region soils. 33. Remove all hydrovac slurry, produced from work, on organic farms to an approved disposal location and replace hydrovac holes with mineral soil obtained from the organic farm.
Clearing Limits	34. Do not clear, mow or grade beyond the stakes unless additional TWS rights have been obtained. Clear vegetation from only those areas essential for construction. 35. Suspend clearing within 30 m, minimum of an active nest discovered during clearing. Note that buffers could be expanded if the nest is being used by a bird species with a special provincial and/or federal protection status. Fence or flag-off the area and contact the Environmental Inspector(s) (see Wildlife Species at Concern Discovery Contingency Plan in Appendix B). 36. Confine all pre-clearing/mowing and general clearing activities within the staked/flagged construction right-of-way boundaries. Adhere to clearing/mowing restrictions associated with watercourse/wetland/lake boundary sensitive environmental features and buffer areas, in addition to those areas outlined in the resource-specific mitigation tables (see Appendices E through Q). 37. Prohibit clearing of extra TWS within the riparian buffer. Ensure staging areas for watercourse/wetland crossing construction, grade/borrow areas for wetland ramps and spoil storage areas are located a minimum of 10 m from the banks of watercourses/wetland/lake boundaries. This distance may be reduced by the Lead Environmental Inspector and the Environmental Inspector(s) where appropriate controls are in place and where no riparian area is present (*e.g.,* cultivated or disturbed lands that abut the watercourse banks or boundaries of the wetland). 38. Request assistance from the Lead Environmental Inspector and the Environmental Inspector(s) to determine the size of an avoidance buffer surrounding areas where clearing is to be avoided.

Activity/Concern	Potential Mitigation Measures
Clearing/ Mowing	39. Ensure the clearing Contractor removes timber and shrubby vegetation and/or mows native or agronomic grasses from the construction right-of-way and TWS prior to the onset of the critical bird nesting season in the spring (typically May 7 in Alberta; March 15 in BC). 40. Avoid clearing one season or 1 year in advance of construction of the right-of-way on steep slopes with erodible soils, except, where necessary and with an approved Erosion and Sediment Control plan. Limit clearing to a travel lane only wide enough to allow access of clearing equipment. 41. Install erosion and sediment control measures such as sediment fences as soon as feasible following pre-clearing and as directed by the Environmental Inspector(s) to reduce the risk of erosion and sedimentation (see Drawing [Sediment Fence] provided in Appendix R). 42. Clear or mow at wetlands with native vegetation outside the restricted migratory bird activity period (RAP) to reduce the risk of birds nesting on the construction right-of-way where construction is scheduled to occur during the spring/summer period. 43. Use methods that leave the sod/vegetation layer (*i.e.,* deciduous woody root layer) intact during pre-clearing activities.
Sensitive Terrain	44. Use hand clearing methods where directed by the Lead Environmental Inspector and Environmental Inspector(s) to avoid or reduce disturbance to the ground surface on sensitive terrain. 45. Use cut-off type saw equipment during timber salvage operations that reduces off the right-of-way disturbance. Use low-ground-pressure equipment to transport salvaged logs.
Watercourses	46. Clear vegetation located within the watercourse/wetland/lake vegetation buffer area crossed by the pipeline right-of-way and TWS only if absolutely necessary. 47. Refer to applicable clearing guidelines for protection of streams and wetlands provided in the *Forest Practices Code,* and the *Riparian Management Area Guidebook* in BC, where riparian management zones (widths) are identified based on stream or wetland class (British Columbia Ministry of Forests 1995). See Appendix I for dimensions of these riparian zones for watercourses crossed by the pipeline in Alberta and BC. 48. Maintain low vegetation or vegetated ground mat within the riparian buffer zone of watercourses, to the extent practical, by clearing only trees and walking-down low vegetation so low-lying vegetation remains intact. Limit grubbing of cleared/mowed trees/shrubs only to the trench line and work side area needed for the vehicle crossing to protect riparian areas. 49. Leave vegetative ground mat and root structure intact at watercourses, wetland or lake riparian buffers when pre-clearing is necessary. Clearing/grading within the vegetated buffer is subject to approval of the Environmental Inspector(s) after considering: 1) slope gradient before grading and after slope has been graded out; 2) potential for sedimentation (*i.e.,* soil texture of materials to be graded); 3) water crossing construction method and schedule; and 4) potential for re-establishment of cleared/grubbed riparian vegetation. Each crossing requires pre-planning with the Environmental Inspector(s) prior to work occurring.

Activity/Concern	Potential Mitigation Measures
Watercourses (cont'd)	50. Salvage flagged or fenced live shrubs from the banks of watercourses if requested by the Environmental Inspector(s) or noted on the Environmental Alignment Sheets. Store salvaged dormant shrubs on the side of the construction right-of-way in a manner such that they do not dry out before replanting during final clean-up. 51. Fell trees away from watercourses and away from limits of the construction right-of-way to reduce damage to streambanks, beds and adjacent trees. Hand clear the area, if necessary, to reduce disturbance. Any trees, debris and soil inadvertently deposited within the ordinary high watermark will be promptly removed in a manner that avoids or reduces disturbance of the bed and banks. Trees will not be stood or hauled across watercourses. 52. Clearly flag/stake the drill path and avoid clearing of riparian vegetation within the vegetated buffers at watercourses to be crossed using a trenchless method (*e.g.,* HDD, bore) except, if necessary, along the travel lane. 53. Retain salvageable timber in the vicinity of water crossings for use in the construction of the watercourse vehicle crossings or reclamation works, if warranted. 54. Ensure disturbance of the right-of-way within the functional riparian area of any watercourse/wetland/lake encountered by the proposed construction right-of-way, is reduced and stabilized and reclaimed.
Wetlands	55. Adhere to clearing guidelines for the protection of streams and wetlands provided in AESRD's guidelines and the Forest Practices Code, Riparian Management Area Guidebook in BC (BC MFLNRO 1995), where riparian management zones (widths) are identified based on stream or wetland class. 56. Schedule construction in wetlands during late fall and winter, to the extent feasible when wetlands are frozen or during periods when water levels are low. 57. Maintain low vegetation or vegetated ground mat within the vegetated buffer zone of wetlands to the extent practical by walking down, mowing, storing material or constructing over the undisturbed areas. 58. Narrow down the construction right-of-way and area of disturbance at wetlands, where practical, by using fencing to prevent encroachment on wetlands. Clearly mark the wetland boundaries using flagging and limit traffic in the vicinity of the flagged area. Utilize appropriate machinery (*i.e.,* wide pad machines) and clean swamp mats or equivalent under non-frozen soil conditions. 59. Salvage flagged or fenced live trees or shrubs from the banks of wetlands if requested by the Environmental Inspector(s) or noted on the Environmental Alignment Sheets. Store salvaged trees and shrubs on the side of the construction right-of-way in a manner such that they do not dry out before replanting during reclamation.
Leaning and Damaged Trees	60. Fell all trees damaged during construction activities immediately. Do not postpone felling or painting of damaged trees until clean-up. Remove any trees that fall outside the boundary of the construction right-of-way. A tree that has fractured limbs or bark loss on 50% of its circumference is to be considered damaged.

Activity/Concern	Potential Mitigation Measures
Forest Health Measures – General	61. Reduce or avoid damage to trees on the edge of the construction right-of-way to limit the potential for infection and spread of forest health pathogens. Remove trees that are inadvertently damaged. 62. Avoid stacking fallen infested trees near healthy standing or felled trees.
Forest Health Measures – BC	63. Carefully control the movement of woody debris and follow the relevant guidelines and restrictions of the local Forest Districts for control of mountain pine beetle and other forest pests, as warranted, as outlined in the Timber Salvage Management Plan (see Appendix C). 64. Use of a variety of techniques such as burning of merchantable timber or removal of all bark from conifer logs will be implemented if tree clearing and hauling occurs within the beetle flight period. Where logs are to be transported into Alberta or within BC, all bark from logs will be removed as per procedural guidelines that apply within the relevant Forest District. Check with the local Forest District contact as to the anticipated beetle flight period prior to transporting logs. 65. Dispose of all salvageable timber infested with mountain pine beetle (or other forest parasite) by burning or mulching to eliminate the risk of spread of forest parasites.
Merchantable/ Salvageable Timber	66. Salvage and deck timber as denoted in the Timber Salvage Management Plan (see Appendix C). Locations of log deck sites will be shown on the final Environmental Alignment Sheets. 67. Salvage timber with equipment that is appropriate for the terrain conditions, limits damage to salvaged timber and harvests timber that meets the receiving mill's requirements (see Tables 8.1-1 and 8.1-2 for timber salvage requirements for Alberta and BC, respectively). 68. Salvage and deck timber (merchantable and salvageable) on privately-owned lands where requested on the Line List. Consider the timber to be non-salvageable and dispose of it accordingly if the landowner has not requested timber salvage. 69. Use low-ground-pressure equipment, where warranted, to transport salvaged logs to deck sites. 70. 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. 71. Use cut-off type saw equipment and fell timber in a manner which reduces butt shatter and breakage. 72. Cut Douglas-fir and spruce stumps below a height of 45 cm. 73. Manage logging debris and slash to reduce secondary bark beetle habitat and wildfire hazard.
Log Deck Site Preparation	74. Locate deck sites in previously disturbed areas, wherever practical. Avoid additional clearing and grading. Do not salvage root zone material at deck sites. 75. Ensure that deck sites are set back further than 30 m from existing foreign line/utility crossings and in accordance with the Timber Salvage Management Plan (see Appendix C).

Activity/Concern	Potential Mitigation Measures
Non-Salvageable Timber	76. Clear non-salvageable timber with a bulldozer equipped with a cutter blade or equivalent. This will assist in maintaining an intact ground surface in areas where grading is not warranted. Angle blade and make initial passes down boundaries of construction right-of-way.
	77. Use brushcutters, brushhogs or other equipment to mulch/chip stumps of cleared non-salvageable timber to reduce terrain disturbance by maintaining an intact ground surface in areas where grubbing and grading is not warranted.
	78. Do not dispose of upland woody debris in mineral wetland.
Corduroy, Rollback, Slash Berms	79. Retain salvageable timber (following consultation and receiving authorization from the Forest District authority and Forest Tenure holder), where warranted, for use as corduroy, slash berms and/or rollback.
	80. Locations where rollback/slash berms are to be used are identified in the resource-specific mitigation tables (see Appendix F) and on the Environmental Alignment Sheets. The amount of timber retained for use as rollback, slash berms or corduroy will be determined by the Construction Manager in consultation with the Lead Activity Inspector, the Lead Environmental Inspector and the Environmental Inspector(s) and the appropriate regulatory authorities.
	81. Locate gaps in pipe to facilitate wildlife movement in places that also facilitate construction such as at slope changes, crossings (*i.e.,* watercourse, road, pipeline right-of-way, railway) and bends. The locations of the gaps should coincide with gaps in spoil, slash piles and snow windrows. The locations can be determined in the field by the Environmental Inspector(s). Place rollback in a manner that does not allow for woody slash pieces to touch and create or enhance a fire hazard.
	82. Use salvageable timber for rollback and slash berms that do not have the potential for spreading of forest parasites unless otherwise approved by the appropriate regulatory authority.
Grubbing	83. Postpone root grubbing until immediately prior to grading along segments of the construction right-of-way where pre-clearing occurred and where there is a potential for soil erosion to occur, due to sloping terrain and erodible soils.
	84. Reduce the width of grubbing through wet areas during construction to facilitate the re-sprouting and/or natural regeneration of shrub communities.
	85. Restrict root grubbing to the trench line, if feasible, to minimize surface disturbance and encourage re-sprouting/natural regeneration of deciduous trees and shrubs.
	86. Where grubbing and grading are not necessary, use a mulcher to chip stumps and mow surface vegetation (*i.e.,* shrubs, small trees) to ground level to preserve topsoil/root zone material and establish a smooth work surface.
	87. Grub tree roots with a brush rake attachment on a bulldozer to preserve topsoil/root zone material.
	88. Restrict root grubbing in wet areas, where practical, to avoid creation of bog holes.
	89. Restrict root grubbing on steep erosion prone slopes, unless safety is a concern, in order to minimize soil disturbance and erosion.
	90. Restrict grubbing within 2 m of the edge of the construction right-of-way to prevent damaging adjacent trees.

Activity/Concern	Potential Mitigation Measures
Grubbing (cont'd)	91. Restrict root grubbing to the area located outside of the vegetated riparian buffer adjacent to watercourses/wetlands/lakes. There will be no grubbing within vegetated buffers adjacent to watercourses, wetland and lakes except along the trench line and, where warranted, at vehicle crossing areas. Trench spoil will be stored outside of the vegetated buffer, if practical. Where a vehicle crossing is to be installed, the area within the vegetated buffer can be levelled with geotextile/subsoil, matting or snow packing. Maintain low vegetation or vegetative ground mat within the buffer zone of the watercourses to the extent practical by walking-down vegetation or snow packing over the vegetation mat to facilitate construction activities. Grubbing and grading within the vegetated buffer will be subject to the approval of the Lead Environmental Inspector and the Environmental Inspector(s) after taking into account the following criteria: construction safety; slope gradient both before grading and after the slope has been graded out; potential for sedimentation of the watercourse; and the potential for re-establishment of riparian vegetation.
Slash Piling	92. Limb and buck fell materials to lengths manageable by construction equipment. 93. Use a brush rake attachment on a bulldozer to push slash and non-salvageable timber into piles along the centre or to a side of the construction right-of-way that have been previously cleared. This will facilitate preservation of any topsoil/root zone material. Leave an appropriate fuel break based on risk and surrounding fuels, as determined by qualified personnel. 94. Do not pile any debris resulting from clearing in a manner that creates a continuous barrier to large mammal movements.
Slash Disposal	95. Confirm slash disposal requirements where disposal methods are subject to agreements with AESRD and BC Ministry of Forests, Lands and Natural Resource Operations. 96. Conduct burning in accordance with burning permit requirements and *A Smoke Management Framework for British Columbia* (BC MOE 2011a), as applicable. Adhere to the AESRD *Forest and Prairie Protection Regulations* in Alberta. 97. Dispose of all slash (salvageable timber or stumps) through burning or mechanical mulching, unless otherwise directed by the Environmental Inspector(s) or the appropriate regulatory authority. Determine the necessary burning permits prior to disposal. 98. Monitor disposal of slash by mechanical means (*i.e.,* mulching), to ensure the maximum depth of mulch will not exceed 5 cm or in accordance with the applicable provincial legislation, whichever is less. 99. Avoid burning slash in the Lower Mainland Region where air quality is an issue. Mulch in place or chip/haul slash to an approved disposal location. 100. Store slash along the construction right-of-way, in natural clearings, cutline intersections or in approved push-outs if burning is to be delayed. Leave gaps in the slash windrow where directed by the Environmental Inspector(s). 101. Notify the appropriate regulatory authority prior to commencement of burning slash. When the fire risk is varying and when required, obtain and record the fire ratings daily to determine whether it is safe to burn. During slash disposal activities, maintain communication on a daily basis regarding time of ignition, location, extent and anticipated duration of burning activities.

Activity/Concern	Potential Mitigation Measures
Slash Disposal (cont'd)	102. Follow the BC *Open Burning Smoke Control Regulation* and the BC *Forest Fire Prevention and Suppression Regulation* when burning (this legislation is currently undergoing revision). Adhere to the AESRD *Forest and Prairie Protection Regulations* in Alberta. 103. Avoid locating burn piles on peat-rich soils in order to limit the risk of residual fires after construction. Locate burn piles on exposed soils (*i.e.,* where topsoil/root zone material salvage has occurred). 104. Access weather forecast information for wind speed and wind direction prior to burning within 300 m of highways, unnamed and named watercourses/wetlands, residential areas, occupied campgrounds and school grounds, hospitals or community care centres and occupied buildings and work sites. Alternatively, mulch in place or chip/haul slash present within the above locations to suitable locations for burning. 105. Pile slash in a manner that allows for clean, efficient burning of all material. Implement techniques to limit smoke production including limiting pile size, reducing fuel moisture content and maintaining loose burning piles free of soil. 106. Utilize burning sleds, to dispose of green woody debris. 107. Burn only when the fire hazard is at acceptable levels. No burning is to be conducted during high winds. 108. Burn only when conditions allow for adequate dispersion of smoke so that high concentrations of smoke do not locally affect human or wildlife health. 109. Reduce the liability for causing poor visibility on highways that could potentially lead to traffic accidents. The Environmental Inspector(s) in consultation with the Contractor will consider alternative locations or disposal methods before burning debris piles next to highways (*i.e.,* greater than the 100 m setback). 110. Burn piles located near habitation or roads when weather conditions are favourable to ensure a safe dispersal of smoke (avoid burning when temperature inversions are present or predicted). 111. Monitor burning at all times and prevent fire from spreading off the construction right-of-way. Extinguish burning embers before leaving the site and monitor burn sites to ensure no smouldering debris remains. Push unburned stumps along the edge of the construction right-of-way after attempting to burn them. 112. Ensure that slash burning crews have firefighting equipment on hand that is capable of controlling any fire that may occur as a result of their activities. 113. Burn piles must be spread and mixed with water or snow to ensure they are properly extinguished.
Hay/Crops	114. Arrange for landowners to harvest crops, if practical. Mow any remaining crops along the construction right-of-way to facilitate topsoil handling.

Activity/Concern	Potential Mitigation Measures
Beaver Dams and Lodges	115. Abide by the conditions, including the 14 day notification period, of the DFO's *Operational Statement for Beaver Dam removal* (2008i) during open water conditions or, following a case-specific review, for removal of a beaver dam during frozen soil conditions in Alberta or the BC MOE *Standard and Best Practices for Instream Work/Beaver Dam Removal* (BC Ministry of Water, Land and Air Protection n.d.[a]), and the 45 day notification, as per Section 40 of the BC *Water Regulation*. Where approval for removal of a beaver dam has been granted, remove/breach the dam slowly by physical means in order to avoid the rapid release of water, erosion of the bed and banks of the watercourse, downstream flooding and sedimentation as well as wash out of downstream beaver dams. The preservation of water quality baseline parameters (*e.g.,* turbidity, dissolved oxygen) will be maintained downstream of locations where beaver dams have been breached. 116. Where approval for removal of a beaver dam has been granted, remove/breach the dam slowly by physical means in order to avoid the rapid release of water, erosion of the bed and banks of the watercourse, downstream flooding and sedimentation as well as wash out of downstream beaver dams.
Gates	117. Install locked gates at locations noted on the Environmental Alignment Sheets to block unauthorized travel along the construction right-of-way following clearing. Keep gates locked and assign security personnel, if warranted, to block access.
Fences	118. Brace fences before they are cut. Install gates in fences crossed by the construction right-of-way. Ensure gates are located within the boundaries of the construction right-of-way, are the same height as the adjacent fence and are adequately sized to allow passage of all construction equipment. 119. Close gates after use.

TABLE 8.1-1

TIMBER SALVAGE REQUIREMENTS - ALBERTA

Salvage Requirements:	Coniferous and Deciduous 15 cm min. top 10 cm min. base
Salvage Method:	Mechanical/Handcut
Decking	All salvaged timber to be limbed and decked in a manner accessible to hauling trucks (see Drawing [Log Decking] provided in Appendix R).
Locations	Wherever minimum salvage requirements are met; general locations will be indicated on the Environmental Alignment Sheets.
Timing	Salvage to be conducted following Project approval. Hauling to be conducted immediately prior to/coincident with pipeline construction.
Salvage Contractor	To be determined through bid process following Project approval. A Timber Salvage Management Plan is to be prepared by the salvage Contractor prior to the commencement of clearing operations.
Hauling Contractor	To be determined through bid process following Project approval. Conduct salvage operations in accordance with the *Timber Management Regulations* in the Province of Alberta *Forests Act,* the *Forest and Prairie Protection Act* Regulations (Parts 1 and 2), *and Alberta Timber Harvest Planning and Operating Ground Rules* (Alberta Environmental Protection 1994 as they pertain to site clearing, debris disposal and required firefighting equipment.

TABLE 8.1-2

TIMBER SALVAGE REQUIREMENTS - BC

Salvage Requirements:	Coniferous: Minimum DBH 12.5 cm
Salvage Method:	Mechanical/Handcut
Decking	All salvaged timber to be limbed and decked in a manner accessible to hauling trucks (see Drawing [Log Decking] in Appendix R).
Locations	Wherever minimum salvage requirements are met; general locations will be indicated on the Environmental Alignment Sheets.
Timing	Salvage to be conducted following Project approval. Hauling to be conducted immediately prior to/coincident with pipeline construction.
Salvage Contractor	To be determined through an open bid process following Project approval. A Timber Salvage Management Plan is to be prepared by the salvage Contractor prior to the commencement of clearing operations.
Hauling Contractor	To be determined through bid process following Project approval. Conduct salvage operations in accordance with the *British Columbia Forest and Range Practices Act* and in coordination with the Ministry of Forests, Lands and Natural Resource Operations District Managers.

8.2 Topsoil/Root Zone Material Handling and Grading

Introduction

The following potential mitigation measures may be implemented by Trans Mountain, its Contractors and/or subcontractors during topsoil/root zone material handling and grading construction activities.

Objective

The objective of these potential mitigation measures is to avoid or reduce effects on topsoil/root zone material productivity, surface drainage patterns and to conserve surface material in order to facilitate reclamation of disturbed areas.

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern		Potential Mitigation Measures
Approvals, Licenses Permits	1.	Ensure that any approvals, licenses and permits that may be necessary are in place prior to commencing applicable construction activities.
Resource-Specific Environmental and Resource Features	2.	Confirm that flagging, staking and/or fencing installed during survey activities (see Section 6.0) to identify resource-specific resource features (*e.g.,* Noxious or Prohibited Noxious weed infestations, archaeological sites, rare plant locations) are in place and are maintained throughout topsoil/root zone material salvage and grading activities.
	3.	Refer to environmental resource-specific mitigation tables for weeds, soils, rare plants, heritage resources and traditional land use features provided in Appendices C, F, J, M and Q, respectively, and as identified on the Environmental Alignment Sheets.
	4.	Review with the Contractor resource-specific locations to be avoided during topsoil/root zone material salvage and grading activities. Also review and finalize the Grade Plan prepared by the Contractor to ensure that resource-specific locations are identified and will be avoided.
Droughty Soils	5.	Assess the wind erosion hazard, competency of the sod and potential for soil pulverization due to droughty soils. Notify the Contractor if measures applicable to droughty, wind erodible soils, or where the biological soil crust has been disturbed (*i.e.,* Lac de Bois area), will be required to avoid or reduce the effect of soil pulverization and wind erosion (see Soil/Sod Pulverization Contingency Plan in Appendix B).
	6.	Refer to environmental resource-specific mitigation tables for erodible soils provided in Appendix F and as identified on the Environmental Alignment Sheets.
Monitoring of Topsoil/Root Zone Material Windrows	7.	Monitor topsoil/root zone material windrows/piles for erosion and weed growth until the soil windrows are replaced. Direct the Contractor to initiate erosion control (*e.g.*, watering down, tackifier application) (see Soil Erosion and Sediment Control Contingency Plan in Appendix B) or weed control measures (*e.g.,* spraying, hand pulling) (see WVMP in Appendix C), if warranted.
Windrow Gap Locations	8.	Locate gaps in pipe, snow, topsoil/root zone material and spoil to facilitate wildlife, livestock and equipment movement and trapper lines, in places that also facilitate construction such as at slope changes, crossings (*i.e.,* watercourse, road, pipeline right-of-way, railway) and bends. The locations can be determined in the field by the Environmental Inspector(s).

Activity/Concern	Potential Mitigation Measures
Watercourse / Wetland / Lake Signage	9. Post signs, stakes, flagging and/or post and rope (including name, number and RK) a minimum of 100 m from each watercourse/wetland/lake or at the top of the approach slope (whichever is greater) following clearing to alert the Contractor of the upcoming watercourse/wetland/lake.
Dust	10. Trans Mountain will consult with and inform landowners with the potential to be affected by dust emissions from construction activities prior to commencement of these activities in proximity to the respective landowners.

Contractor Measures

The following activity-specific mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Workspace	11. Obtain approval from the Construction Manager, landowner/lessee, or Crown land authority representative prior to taking additional workspace in the field, where warranted.
Timing	12. Ensure that there is sufficient frost or low enough soil moisture to allow construction without causing excessive rutting or soil compaction.
Known Archaeological Sites	13. Do not permit grading in proximity to known archaeological sites unless mitigation measures have been implemented, or otherwise approved by the appropriate regulatory authority. 14. Refer to environmental resource-specific mitigation tables for heritage resource features provided in Appendix M.
Snow Management and Windrow Gaps	15. Locate gaps in pipe, snow, topsoil/root zone material and spoil to facilitate wildlife, livestock and equipment movement and trapper lines, in places that also facilitate construction such as at slope changes, crossings (*i.e.,* watercourse, road, pipeline right-of-way, railway) and bends. The locations can be determined in the field by the Environmental Inspector(s). 16. Windrow snow over the trench line to prevent deep frost penetration that could adversely affect trenching. 17. Remove or pack snow on the work side to increase frost penetration into the soil during the winter. During mid to late winter, pack snow on the work side to avoid premature thawing of the upper soils. Grade snow over travel lane, if the lane is rough, to improve driving conditions. Windrow surplus snow and any snow placed over the trench area to the closest side of the construction right-of-way immediately prior to topsoil or root zone material salvage. 18. Use snow to create a level work surface, to the extent feasible in order to avoid disturbance of the vegetation mat on cleared ungrubbed construction right-of-way and in watercourse, wetland and lake vegetation buffer areas. Grade the spoil area or grade snow over the spoil area on cultivated lands to smooth furrows and facilitate removal of spoil during backfilling. 19. Discuss snow management issues with the Crown land authority if excessive snow depths are encountered during winter construction. 20. Refer to environmental resource-specific mitigation tables for uneven terrain and soils conditions, and sedimentation control at watercourses in Appendices E, F and I.

Activity/Concern	Potential Mitigation Measures
Sod/Vegetation Mat Conservation	21. Retain sod and the vegetation mat on all lands if a competent sod layer exists. In these areas, grade only where safety considerations dictate in order to reduce disturbance to sod and the vegetation mat. Grading of well-sodded lands will not be permitted on level terrain. 22. Refer to environmental resource-specific mitigation tables for riparian vegetation at watercourses/wetlands/lakes and native grass vegetation provided in Appendices I and J, respectively.
Topsoil/Root Zone Material Handling Contingency Measures	23. Implement the Soil Handling Contingency Plan (see Appendix B) during topsoil/root zone material salvage if any of the following are encountered: little or no topsoil; uneven boundary between topsoils and subsoils; poor colour separation between topsoils and subsoils; stony soils; uneven surface on tame pasture; wetlands; high winds or requests for alternate topsoil handling methods by a landowner. 24. Salvage topsoil/root zone material in areas of equipment and vehicle travel where it is determined that soils may be prone to pulverisation (see Soil/Sod Pulverization Contingency Plan in Appendix B). 25. Implement the Wet/Thawed Soils Contingency Plan (see Appendix B) during wet/thawed soil conditions, in the event wet or thawed soils are encountered during construction.
Landowner Requests	26. Accommodate landowner/Crown land authority topsoil/root zone material salvage requests, if feasible. Record any locations where a landowner/land authority has requested topsoils handling which differs from the planned method.
Topsoil/Root Zone Material Salvage Schedule	27. Pre-salvage topsoil/root zone material prior to freeze-up if feasible. Attempt to have all topsoil/root zone material salvage completed prior to October 31 where feasible for areas to be constructed that winter in Alberta and Interior BC.
Topsoil/Root Zone Material Salvage - Full Construction Right-of-way	28. Salvage topsoil/root zone material from the entire construction right-of-way (see Drawing [Topsoil or Root Zone Material Salvage in Forest – Full Right-of-Way] provided in Appendix R) where grading is necessary and at locations indicated on the Environmental Alignment Sheets. 29. Salvage topsoil from the entire construction right-of-way at locations indicated on the Environmental Alignment Sheets (as outlined in the Line List) where localized weed infestations are encountered or at organic farm locations (see Drawing [Topsoil Salvage on Agricultural Lands – Full Right-of-Way] provided in Appendix R). 30. Refer to environmental resource-specific mitigation tables for terrain and weed environment features provided in Appendices E and J, respectively.
Topsoil Salvage - Cultivated and Poorly-Sodded Lands	31. Salvage topsoil from the trench and spoil pile area (see Drawing [Topsoil or Root Zone Material Salvage – Trench and Spoil Area] provided in Appendix R) at the locations indicated on the Environmental Alignment Sheets.
Topsoil/Root Zone Material Salvage – Tame Pasture, Hay and Well-Sodded Land	32. Salvage a blade width of topsoil/root zone material centered over the trench (see Drawing [Topsoil or Root Zone Material Salvage – Blade Width/Frozen] provided in Appendix R) at locations indicated on the Environmental Alignment Sheets. Disc well-sodded lands prior to topsoil/root zone material salvage in order to facilitate topsoil salvage operations.

Activity/Concern	Potential Mitigation Measures
Increased/ Decreased Topsoil/ Root Zone Material Salvage Width	33. Increase the topsoil/root zone material salvage width, if warranted, at locations where bedrock, boulders or sandy textured soils may be encountered at trench depth, in order to reduce the risk of topsoil/root zone material/subsoil mixing or, where the trench may be prone to sloughing or the trench walls may be sloped in order to prevent topsoils from sloughing into the trench. Salvage root zone material from a blade width (minimum) centred over the trench from all locations where grubbing was limited to the area over the trench. 34. Reduce the topsoil/root zone material salvage width at localized sensitive areas as shown on the Environmental Alignment Sheets or as directed by the Lead Environmental Inspector and the Environmental Inspector(s). 35. Salvage topsoil from twice the width of the trench centred over the trench at locations indicated on the Environmental Alignment Sheets.
Topsoil/Root Zone Material Salvage - Frozen Soil Conditions	36. Salvage topsoil/root zone material from an area approximately 1 m wider than the trench and centred over the trench (see Drawing [Topsoil or Root Zone Material Salvage – Trench Width] provided in Appendix R) at all locations during frozen soil conditions unless otherwise indicated on the Environmental Alignment Sheets. Limit topsoil/root zone material salvaging activities to specialized equipment capable of accurately separating variable depths of topsoil from subsoil (*e.g.,* frozen topsoil cutter, topsoil mulcher or equivalent, if available). If a frozen topsoil cutter, topsoil mulcher or equivalent is not available, rip frozen topsoil/root zone material to the same depth as the salvage requirements. Note that multiple passes with a ripper are preferred to avoid topsoil/root zone material mixing that commonly occurs when attempting to rip to the full salvage depth. Do not over rip and avoid overstripping.
Three-Lift Soils Handling	37. Utilize three-lift soils handling where indicated on the Environmental Alignment Sheets (see Drawings [Topsoil or Root Zone Material Salvage - Three-Lift Soils Handling on Well-Sodded Land] and [Topsoil or Root Zone Material Salvage – Three-Lift Soils Handling on Cultivated Land] provided in Appendix R). Salvage topsoil from the trench and spoil area on lands requiring three-lift soils handling. Depths of material to be removed during the upper subsoil lift will be outlined on the Environmental Alignment Sheets unless otherwise directed by the Environmental Inspector(s). 38. Refer to environmental resource-specific mitigation tables for soils features provided in Appendix F.
Topsoil/Root Zone Material Salvage Depth	39. Salvage all available topsoil (min. 10 cm and max. 40 cm) and root zone material (min. 15-20 cm or 50% organic material and 50% mineral soil) using the Environmental Alignment Sheets as a guide. Where soils are not readily distinguishable by colour, the Environmental Inspector(s) will provide direction based on an evaluation of soil texture and structure as well as the recommended depths noted on the Environmental Alignment Sheets. Overstrip topsoils to a total depth indicated on the Environmental Alignment Sheets at select locations with saline or sodic lower subsoils, or sands and gravels at depth which occurs on native grassland, irrigated lands and/or areas of high wind erosion (see Environmental Alignment Sheets).
Peaty Soils	40. Salvage surface material in unsaturated wetlands, giving extra attention to maintaining dormant root stocks for replacement, where feasible. Salvage a maximum of 40 cm of surface soil if the peat is deeper than 40 cm or to the depth of colour change where there is less than 40 cm of surface material. Ensure a minimum of 15 cm of surface and subsoil is stripped if peat is less than 15 cm.

Activity/Concern	Potential Mitigation Measures
Stony Soils	41. Attempt to use conventional equipment to salvage topsoil/root zone material. Employ a backhoe if the conventional equipment is ineffective.
Treed/Shrub Land	42. Salvage the litter layer in addition to the surface soil. 43. Salvage very shallow surface soils (*i.e.,* organic and mineral soils) to at least a 15 cm depth, unless the material is unsuitable (*e.g.,* bedrock, gravel, rock).
Sidebends and Infrastructure and Utility Crossings	44. Salvage topsoil/root zone material from the area to be excavated at sharp sidebends and at crossings of roads, rail lines and foreign lines to accommodate grading and/or a wider and deeper trench. 45. Salvage topsoil from either the full construction right-of-way or bellhole and spoil storage areas during non-frozen soil conditions at all bored crossings on cultivated lands (see Drawings [Conventional Right-of-Way Configuration] and [Materials Handling at Road Bores] provided in Appendix R). 46. Salvage topsoil from an area larger than the bellhole on well-sodded lands during non-frozen soil conditions to allow feathering-out of spoil over the salvaged area (see Drawings [Materials Handling at Road Bores] and [Materials Handling at Rail Bores] provided in Appendix R). 47. Salvage topsoil from the area to be excavated during frozen soil conditions.
Topsoil Salvage of Adjacent Hot Lines	48. Maintain sufficient cover over the hotlines for the safe operation of the equipment and pipeline (utilities will have their own specific requirements). If it is determined that there is insufficient cover, topsoil salvage will be reduced or suspended. Place a protective covering over the topsoil in the spoil area to prevent topsoil and subsoil mixing (*e.g.,* matting, sheeting, straw).
Storage of Salvaged Topsoil/Root Zone Material	49. Windrow salvaged topsoil/root zone material as shown on the applicable soil handling drawing (see Drawings [Topsoil or Root Zone Material Salvage – Blade Width/Frozen] and [Topsoil or Root Zone Material Salvage – Trench and Spoil Area] and [Topsoil or Root Zone Material Salvage in Forest – Full Right-of-Way] provided in Appendix R). Consider the excavation equipment to be used, depth and width of the trench, local topography, presence of nearby existing hotlines, drainage and the susceptibility of the trench walls to sloughing when determining the location of salvaged topsoil/root zone material windrows on the construction right-of-way. 50. Store topsoil/root zone material prior to grading along the nearest pipeline construction right-of-way boundary, taking into consideration space requirements for grade and trench spoil, existing nearby hotlines, local topography and drainage. 51. Place topsoil/root zone material piles on the high side of the pipeline construction right-of-way, where practical, to prevent overlap with the grade spoil pile storage areas. 52. Store salvaged root zone material over the adjacent existing pipeline on non-cultivated lands. Do not store trench spoil over the adjacent exiting pipeline because of the difficulty removing trench spoil from an uneven surface.

Activity/Concern	Potential Mitigation Measures
Erosion of Topsoil/ Root Zone Material Windrow	53. Tackify or apply water/snow or pack the topsoil/root zone material windrow with a sheep foot packer or other approved equipment, if the assessment by the Environmental Inspector(s) indicates that soils are likely to be prone to erosion by wind (see Soil Erosion and Sediment Control Contingency Plan in Appendix B). 54. Apply tackifier (see Appendix D) to topsoil/root zone material windrows in areas of known disease (*e.g.,* clubroot) concern when there is potential for topsoil transfer during windy conditions, or if topsoil windrows are to be maintained over the winter, to prevent the possible spread of clubroot or other disease. 55. Assess the wind erosion hazard, competency of the sod and potential for soil pulverization due to droughty soils. Implement measures applicable to droughty, wind erodible soils to reduce the effect of soil pulverization and wind erosion (see Soil/Sod Pulverization Contingency Plan in Appendix B). 56. Refer to environmental resource-specific mitigation tables for soil erosion in Appendix F.
Dust	57. Water down construction sites and access roads, when warranted, as directed by Trans Mountain, to reduce or avoid the potential for dust emissions. Increase the frequency of watering roads and sites during periods of high risk (*e.g.,* high winds). Additional dust abatement measures (*e.g.,* covering topsoil windrows, installing sediment fences, applying a tackifier) will be implemented, when warranted, during clearing and construction activities. 58. Apply water or approved tackifier to exposed soil piles if wind erosion occurs. 59. Apply water or approved tackifier to disturbed areas if traffic and wind conditions result in pulverized soils and dust problems. 60. Ensure that watering of roads and sites does not generate excessive formation of surface water accumulation (*i.e.,* puddles or excessive mud generation), or result in overland water flow or sedimentation of the watercourses/wetlands/lakes. 61. Use only approved chemical dust suppressants.
Grading - General	62. No grading will be permitted in proximity to known archaeological sites unless otherwise approved by an appropriate regulatory authority. 63. Salvage topsoil/root zone material from areas to be graded and windrow to the closest edge of the construction right-of-way. Avoid overstripping. The area salvaged is to correspond to the area to be graded. 64. Reduce grading along the construction right-of-way and associated facilities, especially within watercourse/wetland/lake vegetated buffers and on hay land and tame pasture lands with a competent vegetation mat/sod layer. 65. Reduce grading on steep slopes, unless safety concerns are identified. 66. Store grade spoil on the work side along the construction right-of-way boundary unless needed for local fill. Take into consideration local topography and drainage when determining spoil storage locations. Maintain a minimum of 1 m separation between grade spoil storage piles and topsoil/root zone material windrows/piles where separation materials (*e.g.,* straw) are not used.

Activity/Concern	Potential Mitigation Measures
Grading – General (cont'd)	67. Ensure graded material does not spread off the construction right-of-way. 68. Ensure that graded material is not mixed with topsoil or foreign material such as stumps or slash. 69. Store graded material in discrete piles or windrows for replacement during backfilling or rough clean-up. 70. Clearly identify the topsoil piles and grade spoil piles with signs or staking where the topsoil/subsoil colour change is not obvious. 71. Grade the construction right-of-way, where feasible, to direct surface water away from the trench line. 72. Refer to environmental resource-specific mitigation tables for identified terrain and soils features in Appendices E and F, respectively.
Watercourses/ Wetlands /Lakes Grading	73. Install erosion control measures, where warranted, prior to commencing grading in the vicinity of water crossings. 74. Salvage willows/shrubs prior to grading at locations adjacent to watercourses/wetlands/lakes (see Section 8.1). 75. Grade away from watercourses/wetlands/lakes to reduce the risk of introduction of soil and organic debris. Do not place windrowed or fill material in watercourses/wetlands/lakes during grading. Keep wetland soils separate from upland soils. 76. Refer to environmental resource-specific mitigation tables for riparian vegetation salvage provided in Appendices I and K.
Temporary Berms/ Sediment Fences	77. Install temporary berms on approach slopes to watercourses and erect sediment fence(s) near the base of approach slopes to watercourse(s) following grading (see Drawings [Cross Ditches and Diversion Berms] and [Sediment Fence] provided in Appendix R) where indicated on the Environmental Alignment Sheets. Inspect the temporary sediment control structures on a daily basis and repair, if warranted, before the end of each working day.
Monitor Soil Windrows	78. Monitor soils windrows during the growing season for wind and water erosion, and weed growth until the soils are replaced. Implement additional mitigation measures to control erosion (see Soil Erosion and Sediment Control Contingency Plan in Appendix B) and weed growth when warranted (see WVMP in Appendix C).

8.3 Stringing, Welding, Trenching and Lowering-In

Introduction

The following potential mitigation measures may be implemented by Trans Mountain, its Contractors and/or subcontractors during stringing, welding, trenching and lowering-in of the pipeline.

Objective

The objective of these potential mitigation measures is to:

- reduce or avoid disruption of surface and subsurface drainage;
- limit ground disturbance;
- reduce or avoid interference with other land uses;
- reduce disruption of movements to wildlife; and
- facilitate the successful reclamation of the construction right-of-way.

Contractor Measures

The following activity-specific mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Timing	1. Work during frozen soil conditions along the portions of the construction right-of-way where frozen soils are encountered during winter to ensure that there is sufficient frost or during periods of low soil moisture where frozen soil conditions are not encountered during winter (Lower Mainland Region of BC) to allow construction without causing excessive rutting or soil compaction.
Stringing Traffic	2. Confine stringing truck traffic to the trench area to the extent feasible or areas on the work side of the construction right-of-way where topsoil salvage has occurred. 3. Locate turn-around points for stringing trucks in natural clearings where feasible. Obtain approval from the Lead Environmental Inspector and the Environmental Inspector(s) and landowner/Crown land authority if extra TWS is needed for turn-around points. 4. Suspend stringing truck traffic when soils are wet or limit stringing traffic to machinery/vehicles equipped with low-ground-pressure tires or wide tracks. Install matting, geotextile, log corduroy or other material approved by the Environmental Inspector(s) to allow traffic through localized areas of wet/thawed soils. Record the UTM coordinates at all locations where installed to facilitate access. 5. Confirm that caps on all strung pipe remain in place until immediately prior to welding to avoid trapping or confining wildlife.

Activity/Concern	Potential Mitigation Measures
Gaps in Set-Up Pipe	6. Leave gaps in set-up and welded pipe to allow wildlife, farm equipment and livestock to cross the construction right-of-way. Trans Mountain will typically locate 3 m wide gaps in strung and set-up pipe at obvious drainages, wildlife and trapping trails and, where requested, for farm machinery and livestock to cross the construction right-of-way. Adhere to the direction of the Lead Environmental Inspector and the Environmental Inspector(s) regarding the location of gaps. Breaks in the pipe shall be coincident with gaps in topsoil/root zone material, grade spoil, snow and rollback windrows (if present).
	7. Refer to environmental resource-specific mitigation tables for Wildlife provided in Appendix L.
Welding	8. Weld up pipe prior to trenching at locations with soils prone to sloughing in order to reduce the time the trench is left open.
	9. Use a tarp and/or magnets to collect the bevel shavings on a daily basis to prevent ingestion by wildlife.
	10. Ensure a tarp is used to collect all bevel shavings when working on organic fields.
Coating	11. Place tarps or other impermeable material on the ground to catch drippings from coating application at weld joints and areas where repairs to the coating are made. Dispose of spilled coating at approved locations.
Heritage Resources	12. Alert the Lead Environmental Inspector and the Environmental Inspector(s) to have an archaeologist present to monitor trenching activities at locations identified on the Environmental Alignment Sheets and as outlined in the environmental resource-specific mitigation tables for Heritage Resources in Appendix M.
	13. Alert the Lead Environmental Inspector and the Environmental Inspector(s) to have a palaeontologist present to examine the easement and sample for macrofossils and microfossils following topsoil/root zone material salvage and prior to trenching, and to monitor activities during trenching at locations indicated on the Environmental Alignment Sheets and as outlined in the environmental resource-specific mitigation tables for Heritage Resources provided in Appendix M.
Temporary Fences	14. Install temporary fences surrounding the trench where livestock are kept, if requested by the landowner, in order to prevent entry onto the construction right-of-way during construction.
	15. Where bore holes are located near public access areas, fence the entire perimeter of the excavation to avoid injury to people, livestock and wildlife.
Trenching	16. Ensure temporary berms and/or sediment fence installed following grading (see Section 8.2) will adequately control runoff from entering the open trench in the vicinity of water crossings.
	17. Windrow surplus snow and any snow over the trench to the closest side of the construction right-of-way immediately prior to trenching.
	18. Minimize trench width on native grasslands during trenching, to the extent feasible, in order to limit spoil storage requirements and sod disturbance.

Activity/Concern	Potential Mitigation Measures
Trenching (cont'd)	19. Limit the length of open trench and the time the trench will be left open to reduce the amount of trench sloughing, frost penetration and interference with wildlife, landowners and livestock. 20. Ensure that trenching does not encroach upon the riparian buffer area at watercourse and wetland crossings. Allow adequate space for the excavation of a bellhole to complete the tie-in following watercourse/wetland crossing construction without disturbance of the riparian buffer. 21. Leave or install soft plugs in the trench, in the event that the pipeline trench separates livestock from water supply. If the livestock are reluctant to cross the trench, make arrangements to provide a temporary water supply (trucked in water and troughs) in the area where the livestock are located. 22. Keep trench spoil pile separate from topsoil/root zone material pile. Maintain a minimum separation distance of 1 m between topsoil and trench spoil piles on agricultural lands (see Drawing [Conventional Right-of-Way Configuration] provided in Appendix R). 23. Place a barrier (*e.g.,* approximately 15 cm thick straw barrier, tarps or other material approved by the Environmental Inspector[s]) at localized areas where a 1 m (minimum) separation cannot be maintained between topsoil/root zone material and subsoil piles due to workspace limitations. 24. Leave gaps in the spoil pile and trench line, where requested, to allow farm equipment and livestock to cross the construction right-of-way. Gaps will be coincident with gaps in welded pipe and topsoil/root zone material, snow (if present) and rollback windrows (if present). For temporary crossing, soft plugs may be installed following trenching. 25. Leave hard plugs or install soft plugs at locations where the open trench could dewater a wetland or flood other areas. Allow access for excavators to remove hard and soft plugs. 26. Install soft plugs across the open trench, where warranted, in areas of high wildlife use and where the trench will be left open for a longer than typical period (*e.g.,* locations where blasting or boulder excavation will be or has been conducted) in order to provide access across the trench for wildlife, livestock and equipment. Locations where trench plugs for wildlife and/or livestock movement are to be installed will be identified by a Wildlife Resource Specialist, the Inspector(s) or as shown on the Environmental Alignment Sheets. 27. Remove any trapped animals from the trench before conducting construction activities. 28. Refer to environmental resource-specific mitigation tables for wildlife crossings in Appendix L. 29. Ensure an environmental monitor with experience in contaminated sites is present to check for indications of potential groundwater contamination (*i.e.,* sheen, adjacent soil staining) during pipeline trench excavation in areas where there is higher potential for encountering contamination (*e.g.*, urban areas). Where groundwater contamination is suspected, the groundwater should be sampled and analyzed by an accredited laboratory.

Activity/Concern	Potential Mitigation Measures
Trenching (cont'd)	30. Ensure contaminated soil and water are not transported off-site or disposed until analytical results have been received as per federal and provincial regulations and legislation. The Construction Manager, Lead Activity Inspector, Lead Environmental Inspector and Environmental Inspector(s) will provide notification as to when excavations can be backfilled. 31. Assess permeability of aquifer materials to determine the potential for sediment migration during trenching over highly vulnerable aquifers. Where poorly graded and coarse material is observed, filter fabric will be installed at the base of the trench to prevent migration of fine sediment into the aquifer, where feasible.
Drain Tiles	32. Mark the location of drain tiles cut during trenching. Cap the ends to prevent clogging of the drains with soil or debris and install a temporary flume, if necessary, to maintain drainage. Obtain assistance from a drainage tile expert to ensure that permanent damage to drainage does not result from damage to drainage tiles. Follow the measures related to drain tiles presented in the Agricultural Management Plan in Appendix C.
Bedrock	33. Rip bedrock in trench, if encountered and if feasible. Ripping is preferred over blasting. 34. Blast bedrock encountered within trench depth only if ripping or typical trenching methods are not feasible. 35. Reduce the potential for injury from flying rock, by using sound warning calls and visually scan for wildlife in the blasting area. If wildlife is spotted within the blasting area, use measures recommended by the Wildlife Resource Specialist to displace wildlife prior to blasting. 36. Utilize warning sirens, blasting mats, blasting controls and monitoring to reduce potential injury to wildlife. 37. Dispose of excess blast rock and excavated rock at approved locations. 38. Haul excavated trench spoil that is not suitable for use as backfill (*e.g.,* excess bedrock) and dispose of at locations approved by the Lead Environmental Inspector and the Environmental Inspector(s). 39. Ensure that bedding material, if needed, is not deposited on unsalvaged topsoil/root zone material prior to placement in the trench unless otherwise approved by the Environmental Inspector(s).
Blasting Near Watercourses	40. Follow appropriate procedures provided in *Guidelines for the Use of Explosives in or near Canadian Fisheries Waters* (Wright and Hopky 1998) if blasting is necessary. Blasting within 300 m of a watercourse/wetland/lake will be reduced or avoided to the extent feasible (see Watercourse Crossing Management Plan provided in Appendix C).
Blasting Near Domestic Water Wells	41. Monitor all registered or known potable water wells located within 200 m of any blasting prior to and following blasting. Monitoring will include measurement of well yields, static and pumping water levels as well as water sampling in accordance with *Guidelines for Canadian Drinking Water Quality* (Health Canada 2012).
Irrigation Canals	42. Bore the irrigation and drainage canal crossing(s) during the irrigation season or where a trenched crossing will result in potentially long-term bank instability. Take any additional measures necessary to maintain the integrity of the canal(s). Follow all conditions noted on canal crossing permit(s).

Activity/Concern	Potential Mitigation Measures
Topsoil/Root Zone Material/Subsoil Separation	43. Maintain the spoil pile separately from the topsoil/root zone material pile. Maintain a minimum separation distance of 1 m between topsoil/root zone material and spoil piles on agricultural lands (see Drawing [Conventional Right-of-Way Configuration] provided in Appendix R). 44. Maintain a separation distance between the topsoil and the upper subsoil piles as well as between upper and lower subsoil piles, where three-lift soils handling is conducted.
Wildlife and Livestock	45. Report the location and species of wildlife or livestock trapped in the trench if present, to the Environmental Inspector(s) if wildlife or livestock are discovered in the trench. The Lead Environmental Inspector or the Environmental Inspector(s) will contact the appropriate regulatory authority (AESRD Fish and Wildlife, BC MOE) or the land agent, who in turn will contact the landowner, if necessary.
Unstable Trench Walls	46. Store salvaged topsoil or root zone material at a sufficient distance from the trench so that topsoil or root zone material is not lost in the trench, if trench instability is anticipated. 47. Suspend trenching and salvage a wider area of topsoil/root zone material if the trench walls slough into the trench and the potential for topsoil/root zone material/subsoil mixing exists. Backslope the trench walls until stable. Equip backhoe with a swamp bucket, if practical, to avoid or reduce trench sloughing.
Potential Springs	48. Monitor water encountered in the trench during trenching to determine if groundwater flow is being intercepted. If spring flow has been disrupted, seek and follow the advice of the Hydrogeological or Geotechnical Resource Specialist to maintain cross drainage within the trench (*e.g.,* installation of subdrains, trench breakers, etc.). 49. Refer to environmental resource-specific mitigation tables for hydrologic features provided in Appendix G.
High Water Table	50. Delay trenching until immediately prior to lowering-in at locations with a high water table or where there is a risk of sloughing. 51. Assess the need for well points or other dewatering methods, prior to commencing trenching, to intercept groundwater at site-specific locations before it enters the trench.
Dewatering Trench	52. Ensure that no wetlands are dewatered. Water will not be permanently removed from the wetland. Options for trench dewatering within wetlands will be discussed with the Lead Environmental Inspector, the Environmental Inspector(s) and the appropriate regulatory authority in order to develop the appropriate plans.

Activity/Concern	Potential Mitigation Measures
Dewatering Trench (cont'd)	53. Obtain approval from the Lead Environmental Inspector and the Environmental Inspector(s) for dewatering sites prior to initiating dewatering activities. 54. Dewater the trench, if warranted, when laying pipe in areas with high water tables. Place pumps on a tray or within an excavated sump lined with polyethylene sheeting above the ordinary high water level of the watercourse/wetland/lake. Pump water onto stable and well-vegetated areas, tarpaulins or sheeting at least 50 m from the nearest watercourse/wetland/lake in a manner that does not cause erosion or any unfiltered or silted water to re-enter a watercourse. Also, dewater the trench if existing or anticipated (based on precipitation forecasts) water levels or flow rates in the trench could overwhelm existing trench water control measures (*e.g.,* berms, take-offs) allowing sediment-laden water to affect watercourses/wetlands/lakes. If warranted, install soft plugs or maintain hard plugs in the trench. 55. Use floating suction hose and elevated intake, or other measures approved by the Environmental Inspector(s), to prevent sediment from being sucked from the bottom of the trench. Secure the pump intake a minimum of 30 cm above the bottom of the trench. 56. Monitor the water discharge site to ensure that erosion, saturation of the discharge site, flooding, icing or flow off of the property does not occur. Suspend dewatering and either apply erosion control measures, reduce the flow or move the discharge site if it appears that the above effects could occur. 57. Adhere to recommendations of the Soil/Geotechnical Resource Specialist and/or the Lead Environmental Inspector and the Environmental Inspector(s) at locations where acid rock drainage may be present and trench dewatering is necessary. Record locations and estimated volumes of trench water discharged. 58. Notify and adhere to the advice of the Environment, Health and Safety Department or the Lead Environmental Inspector and Environmental Inspector(s) at locations where water that has been potentially contaminated with hydrocarbons or other materials is to be discharged from the trench. Measures may include the use of tank trucks to haul discharged water to an appropriate disposal facility/site, ensuring the intake is submerged below the surface sheen, lab testing and use of sorbent booms to hold the sheen away from the pump intake.
Lowering-In	59. Inspect the trench for potentially trapped animals at the start of each day before conducting construction activities. The Environmental Inspector(s) will contact the appropriate wildlife authority (*i.e.,* AESRD Fish and Wildlife, BC MOE) to remove animals and livestock trapped in the trench. 60. Avoid or reduce sideboom traffic on the topsoil/root zone material windrow if it is located on the work side during lowering-in. 61. Avoid scalping of the vegetation mat where bedding material is moved from a location adjacent to the trench and placed in the trench prior to lowering-in.

8.4 Backfilling

Introduction

The following potential mitigation measures may be implemented by Trans Mountain, its Contractors and/or subcontractors during backfilling activities for the pipeline.

Objective

The objective of these potential mitigation measures is to:

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

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern	Potential Mitigation Measures
Assess Trench Compaction Issues	1. Assess the need for special trench compaction measures or equipment prior to the commencement of backfilling. Factors to be considered by the Construction Manager and the Environmental Inspector(s) during the assessment include typical trench width, locations with a wider than normal trench (*e.g.,* sharp sidebends, bellholes, tie-ins, etc.), trench depth, soil texture, soil moisture content and frozen versus non-frozen soils. 2. Special trench compaction measures/equipment to be implemented, if determined to be warranted during the above assessment, include: use of specialized equipment, backfilling and compacting in lifts, retention of a higher than normal trench crown, and subsequent monitoring and remedial work to correct locations with either an excessive trench crown height or excessive subsidence.
Select Backfill	3. Identify potential sources for additional or replacement backfill prior to construction. In areas under biosecurity (nurseries) and organic farms, determine if permission from land owner and the appropriate regulatory authorities (Canadian Food Inspection Agency or Agricultural Land Commission) is necessary for use of imported backfill. 4. Use select backfill, at specific locations, to pad the trench and/or backfill the entire trench, where required, to address geotechnical issues. Known locations where select backfill is to be used will be identified prior to trenching and additional locations where select backfill is to be used will be determined by the Geotechnical Resource Specialist following trenching. 5. Refer to environmental resource-specific mitigation tables for terrain, soils and hydrologic features in Appendices E, F and G, respectively.

Contractor Measures

The following activity-specific mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Timing	6. Backfill the trench as soon as practical following lowering-in to reduce hazards to wildlife/livestock and frost penetration of the trench walls.
Install Trench Breakers - Slopes	7. Install trench breakers (sack, foam or bentonite), where warranted, on moderate and steep slopes with high soil water erosion potential on non-agricultural lands to control subsurface flow (see Drawing [Trench Breakers/Ditch Plugs] provided in Appendix R). 8. Determine the exact location of breakers in the field in consultation with the designated Trans Mountain representative. General locations (long slopes) where breakers may be needed are identified on the Environmental Alignment Sheets. Mark the location of each breaker prior to backfilling to facilitate correct placement of diversion berm immediately downslope of the breaker.
Install Trench Breakers - Watercourses/ Wetlands	9. Install sack trench breakers back from the edge of watercourses where the banks consist of organic material to prevent sloughing of backfill into the channel (see Drawing [Trench Breaker – Watercourse/Wetland] provided in Appendix R).
Install Trench Breakers - Wetlands	10. Install trench breakers, where warranted, at the edge of perched wetlands to prevent the pipeline trench from acting as a drain (see Drawing [Trench Breaker – Watercourse/Wetland] provided in Appendix R).
Install Trench Breakers - Flood Irrigated Lands	11. Install trench breakers on flood irrigated lands, where warranted, to force groundwater seepage along the pipeline trench to the surface (see Drawing [Trench Breakers/Ditch Plugs] provided in Appendix R).
Install Subdrains	12. Install subdrains in association with trench breakers as directed by the Hydrogeological Resource Specialist where there is evidence of seepage or a flowing spring on a slope once the trench is excavated (see Drawing [Subdrains] provided in Appendix R).
Install Stub Berms	13. Install stub berms when directed by Trans Mountain, on sloping peatland terrain to prevent surface water flows along the trench line and erosion of trench backfill (see Drawing [Peatland Wetland – Stub Berms] provided in Appendix R).
Select Backfill	14. Use select backfill (*e.g.,* washed gravel) at specific locations to address geotechnical issues (*e.g.,* erodible native spoil). Known locations where select clean backfill is to be used will be identified prior to trenching and additional locations where select backfill is to be used will be determined by the Geotechnical Engineer following trenching.
Springs	15. Install trench breakers to force groundwater seepage along the pipeline trench to the surface, if springs are encountered along the route. Install sub-drains if warranted, to divert shallow groundwater flow from the right-of-way.
Backfill Trench	16. See Section 8.3 for mitigation pertaining to wildlife observed in the trench. 17. Avoid depositing bedding or padding material on non-salvaged topsoil/root zone material prior to placement in the trench unless a snow layer is present or is otherwise approved by the Environmental Inspector(s). 18. Re-compact fine textured trench spoil in lifts and tamp lightly to avoid trench subsidence and over-compaction.

Activity/Concern	Potential Mitigation Measures
Backfill Trench (cont'd)	19. Ensure that potential sources for additional or replacement clean backfill will be identified in a plan prepared by the Contractor prior to construction. 20. Backfill the trench without mixing spoil with topsoil/root zone material pile or snow. Do not walk machinery on the topsoil/root zone material pile while backfilling spoil. 21. Avoid scalping of the vegetation mat/sod layer on cleared/ungrubbed riparian vegetation as well as the sod layer on tame pasture, hay lands and native grasslands when moving the spoil pile during backfill. Use equipment (*e.g.,* clean-up bucket) for final pass of backfilling which will minimize scalping. 22. Ensure that the lower lift of subsoil is backfilled before the upper lift of subsoil where three-lift soils handling has been conducted. 23. Ensure that bedrock excavated from the trench is not backfilled into the upper 50 cm of the trench if the potential exists for a reduction in agricultural capability. Dispose of excess bedrock at locations approved by the landowner/Crown land authority, where warranted, and the Lead Environmental Inspector and the Environmental Inspector(s). Known locations with shallow bedrock will be identified on the Environmental Alignment Sheets. 24. Compact the backfill, if feasible, to reduce trench settlement by running a grader wheel over the backfill 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 and wetlands that have been trenched. 25. Backfill the trench in lifts and compact after each lift, if warranted, at locations where a wider than normal trench (*e.g.,* sharp sidebends, bellholes) is necessary. Adhere to other backfilling and/or trench compaction measures or equipment requirements arising from the assessment conducted by the Lead Environmental Inspector and the Environmental Inspector(s). 26. Backfill clay/mineral soil first, if salvaged separately from organic material in shallow peatland areas, to ensure that cross drainage is maintained. 27. During winter construction, avoid mixing snow with spoil material during backfill. Have trench spoil backfilled by the end of the working day to minimize hazards to livestock and wildlife, as well as reduce frost penetration. Ensure that all segments trenched during frozen soil conditions are backfilled prior to spring breakup. 28. Postpone compaction of frozen trench spoil until final clean-up in mid to late spring.
Flood Irrigation and Pivot Irrigation Wheels	29. Ensure that the backfill is adequately compacted (*i.e.,* in minimum of 2 lifts) on flood irrigated fields. Compact after each lift. Also backfill and compact trench spoil in lifts or install a steel plate at locations where the wheels of pivot irrigation systems cross the backfilled trench line. Inform landowners of the location and depth of burial of any steel plates installed (see Agricultural Management Plan in Appendix C). 30. Ensure that no trench crown is left on flood irrigated lands. 31. Repair and compact any irrigation/border dikes disturbed during construction to a standard that matches the adjacent undisturbed dikes.

Activity/Concern	Potential Mitigation Measures
Flood Irrigation and Pivot Irrigation Wheels (cont'd)	32. Reclaim the construction right-of-way and border dikes on flood irrigated lands to their pre-construction profile using the pre-construction detailed elevation survey (see Section 6.0) to guide re-contouring activities.
Drainage Tiles	33. Repair any drainage tiles cut during trenching or crushed by heavy equipment. Obtain assistance from a drainage tile expert to ensure that permanent damage to drainage does not result from damage to drainage tiles (see Agricultural Management Plan in Appendix C).
Crown Trench	34. Crown the trench with remaining spoil to allow for settlement. A larger crown will be needed to compensate for settlement after thawing allows the portion of the route constructed during frozen soil conditions. 35. Leave breaks in the trench crown at obvious drainages and wherever seepage occurs to reduce or avoid interference with natural drainage. Leave breaks in the crown at frequent intervals where sidehill is encountered. Compact backfill where breaks have been left. 36. Postpone feathering-out of excess spoil along segments of the route constructed during frozen soil conditions until after the spring breakup and the trench has settled.
Excess Trench Spoil	37. Feather-out excess trench spoil over the salvaged portion of the construction right-of-way on a non-peat land use during non-frozen soil conditions to avoid the creation of a permanent trench crown. Excess spoil will not be feathered-out over the salvaged area to an extent that may cause excessive subsidence of the trench.
Recontour Construction Right-of-Way	38. Replace grade material to a stable contour that will approximate the pre-construction contour, except where it is not practical or safe to do so. When replacing sidehill or other graded areas is not practical due to the risk of slope failure, the Lead Activity Inspector, the Lead Environmental Inspector, the Environmental Inspector(s), the Construction Manager and a Geotechnical Engineer will discuss to determine an appropriate grade. 39. Ensure that wetlands are reclaimed to their pre-construction profile. Remove all corduroy, swamp mats and ramps through sloughs or wetlands, in all circumstances. 40. Postpone regrading of the construction right-of-way until after spring breakup, if summer access is available, where the grade spoil piles have been frozen to an extent that would impair the restoration of the construction right-of-way to its pre-construction profile.
Erosion and Sediment Control	41. Install temporary erosion and sediment control structures (*e.g.,* sediment fences, coir logs) immediately following the completion of backfilling lands adjacent to water crossings and wetlands where the potential for sedimentation of the watercourse/wetland/lake exists (see Drawings [Sediment Fence] and [Coir/Straw Log Installation] provided in Appendix R).

8.5 Hydrostatic Testing

Introduction

The following potential mitigation measures are to be considered during hydrostatic testing where water will be used to pressure test sections of pipeline. Water will typically be withdrawn from nearby watercourses/wetlands/lakes in accordance with applicable permits/approvals for withdrawal of water.

Objective

The objective of these potential mitigation measures is to:

- ensure pressure testing activities are conducted in accordance with all approval conditions and permits; and
- reduce or avoid effects on watercourses/wetlands/lakes used during hydrostatic testing of the pipeline.

Company Measures

The following activity-specific measures will be the responsibility of Trans Mountain.

Activity/Concern	Potential Mitigation Measures
Approvals, Licenses Permits	1. Ensure that any approvals, licenses and permits that are necessary are in place prior to commencing applicable hydrostatic testing activities. 2. Determine if a Temporary Diversion License (TDL) from AESRD is necessary under the *Water Act* if water withdrawal for pressure testing in Alberta will exceed 30,000 m^3. Trans Mountain will adhere to all conditions of the TDL. 3. Determine if *Water Act* approvals are necessary under Sections 8 and 9, where warranted, from the BC OGC for the short-term use of water and changes in and about a stream or wetland. 4. Determine if a Basin Section 8 Approval from BC OGC is necessary under the *Water Act* for water withdrawals of up to 45 m^3/day, to a maximum of 5,000 m^3/year, as specified to a drainage basin or basins identified by the OGC for pressure testing. Adhere to all conditions of the Basin Section 8 approval.
Federal/Provincial Approvals	5. Determine which applicable regulatory authority approvals are necessary for water withdrawal and discharge to allow for hydrostatic testing of the pipeline and to ensure conditions of approvals are satisfied during water withdrawal for hydrostatic testing. 6. Conduct hydrostatic testing activities in accordance with the *NEB OPR*, provincial legislation, Transport Canada's *Minor Works for Water Intakes* (Transport Canada 2009) as well as the latest version of Canadian Standards Association (CSA) Z662 (CSA 2011) and the *Oil and Gas Waste Regulation* Section 7(2)(e), BC Reg. 254/2005. 7. Trans Mountain must authorize the Contractor's preferred water withdrawal sources for testing purposes (*i.e.,* must have sufficient quantity and quality of water). 8. Follow all conditions of federal/provincial permits/approvals, if applicable, during hydrostatic testing.

Activity/Concern	Potential Mitigation Measures
Provincial Legislation - Alberta and BC	9. Follow applicable notification, sampling and reporting requirements outlined in AESRD's *Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines* (Government of Alberta 1999a). Ensure that written notice of water withdrawal is provided to the AESRD Regional Director a minimum of 7 days prior to commencement of water withdrawal and that applicable sampling and reporting requirements are completed. 10. Follow applicable notification, sampling and reporting requirements outlined in the BC *Oil and Gas Waste Regulation* (BC OGC 2012) and in the *Draft Oil and Gas Waste Regulation - Users Guide* (BC MOE 2007). 11. Follow applicable notification, sampling registration and reporting requirements outlined in AESRD's *Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines* (Government of Alberta 1999b). Complete and submit the registration form a minimum of 7 days prior to commencing hydrostatic testing if test water volumes released to the environment exceed 1,000 m^3. 12. Follow the applicable requirements outlined in Section 7 (2)(e) of the *Oil and Gas Waste Regulation* (BC OGC 2012) and outlined in the *Draft Oil and Gas Waste Regulation - Users Guide* (BC MOE 2007) for before, during and after the discharge of hydrostatic test fluid to land. 13. Ensure that test water withdrawn from one drainage basin will not enter surface waters in another drainage basin.
Notifications	14. Refer to notification requirements related to pressure testing in Section 4.0.
Water Additives	15. Review potential issues associated with the testing program including water quality and, if appropriate, identify any chemical additives to be used during the testing program. Obtain approval, if required, for the use of the additives. Provide direction to the testing Contractor related to the handling, storage, use and disposal of the testing additives including water sampling, if warranted, and disposal of test water containing additives.
Discharge	16. Ensure that the appropriate testing and treatment measures are implemented in accordance with Section 7(2)(a) and 7(3) of the BC *Oil and Gas Waste Regulation*, BC Reg. 254/2005.
Sampling	17. Conduct sampling and testing of potential test water sources and soils at discharge sites, if warranted, to abide by requirements related to test water withdrawal/discharge and any other application/approval requirements.

Contractor Measures

The following activity-specific mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Workspace	18. Obtain approval from the Chief Inspector, the Construction Manager, landowner and determine if approval from applicable regulatory authorities is necessary, where warranted, prior to taking additional workspace in the field.
Code of Practice Conditions – Alberta	19. Follow all applicable COP conditions. Ensure that water withdrawal rates and volumes do not exceed those specified in the respective COP (Government of Alberta 1999a,b). Follow all applicable notification, sampling and reporting requirements as identified in the COP conditions for the withdrawal and discharge of hydrostatic test water.

Activity/Concern	Potential Mitigation Measures
Section 8 Water Act Conditions - BC	20. Follow all applicable Section 8 *Water Act* approval conditions. Ensure that water withdrawal rates and volumes do not exceed those specified in the respective condition. Follow all applicable notification, sampling and reporting requirements as identified in the *Water Act* approval conditions and have copies of permits on site in the field for the withdrawal and discharge of hydrostatic test water.
Federal Approvals	21. Follow all conditions of federal permits/approvals, if applicable, during hydrostatic testing.
Notification of Inspectors	22. Notify the Construction Manager, the Lead Activity Inspector, the Lead Environmental Inspector and Environmental Inspector(s) a minimum of 12 hours prior to commencing water withdrawal and test water discharge activities.
Equipment and Workers	23. Ensure that enough workers and equipment are available onsite to repair any rupture, leak or erosion problems that arise during testing.
Water Trucks	24. Ensure that water trucks, if used to transport test water to the fill site, are clean.
Temporary Fill Lines	25. Ensure that all applicable approvals are in place from the appropriate regulatory authorities prior to installing a temporary fill line that extends off of the construction right-of-way. 26. Determine the approvals which are necessary have been acquired and implement the applicable mitigation measures if clearing, topsoil/root zone material salvage or grading is necessary for the laying of temporary fill line off of the construction right-of-way.
Scheduling	27. Follow construction work windows as outlined in Aquatic Resources (see Appendix I) and on the Environmental Alignment Sheets, unless otherwise approved by the appropriate regulatory authority.
Water Sources	28. Identify potential test water sources and discharge sites during desktop studies followed by a reconnaissance of the site. 29. Determine test water needs for each test section along the pipeline. 30. Identify an alternate test water source if the intended water source will provide inadequate streamflow/volume for testing purposes. The Contractor will assist Trans Mountain in determining the necessary approvals/permits or the provisions of required notifications. 31. Prepare water withdrawal and water discharge site planning sheets to document potential resource-specific issues and associated mitigation at water withdrawal and discharge sites. 32. Complete the Water Withdrawal and Discharge Form in the Water Withdrawal and Discharge Procedures Management Plan (see Appendix C) for each water withdrawal and discharge site. 33. Confirm that approvals/notifications are in place for the intended test water sources and that adequate streamflow/volume is present for the testing program.

Activity/Concern	Potential Mitigation Measures
Sump Excavation	34. Avoid excavation of sumps for use in withdrawing water, to the extent feasible. 35. Employ sediment reduction methods (*e.g.,* sediment mat, sediment fence, sand bag, coffer dam, etc.), where warranted, to protect downstream fish, fish habitat and water users from increased sedimentation or reduced water quality where excavation of a sump in the substrate of the water source is necessary.
Erosion Control	36. Include resource-specific measures in water withdrawal plans (see Sections 7.0 and 8.0) to stabilize both the substrate of the water source and approaches to water sources to ensure that accelerated erosion will not occur during equipment installation, use or removal. 37. Monitor fill and discharge lines for leaks. Repair or control leaks to prevent erosion.
Isolate Pumps	38. Isolate test pumps, generators and fuel storage tanks with an impermeable lined dike or depression to capture and retain any spills of fuels or lubricants. 39. Ensure any leaks in the fill and discharge lines are controlled to prevent erosion.
Screen Intake	40. Ensure pump intakes are placed in a manner that reduces or avoids disturbance to the streambed and are screened in accordance with the DFO screening requirements, to prevent the entrapment of fish or wildlife (*Freshwater Intake End-of-Pipe Fish Screen Guideline* [DFO 1995]). 41. Utilize screen pump intakes with a maximum mesh size of 2.54 mm and with a maximum approach velocity of 0.038 m/s, where fish habitat is present. 42. Maintain screens clear of debris.
Withdrawal	43. Follow the mitigation measures related to water withdrawal provided in Water Withdrawal and Discharge Procedures Management Plan (see Appendix C) during hydrostatic testing. 44. Ensure the water level in a lake does not fall more than 10 cm once water withdrawal has started if the *Water Act* approval requires this (BC OGC 2010). Retain a copy of the water withdrawal approval/permit onsite and ensure the Environmental Inspector(s) has reviewed the water withdrawal approval/permit prior to the commencement of withdrawal activities. 45. The withdrawal rate and volume will not exceed 10% of the flow rate of the watercourse or of the volume of the body of water unless otherwise approved by the appropriate authority when withdrawing water in Alberta. Avoid or reduce disturbance of the streambed when installing pump intakes. 46. Terminate or reduce the rate of water withdrawal if the approved minimum flow or depth of water in the source watercourse or lake is approached or reached during a water withdrawal, unless otherwise approved by the appropriate regulatory authority. Resume or increase the rate of water withdrawal only when flows or water levels exceed approved minimum values. 47. Implement additional mitigation in consultation with the appropriate regulatory authority in the event that water volumes exceed the allowable volumes and continued water withdrawal is allowed.

Activity/Concern	Potential Mitigation Measures
Chemical Recovery	48. Recover all remaining water and water contaminants (*e.g.,* methanol) in tanks and return to the supplier or dispose of contaminated test water at approved sites/facilities. 49. During winter construction, recover methanol or methanol/water mix, if used, and return to the supplier or dispose of in accordance with appropriate government legislation. Ensure the method and location of disposal has been approved by Trans Mountain and is in accordance with applicable regulations and regulatory direction. 50. Ensure that if test water contains chemical additives, the test water is sampled and treated, if warranted, and discharged in accordance with applicable federal and provincial requirements directed by the appropriate regulatory authority.
Pre-Test Pigging Debris	51. Collect pre-test pigging debris and water. Discharge the water at an acceptable location onsite in a manner that does not cause erosion or allow unfiltered or silted water to directly re-enter a watercourse/wetland/lake. Dispose of the remaining material with other construction waste, in accordance with appropriate federal and provincial guidelines.
Dewatering	52. Follow all measures outlined in the Water Withdrawal and Discharge Procedures Management Plan and in the Water Withdrawal and Discharge Form (see Appendix C) related to dewatering. 53. Ensure that the appropriate testing and treatment measures are implemented in accordance with Sections 7(2) and 7(3) of the BC *Oil and Gas Waste Regulation* when dewatering in BC. 54. Ensure that the appropriate testing and treatment measures are implemented in accordance with provincial legislation, including Schedule 1, Requirements for Release to Land of the AESRD *Code of Practice* for the *Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines* (Government of Alberta 1999b) when dewatering in Alberta. 55. Shunt test water ahead from test section to test section, if feasible, to reduce water hauling, water usage and the number of dewatering points. 56. Ensure that test water withdrawn from one drainage basin is not allowed to enter natural waters of another drainage basin. Further restrictions will be implemented where whirling disease is present. Ensure that pigs and other testing equipment are properly loaded in the pipe to allow the test water to be discharged at the intended location. 57. Monitor discharge locations to ensure that no erosion, flooding or icing occurs. If conditions become saturated to the extent that adequate natural filtration is no longer occurring, suspend dewatering and move the discharge to another approved location (confirm that appropriate approvals and, if warranted, soil testing have been completed) or construct a holding pond for the water and release the water when natural filtration is feasible. 58. Ensure the areas that are to receive discharged water are approved by the Lead Environmental Inspector and the Environmental Inspector(s) in accordance with the applicable regulatory guidance. 59. Conduct testing of the test water and soils at the discharge site, when required, and in accordance with applicable federal/provincial requirements.

Activity/Concern	Potential Mitigation Measures
Dewatering (cont'd)	60. Dewater onto approved areas where water will be filtered through vegetation and soils before returning to a watercourse/wetland/lake. Provide scour protection (*e.g.,* use of rock aprons, plastic sheeting, plywood, straw bales etc.) or an energy diffuser (*e.g.,* cone with baffles, frog's foot) at the discharge site as directed by Trans Mountain. The rate of discharge will be reduced if these measures are ineffective. 61. Dewater into a bar ditch, if feasible, or onto non-arable land. Do not dewater onto cultivated lands or directly back into a watercourse or watercourse/wetland/lake unless otherwise allowed by water discharge approvals and the Environmental Inspector(s). 62. Preserve water quality to the extent feasible including preventing the introduction of foreign material (debris, sediment, etc.) into the receiving watercourse/wetland/lake.
Sample Collection	63. Collect samples of source water, hydrostatic test water and soil of the receiving environment and analyze according to the parameters listed in Water Withdrawal and Discharge Procedures Management Plan (see Appendix C).
Pigging Debris	64. Collect pigging debris and dispose of at an acceptable location (*e.g.,* landfill). Dispose of remaining construction waste, in accordance with the appropriate regulatory authority.
Daylighting	65. Follow applicable EPP protection measures if exposure (daylighting) of the pipe is needed for inspection or repairs.

8.6 Construction Clean-Up and Reclamation

Introduction

Clean-up and reclamation are important steps in returning construction sites to a condition similar to pre-construction. Note that further details on reclamation measures and techniques are provided in the Reclamation Management Plan (see Appendix C). The following potential mitigation measures may be implemented, as warranted, by Trans Mountain, its Contractors and/or subcontractors during construction clean-up and reclamation activities.

Objective

The objective of these potential mitigation measures is to:

- remove construction debris and materials;
- re-establish the construction right-of-way to a stable condition acceptable for operational requirements;
- effectively use reclamation techniques that prevent surface material loss due to wind and water erosion;
- establish a vegetative cover compatible with surrounding vegetation and land uses, and to deter the proliferation of weeds; and
- maintain equivalent land productivity, ensuring the ability of the land to support various land uses similar to the uses that existed prior to construction.

8.6.1 General Measures

The following general potential mitigation measures are applicable to clean-up and reclamation activities. Further detail is provided for mitigation measures related to clean-up and reclamation in the subsections that follow.

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern		Potential Mitigation Measures
Approvals, Licenses Permits	1.	Ensure that any approvals, licenses and permits that are necessary are in place prior to commencing applicable construction activities.
Scheduling	2.	Schedule construction and clean-up activities in peatlands during frozen soil conditions, where feasible (Alberta and Interior BC). Follow activity restriction guidelines and road bans and consider spring melt when scheduling clean-up and reclamation activities.
Resource-Specific Environmental and Resource Features	3.	Confirm that flagging, staking and/or fencing installed during survey activities (see Section 6.0) to identify resource-specific resource features (*e.g.,* Noxious or Prohibited Noxious weed infestations, archaeological sites, rare plant locations) are in place and need to be maintained throughout all phases of construction.
	4.	Refer to environmental resource-specific mitigation tables for weed species of concern, rare plants and heritage resources features provided in Appendices J and M.

Activity/Concern	Potential Mitigation Measures
Assess Erosion Hazard	5. Assess the erosion hazard prior to the commencement of rough and final clean-up. This assessment, to be conducted by the Environmental Inspector(s) in consultation with the Construction Manager, will consider topography, degree of disturbance, soil erodibility, snow depth, access limitations, timing constraints, and the likely schedule for rough clean-up, final clean-up and seeding. Request assistance in conducting the assessment, if warranted, from the Environmental Manager, or the Geotechnical, Soil or Reclamation Resource Specialist. 6. Direct the Contractor to implement appropriate erosion control measures that may be in addition to those identified on the Environmental Alignment Sheets or noted elsewhere in this EPP.
Seeding	7. Review and retain seed Certificates of Analysis for each seed species seed lot used in seed mixtures to be sown. 8. Review and, if appropriate, approve of the Contractor's planned seeding procedures including the seeding equipment to be used along the various segments of the construction right-of-way, calibration procedures for drill/broadcast seeders and the schedule for seeding.

Contractor Measures

The following activity-specific mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Scheduling	9. Commence rough clean-up on segments constructed during the winter with summer access, prior to spring breakup. Perform final clean-up once the trench has settled after spring breakup. 10. Complete rough and final clean-up on all areas disturbed where summer access is not practical (*e.g.,* wet conditions or spring timing constraints), prior to breakup (see Appendix L for timing restrictions). Note that many final clean-up activities may need to be repeated during the winter following construction after the trench crown has settled. 11. Complete all phases of clean-up on segments constructed during summer as quickly as practical and prior to freeze-up. 12. Coordinate activities to reduce the risk of interference with agricultural/forestry operations as much as practical given the season. 13. Postpone clean-up work during the summer on excessively wet soils until conditions are suitable.
Landowner Requests	14. Review the Line List to ensure that any special landowner requests related to clean-up are implemented, where feasible.
Water Crossings/ Re-Establish Streambanks and Approach Slopes	15. Remove vehicle crossing structures from all watercourses following the season of construction unless otherwise approved by the appropriate regulatory authority. Remove all crossing structures on segments constructed during the winter prior to spring breakup. Remove snow or ice bridges, if used, cutting in a v-notch by physical means rather than blasting.

Activity/Concern	Potential Mitigation Measures
Water Crossings/ Re-Establish Streambanks and Approach Slopes (cont'd)	16. Temporary vehicle crossings may be left in place through spring breakup if this meets regulatory approval, or is otherwise approved by provincial and federal authorities and if the vehicle crossing has been designed to withstand high flows during spring break up. Otherwise remove the vehicle crossing prior to spring breakup and reinstall for use during final clean-up. 17. Re-establish streambanks and approaches immediately following construction of water crossings as outlined in the Reclamation Management Plan (see Appendix C).

8.6.2 Rough Clean-Up

The following activity-specific mitigation measures for rough clean-up will be implemented following construction by the Contractor.

Activity/Concern	Potential Mitigation Measures
Scheduling	1. Commence rough clean-up immediately following backfilling and prior to spring break up on segments constructed during winter with no summer access.
Log Corduroy	2. Remove clay cap, if used, overlying log corduroy and return to pre-construction location unless otherwise requested by landowner or Crown land authority. 3. Remove all corduroy from all locations along the construction right-of-way prior to final clean-up except at locations identified by the Environmental Inspector(s) where the corduroy is necessary to provide access during final clean-up. 4. Burn corduroy, slash and any remaining leaning trees or incorporate into rollback or slash berms.
Swamp Mats, Matting, Geotextiles	5. Remove geotextile, swamp mats and matting from all locations on the construction right-of-way during clean-up unless otherwise directed by the Environmental Inspector(s). Review the UTM coordinates for locations where the above materials were installed to confirm that all materials are removed. Note that sediment fences are to remain in place, where warranted, to assist with controlling erosion until vegetation is re-established.
Debris	6. Remove all remaining garbage and debris from the construction right-of-way.
Winter Access Control	7. Construct snow berms 3+ m high across the entire construction right-of-way at potential access points to the construction right-of-way where access is to be blocked for the remainder of the winter period as directed by the Environmental Inspector(s) (see Drawing [Access Control – Frozen] provided in Appendix R). 8. Install and maintain gates at potential access points to the construction right-of-way as directed by the Environmental Inspector(s).
Cross Ditches and Berms	9. Install subsoil cross ditches and berms on steep and moderate slopes on tame pasture, and treed lands in order to prevent runoff along the construction right-of-way and subsequent erosion. Exact locations of berms will be determined in the field; however, general locations where berms will be installed will be shown on the Environmental Alignment Sheets. Tie berms into existing erosion control structures on adjacent rights-of-way. Install berms immediately downslope of all trench breakers installed on slopes (see Drawing [Cross Ditches and Diversion Berms] provided in Appendix R). 10. Increase berm height to 2 m (approx.), if warranted, to limit truck access. 11. Construct berms of subsoil capped with topsoil/root zone material where grading has occurred or extensive disturbance to the surface layer has occurred. Construct berms of timbers, imported logs, coir logs or sandbags where disturbance of the sod layer is limited.
Sediment Fences	12. Install temporary sediment fences, where warranted, to control sedimentation prior to final clean-up and the establishment of permanent erosion and sediment control measures (see Drawing [Sediment Fence] provided in Appendix R).

Activity/Concern	Potential Mitigation Measures
Temporary Fences and Gates	13. Install temporary fences and gates crossed by the construction right-of-way during frozen soil conditions until replaced with permanent structures during non-frozen soil conditions if not already installed during clearing.
Bar Ditch Ramps	14. Remove bar ditch ramps to prevent blockage of spring runoff in road ditches unless culverts were installed during surface preparation activities.
Topsoil/Root Zone Material Windrows	15. Walk down the topsoil/root zone material windrow and windrow snow over the topsoil to reduce the risk of wind erosion during the winter. Consider tackifying or watering down the topsoil/root zone material windrow if snow is not available.
Burn Piles	16. Confirm burn piles are properly extinguished prior to completion of rough clean-up.
Infrared Scanning	17. Conduct infrared scanning of burn piles to locate any hot spots. Contact the appropriate regulatory authority to determine optimum time for scanning.

8.6.3 Final Clean-Up/Reclamation

The following activity-specific mitigation measures for final clean-up and reclamation mitigation measures will be implemented by the Contractor following construction.

Activity/Concern	Potential Mitigation Measures
Scheduling	1. Implement final clean-up and reclamation within urban areas
	2. Revegetate as soon as feasible to reduce or avoid soil erosion and establish long-term cover. Seed immediately following topsoil/root zone material replacement.
	3. Reclaim all disturbances within one growing season. If feasible, seed and plant seedlings in early spring to take advantage of the spring precipitation.
	4. Contact the local land authorities, to determine the appropriate schedule for planting of seedlings.
Temporary Access and Shoo-Flies	5. Conduct final clean-up on temporary access roads and shoo-flies as part of final clean-up unless previously reclaimed during rough clean-up (see Section 9.0).
Temporary Vehicle Crossings	6. Re-install temporary vehicle crossings as per measures provided in Section 8.7.
Recontouring	7. Recontour the construction right-of-way, including the removal of temporary subsoil berms on agricultural land and re-establish the pre-construction grades and drainage channels if frozen soil conditions prevented completion of this task during backfilling.
	8. Regrade areas with vehicle ruts, erosion gullies or where the trench has settled, etc.
	9. Install mounds on contours in riparian areas, to reduce erosion and to enhance woody vegetation establishment (see Drawing [Mounding in Riparian Areas] provided in Appendix R).
Surface Drainage	10. Re-establish subsoil berms and cap with topsoil/root zone material on non-agricultural land where grading or extensive disturbance to the surface layer has occurred. Construct berms of timbers, imported logs or sandbags where disturbance of the surface layer is limited.
Water Crossings	11. Recontour the construction right-of-way and stabilize approach slopes at watercourse crossings. Where reclamation of the pre-construction grade is not feasible due to risk of failure of fill on slopes or maintenance of an access trail, recontour to grades as directed by the Geotechnical Engineer.
	12. Install rollback on the construction right-of-way within riparian areas to prevent erosion and sedimentation into watercourses and provide micro-sites to enhance woody vegetation establishment (see Drawing [Erosion Control – Rollback in Riparian Areas] provided in Appendix R).

Activity/Concern	Potential Mitigation Measures
Water Crossings (cont'd)	13. Seed riparian areas with an approved annual or perennial grass cover crop or native grass mix as soon as feasible after construction. See additional measures outlined in the Reclamation Management Plan (see Appendix C). Install temporary erosion control measures such as temporary berms, sediment fences, mounds or cross ditches within 24 hours of backfilling banks and approach slopes of water crossings at any location where runoff from the construction right-of-way may flow into a watercourse. Commence clean-up immediately following backfill and erosion control operations. Transplant dormant shrubs, or install dormant willow stakes or commercially grown rooted stock plants (plugs), where warranted, during reclamation of streambanks where riparian vegetation was present prior to construction. See additional measures outlined in the Reclamation Management Plan (see Appendix C) and aquatic resources (see Appendix J). 14. Install permanent erosion control measures, as outlined in the Reclamation Management Plan (see Appendix C) unless otherwise approved by Trans Mountain to adjust for site conditions and suitability.
Peatland/Wetlands	15. Allow wetlands to recover naturally (*i.e.,* do not seed wetland areas). 16. Spread mulch to a depth of no more than 5 cm along the construction right-of-way in areas classified as treed peatlands. 17. Leave a trench crown during clean-up of peatlands and non-peat wetlands to allow for settlement of backfilled material within the trench. 18. Re-establish surface drainage patterns in wetlands/peatlands to as close to the pre-construction contours as practical during reclamation. Leave frequent breaks in the trench crown in any areas identified as peatland to reduce the risk of ponding water and to re-establish drainage connectivity across the wetland.
Subsoil Compaction	19. Determine locations where subsoil compaction has occurred by comparing compaction levels on and off the construction right-of-way. Sites compared will be in close proximity and have similar drainage, soil moisture, aspect and land use, if feasible. 20. Rip compacted subsoils on the construction right-of-way adjacent to the ditchline and along shoo-flies with a multi-shank ripper or breaking disc to a depth of 30 cm or the depth of compaction, whichever is deeper. If soils are moist, postpone ripping of subsoils until soils dry to ensure that the soils fracture when ripped. 21. Employ a subsoiler plow (*e.g.,* Paratiller) along segments of the construction right-of-way adjacent to the ditchline where topsoil salvage did not occur and subsoil compaction is severe. Do not use a subsoiler plow on native grasslands.
Subsoil Preparation	22. Disc or chisel plow and harrow ripped subsoils to smooth the surface. Limit discing to that necessary to break up clods in order to prevent further compaction of the subsoils or to increase the potential for soil erosion by wind.
Excess Trench Spoil	23. Feather-out excess trench spoil over the portion of the construction right-of-way where topsoil/root zone material salvage occurred to avoid 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.

Activity/Concern	Potential Mitigation Measures
Excess Rock	24. Dispose of excess rock displaced from the trench or from blasting on non-agricultural lands in discrete piles, windrows or scattered along the construction right-of-way, or as directed by the landowner or appropriate regulatory authority.
Stony Subsoils	25. Pick stones on cultivated, hayland, pasture and native grassland land uses so that the stone content of exposed subsoils that have been disturbed by construction activity (*e.g.,* trenching/backfilling, grading, ripping) is equivalent to that of exposed subsoils that have not been disturbed. Dispose of stones at locations approved by landowner or appropriate regulatory authority, where warranted.
Topsoil/Root Zone Material Replacement	26. Replace topsoil/root zone material evenly over all portions of the construction right-of-way that have been stripped. Salvage a wider area of topsoil, if warranted, on cultivated, hay or tame pasture lands where topsoil salvage was conducted during the winter to allow excess trench spoil to be feathered-out over the stripped area (see Drawing [Conventional Right-of-Way Configuration] provided in Appendix R). 27. Postpone replacement during wet conditions or high winds to prevent damage to soil structure or erosion of topsoil/root zone material.
Vegetation Mat/Sod Conservation	28. Avoid scalping of the vegetation mat/sod layer during topsoil/root zone material replacement on cleared/ungrubbed riparian vegetation, native grasslands, hay and tame pasture. Use specialized equipment (*e.g.,* clean-up bucket) that limits the risk of scalping during the final pass of topsoil/root zone material replacement and is approved by the Environmental Inspector(s).
Woody Debris	29. Avoid removing excess small diameter slash in wooded areas with erodible soils.
Stony Topsoils	30. Pick stones on agricultural and native grasslands so that the construction right-of-way surface is equivalent (*i.e.,* stone size and density) to that of adjacent lands. Dispose of stones at locations approved by the Environmental Inspector(s), the landowner or appropriate regulatory authority, where warranted.
Cultivation	31. Cultivate or rip the full width of the construction right-of-way on cultivated fields and hay, tame pasture, bush or woodlands where poor sod development exists to a depth adequate to alleviate surface compaction and in a manner acceptable to the landowner. Do not cultivate into the subsoil. 32. Limit cultivation in areas of fine textured soils to prevent pulverization of the soil (see Soil/Sod Pulverization Contingency Plan in Appendix B). 33. Disc and harrow only if the site is to be seeded immediately; otherwise, leave the ripped topsoil in a rough condition to reduce wind erosion potential. 34. Disc or rip disturbed topsoil on hay and tame pasture lands where the sod layer has been broken or where topsoils are compacted and reseeding is warranted.
Flood Irrigation Lands	35. Repair and compact any irrigation/border dikes disturbed during construction to a standard that matches the adjacent undisturbed dikes. 36. Confirm that the construction right-of-way and border dikes on flood irrigated lands have been reclaimed to their pre-construction profile as shown on the pre-construction detailed elevation survey (see Agricultural Management Plan in Appendix C).

Activity/Concern	Potential Mitigation Measures
Surface Preparation – Native Grasslands	37. Determine the extent of disturbance to native grass lands (*e.g.,* compaction, rutting, etc.) and prepare the surface prior to seeding as per discussions with the Lead Environmental Inspector and the Environmental Inspector(s).
Surface Preparation – Steep Slopes	38. Confirm, prior to seeding/planting, that surface texturing is present on steep slopes. If warranted, establish mounds to create microsites on steep, wind exposed slopes where woody vegetation establishment is desirable to retain moisture and enhance vegetation establishment success by creating mounds on steep slopes (see Drawing [Mounding in Riparian Areas] provided in Appendix R), or where grass vegetation establishment is desirable, implement track cleat imprinting by aligning the final pass of bulldozers parallel to the slope during the final pass.
Erosion Control	39. Install erosion control blanket, coir/straw logs or rollback on exposed moderately to highly erodible soils where there is potential for water or wind erosion prior to re-establishment of vegetation (see Drawings [Rollback] and [Erosion Control – Rollback in Riparian Areas] and [Coir/Straw Log Installation] and [Erosion Control Matting/Blanket] provided in Appendix R). 40. Install mounds in riparian areas to reduce the potential for overland flow and sedimentation into watercourses/wetlands/lakes and to provide micro-sites to enhance woody vegetation establishment (see Drawing [Mounding in Riparian Areas] provided in Appendix R). 41. Control wind and water erosion using one or a combination of the options available in this EPP including measures listed below as well as those provided in the Soil Erosion and Sediment Control Contingency Plan in Appendix B. The appropriate option for the site-specific conditions will be selected in consultation with the Environmental Inspector(s). 42. Conduct straw crimping on disturbed agricultural or native grassland soils where wind erosion may be problematic. Prior to spreading and crimping of straw, confirm that approval from the landowner or appropriate regulatory authority is in place, where warranted. Straw used will be obtained from the landowner where the straw will be spread, a Certified seed grower or fields or bales that have been inspected to be free of weeds. Straw to be crimped must have a minimum stem length of 30 cm (see Drawing [Straw Crimping] provided in Appendix R). 43. Crimp straw into the soil to an approximate depth of 5 cm in rows spaced approximately 15 cm apart. 44. Apply tackifier on disturbed soils at a rate recommended by the supplier where soil wind erosion may be problematic (see Environmental Alignment Sheets). 45. Rollback slash and small diameter, salvageable timber on steep slopes and approach slopes to watercourses. Do not bury rollback when walking down with bulldozer. Leave gaps in rollback at all obvious wildlife trails. 46. Refer to environmental resource-specific mitigation tables for erodible soils and aquatic habitat features provided in Appendices F and I, respectively. 47. Ensure that mulch does not exceed 5 cm in depth so that soil thermal properties and vegetation re-establishment are not compromised. 48. Apply hydromulch/hydroseed at a rate recommended by the supplier on steep recontoured slopes and/or where soil wind erosion may be problematic (see Environmental Alignment Sheets).

Activity/Concern	Potential Mitigation Measures
Reclamation	49. Reclaim all temporary access trails and shoo-flies to stable conditions. 50. Remove unnecessary sediment fence or other temporary measures not required, as specified by the Environmental Inspector(s). 51. Limit pipeline construction equipment or vehicle travel down the construction right-of-way, except for tie-ins and testing crew access, once final clean-up and reclamation have been completed. 52. Implement appropriate reclamation measures as indicated on the Environmental Alignment Sheets and as described in this EPP to address resource-specific conditions that may result in revegetation problems. 53. Adhere to guidelines provided in the Reclamation Management Plan (see Appendix C).
Reclamation of Caribou Habitat	54. Refer to the environmental resource-specific mitigation for mountain caribou range provided in Appendix L.
Remove Remaining Vehicle Crossings	55. Remove any temporary vehicle crossings that were reinstalled to provide access during final clean-up. Follow measures related to bank restoration in this section and in Section 8.7.
Seeding Responsibility – Landowner/ Occupant	56. It is the responsibility of the landowner or occupant to seed and fertilize cultivated land segments of the construction right-of-way as part of their normal farming operations. Cultivated land refers to lands that are under annual crop or fallow at the time of construction.
Seeding Responsibility – Contractor	57. Drill (during non-frozen soil conditions) or broadcast seed highly erodible cultivated lands with a cover crop of barley (var. Local Certified) or annual oats (var. Local Certified) at 45 kg/ha immediately following topsoil replacement.
Seeding of Bush-Pasture/ Hay/Tame Pasture/Treed Land/ Native Grassland/ Open Coniferous Forests	58. Seed disturbed lands with land uses that support native and non-native plant communities with native and non-native grass mixtures and rates, respectively, as identified in the Reclamation Management Plan as per results of the vegetation field surveys (see Appendix C). 59. Refer to environmental resource-specific mitigation tables for native species provided in Appendix J.
Seeding of Erodible Soils	60. Seed disturbed erodible soils on non-cultivated land with a mixture of approved agronomic or native seed and cover crop seed such as fall rye if seeding in late summer or annual oats if seeding in the winter, spring or early summer. 61. Refer to environmental resource-specific mitigation tables for erodible soils provided in Appendix F.
Seeding Plans/ Procedures	62. Prepare a seeding plan for approval by the Environmental Inspector(s) that identifies the seeding equipment to be used along the various segments of the construction right-of-way, calibration procedures for the seeding equipment to be used and the seeding schedule.

Activity/Concern	Potential Mitigation Measures
Seed Procurement	63. Use only Certified Canada No. 1 or the best available agronomic seed. For native seed, the highest seed grade available will be obtained. Do not accept seed lots that contain any Prohibited Noxious or Noxious weeds as identified in the Certificate of Analysis. Retain the Certificates of Analysis obtained for both agronomic and native seed for future documentation. The Certificates of Analysis will be presented to the landowner/Crown land authority upon request. 64. Ensure that legume (*e.g.,* alfalfa) components of the seed mix have been treated with inoculants specific to the seed to be sown.
Seed - Alberta	65. Seed lands in Alberta with native and non-native seed mixes developed for the Project that are based on vegetation field survey data and carry out consultation with landowners/lessees or appropriate regulatory authorities.
Seed - BC	66. Revegetation of lands in the ALR in BC must be undertaken in accordance with Schedule B, Site Reclamation Requirements in the *Agricultural Land Reserve Act*. 67. Seed lands outside of the ALR in BC with native and non-native seed mixes developed for the Project that is based on vegetation field survey data and consultation with the landowner and appropriate regulatory authority.
Seed Mix Requirements – Alberta/BC	68. Seed disturbed soils at: • level and gently sloping non-cultivated terrain (tame pasture, hay, shrub/treed and forest land); • steep non-cultivated slopes (including approach slopes of watercourses outside of the riparian area) and erodible soils; • road ditches; and • riparian areas. 69. Seed mixes and application rates will be identified within Appendix S (Details) at the time of construction..
Fertilization Requirements – Alberta/BC	70. Fertilize disturbed soils where woody debris has been added to root zone material during construction to adjust the Carbon:Nitrogen ratio or to encourage vegetation establishment on nutrient deficient soils to be seeded with an agronomic or native grass mix (see Reclamation Management Plan in Appendix C and Environmental Alignment Sheets for application locations, fertilizer blends and application rates).
Fertilizing of Organic Fields	71. Application of fertilizer on organic fields will not be permitted unless otherwise requested by the landowner (see Agricultural Management Plan in Appendix C).
Fences	72. Repair fences and temporary gates will be replaced with permanent fences of equal or better quality, unless otherwise requested by the landowner/Crown land authority.
Cattle Damage	73. Install temporary fences, if warranted, to restrict grazing and trampling of the seeded construction right-of-way until vegetation becomes established or less palatable.
Corduroy	74. Dispose of any remaining log corduroy and geotextile that was left in place to allow access during final clean-up.

Activity/Concern	Potential Mitigation Measures
Visual Barriers	75. Use seedlings and/or larger trees for vegetation screens that have been salvaged from the construction right-of-way or sourced from acceptable donor sites or commercially propagated rooted stock seedlings and container trees grown from a seed sources obtained from the same natural subregion/Biogeoclimatic Zone, as well as the same general latitude and elevation. Avoid using forage species that will attract ungulates. 76. Construct subsoil berms planted with non-forage woody species (see Drawing [Vegetation and Soil Berm – Line-of-Sight Break] provided in Appendix R and the Reclamation Management Plan in Appendix C), where indicated. 77. Install tree/shrub plantings at potential access points and viewsheds to the construction right-of-way to provide a visual screen to the construction right-of-way (see Drawing [Vegetation and Slash Berm – Line-of-Sight Break] provided in Appendix R), where indicated. 78. Refer to environmental resource-specific mitigation tables for wildlife use provided in Appendix L.
Slash Berms	79. Construct slash berms 2 m high across the entire construction right-of-way to provide travel corridors for small mammals and limit line of sight down the construction right-of-way (see Drawing [Vegetation and Soil Berm – Line-of-Sight Break] provided in Appendix R). 80. Refer to environmental resource-specific mitigation tables for Wildlife features in Appendix L.
Ditch Ramps	81. Remove remaining bar ditch ramps, then seed and fertilize accordingly.
Access Restrictions	82. Install tree/shrub plantings at potential access points to the construction right-of-way to visually screen the construction right-of-way (see Drawing [Vegetation Screen] provided in Appendix R). 83. Rollback slash and salvageable timber at locations indicated on Environmental Alignment Sheets to prevent access along the construction right-of-way. Spread evenly over the construction right-of-way. Do not walk down rollback.
Burn Piles/Infrared Scanning	84. Confirm that burn piles are extinguished prior to the completion of final clean-up. Conduct infrared scanning of burn piles to locate any hot spots. Contact the appropriate regulatory authorities to determine optimum time for scanning.
Vehicle Damage	85. Restrict vehicle access over newly seeded areas.

8.7 Water Crossings

Introduction

The following potential mitigation measures may be implemented by Trans Mountain, its Contractors and/or subcontractors during the installation of vehicle/equipment and pipeline crossings of all watercourses/wetlands/lakes during pipeline construction. Additional details on specific water crossings are provided in Appendix I.

Objective

The objectives of these potential mitigation measures are to:

- avoid or reduce adverse environmental effects on fish and fish habitat, water quality and quantity;
- comply with the habitat protection provisions of the *Fisheries Act;*
- comply with all provincial regulatory requirements including the applicable AESRD *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (Government of Alberta 2013b), Enhanced Approval Process (EAP) - Integrated Standards and Guidelines (Government of Alberta 2013c), Operating Conditions EAP (Government of Alberta 2011c), and Best Management Guidelines EAP (Government of Alberta 2011a), BC OGC *Environmental Protection and Management Guide* (BC OGC 2013) and the BC *Water Act* and *Water Regulation*;
- comply with applicable DFO Operational Statements in each province;
- comply with all regulatory, permit, and approval conditions;
- utilize environmentally and economically responsible construction practices at all times, and in accordance with applicable industry standards;
- maintain habitat quality at all water crossings;
- protect riparian areas in proximity to water crossings; and
- maintain the ecosystem function of riparian and wetland areas.

8.7.1 General Measures

The general potential mitigation measures are applicable, as appropriate, to all water crossings. Water crossings are categorized and discussed in further detail in the subsections that follow.

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern	Potential Mitigation Measures
Notification/ Approvals	1. Notify the District Approvals Manager (Alberta only) (see Appendix D) 14 days (minimum) prior to commencement of pipeline or temporary vehicle and equipment water crossing construction. 2. Ensure completion of the onsite checklist for pipeline and vehicle crossings for each watercourse and wetland prior to, during and following construction (attached). These checklists will be filled out by the Environmental Inspector(s). Retain these checklists as a permanent record of pipeline watercourse and wetland crossing installation. 3. Install pipeline and vehicle/equipment crossings at fish-bearing watercourse crossings during window of least risk for proposed crossings in BC and outside the RAP for proposed crossings in Alberta, unless otherwise specified in Appendix I. 4. Notify downstream water users, where warranted, 30 days prior to the commencement of instream crossing construction in accordance with measures identified in Section 4.0. 5. Determine if approvals from the appropriate irrigation district authorities are necessary prior to construction of any canal or ditch crossing under their jurisdiction (see Appendix D). Also obtain approval from the landowner prior to crossing privately-owned irrigation/drainage ditches. 6. Notify and/or determine if applicable authorization, advice or approval is necessary from DFO and Transport Canada for water crossings, as warranted. 7. Complete a Section 8 application for the diversion of water and submit to Front Counter BC a minimum of 45 days prior to the start of construction or testing. Complete a Section 9 application for work in an about a stream and submit to Front Counter BC a minimum of 45 days prior to the start of construction. Based on current processing times (approximately 90 days), the 45 day minimum submission date may be extended based on the project details and areas of work. These requirements will be clearly outlined in approvals and permits. 8. Determine if permits from the appropriate regulatory authorities are necessary before conducting fish salvage prior to and during diversions and trenching at isolated water crossings. 9. Ensure that any permits/approvals that are necessary and a detailed Reclamation Management Plan is in place in the event that a trenchless crossing fails and an alternate method is necessary. 10. Review vehicle crossing installation notification requirements identified in Section 4.0 and ensure notifications have been completed.

Activity/Concern	Potential Mitigation Measures
Scheduling/Planning	11. Review and adhere to applicable instream timing constraints (RAP/least-risk window) and all resource-specific measures outlined in the mitigation tables for aquatic resources provided in Appendix I. 12. Where conditions or measures for typical open cut of seasonally dry or frozen to the bottom watercourses and wetlands in Alberta will not be in accordance with the *Operational Statement for Isolated or Dry Open-cut Stream Crossings* (DFO 2008a) in Alberta or the Pacific Region *Operational Statement for Dry Open-cut Stream Crossings* (DFO 2008b) in BC (*i.e.,* flowing water is expected to coincide with trenched construction), site-specific mitigation and/or reclamation plans will be developed. Discussions with DFO will be conducted to identify preferred timing for instream work in fish-bearing watercourses and wetlands and to confirm whether a fish habitat compensation/offset plan will be required. 13. Site specific mitigation/reclamation and/or compensation plans may be required at highly sensitive watercourses where trenched crossings are proposed as the primary or contingency methods. The need for compensation will be reviewed with regulatory authorities, at a later date. 14. Complete the water crossing planning sheets (see example provided at the end of Section 8) prior to the commencement of any water crossing activities. 15. Ensure all necessary equipment, personnel and materials are onsite and ready for installation prior to commencing instream work. Complete all work as quickly as practical to limit the duration of disturbance. 16. Schedule the installation of bridge abutments on multi-span bridges, if warranted, to occur within the instream work window where feasible or unless otherwise permitted by the appropriate regulatory authority.
Aquatic/Riparian Plants and Pests	17. Determine the presence of any aquatic or riparian plants and pests prior to the commencement of construction activities within the riparian buffer. Notify the Contractor of any special measures to be implemented to prevent the transfer of these organisms from one watercourse to another.
Additional TWS	18. Mark acquired additional TWS prior to the initiation of instream work. Ensure additional TWS does not encroach within vegetated riparian buffers.
Water Monitoring	19. Monitor temporary vehicle crossings to ensure that erosion control measures are adequate and streamflow is not disrupted. 20. Monitor to assess the immediate effects of crossing construction, where warranted. Also monitor sediment release (*i.e.,* turbidity and total suspended solids [TSS]) throughout the crossing construction period, when warranted in accordance with the monitoring measures provided in the Water Crossing Construction Monitoring Plan (see Appendix C). 21. Develop water quality monitoring (WQM) plans, where required, to monitor for suspended sediment during HDD, and select isolated trenched crossings of watercourses with high sensitivity fish habitat, or open-cut crossing construction activities where flow is present. If monitoring reveals that sediment values are approaching threshold values, the water quality monitors will notify the Lead Environmental Inspector and Environmental Inspector(s) who, with the Construction Manager and Contractor, will develop corrective actions.

Activity/Concern	Potential Mitigation Measures
Water Monitoring (cont'd)	22. Ensure a Water Quality Resource Specialist is onsite prior to commencement of crossing for the watercourses/wetlands/lakes identified in the environmental resource-specific mitigation tables for aquatic resources provided in Appendix I and as per permit/approval conditions. 23. Assign the Environmental Inspector(s), Qualified Aquatic Environmental Specialist (QAES) or Qualified Environmental Professional (QEP) with expertise in the containment of inadvertent release of drilling mud and clean up to HDDs under a watercourse (see Drilling Mud Release Contingency Plan in Appendix B). 24. Monitor to assess the immediate effects of crossing construction, where warranted. Also monitor sediment release (*i.e.,* turbidity and TSS) throughout the crossing construction period, when warranted.
Wetland Crossing Plan	25. Review the Wetland Crossing Plan (to be developed by the Contractor and provided under separate cover after approval of the Project) and ensure all conditions and approvals are in place prior to the commencement of construction.

Contractor Measures

The following activity-specific mitigation measures will be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Notification/ Approvals	26. Notify the Environmental Inspector(s) 24 hours (minimum) prior to commencement of water crossing construction (including activities within the riparian buffer). 27. Confirm with the Environmental Inspector(s) that all notifications and approvals and/or letters of advice are in place prior to installing a temporary vehicle crossing or commencing instream construction at each water/canal crossing. Review crossing notification/approval conditions. Retain copies of approvals onsite during crossing construction. 28. Comply with notification and warning of recreational boaters under NEB guidelines or approvals (see Section 4.0). 29. Maintain signage and other warning systems required by the NEB in place until navigational hazards are removed.
Guidelines	30. Follow applicable DFO Operational Statements outlining conditions and measures to avoid serious harm to fish or any permanent alteration to, or destruction of, fish habitat when working in or near a watercourse/wetland/lake that has been identified as providing fish habitat.
Guidelines - BC	31. For all activities in the vicinity of a watercourse/wetland/lake, adhere to the best practices and measures as follows: • A Users' Guide for Working In and Around Water (BC MOE 2005); and • Standards and Best Practices for Instream Works (BC Ministry of Water, Land and Air Protection 2004a).
Codes of Practice - Alberta	32. Abide by procedures presented in the QAES reports and/or notifications prepared to satisfy COP requirements.

Activity/Concern	Potential Mitigation Measures
Beaver Dams	33. Determine if approvals/permits are necessary, in the event that beaver dams or lodges will be disturbed, prior to activities that may cause disturbance. 34. Contact the appropriate regulatory authority if a beaver dam removal is required during frozen soil conditions. 35. Breach the beaver dam slowly to avoid the rapid release of water that could cause erosion of the bed and banks as well as subsequent sedimentation of downstream waters.
Floods	36. Postpone instream water crossing construction if excessive flows or flood conditions are present or anticipated. Ensure that all spoil piles are moved above the anticipated flood line. Resume activities when water levels have subsided or equipment/techniques suitable for conditions are deployed. 37. Limit instream construction to the shortest duration practical given the characteristics of the watercourse and the construction season.
Construction	38. Provide to the Environmental Inspector(s) 72 hours prior to the commencement of water crossing construction site-specific, detailed water crossing construction plans including isolation structure, pumps (sizes and quantity), discharge locations, by pass location, spoil containment areas, grey water management, trenching equipment and a plan describing the excavation procedure. 39. Install the access and pipeline at each watercourse using the technique as identified in environmental resource-specific mitigation table for aquatic resources in Appendix I and as shown on the Environmental Alignment Sheets. Ensure that the technique is implemented as per the reports/notifications/applications provided to applicable regulatory authorities. 40. Store spoil material removed from the trenched crossing above the ordinary high water level. Stabilize this material, if warranted, to reduce the potential for runoff events to transport spoil material into the watercourse. 41. Prevent construction materials and debris from entering watercourses. 42. Review all mitigation and regulatory requirements during the pre-job or tailgate meetings involving the appropriate personnel (*i.e.,* the Contractor, the Environmental Inspector(s), WQM crews and/or subcontractors) to ensure that all applicable mitigation are understood and can be implemented.
Construction Traffic	43. Follow the measures in the Traffic and Access Control Management Plan (see Appendix C).
Equipment	44. Wash all equipment transferred between sub-basins to ensure that aquatic pests are not transferred. 45. Review and adhere to the general mitigation measures provided in Section 7.0 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 during water crossing construction. 46. Ensure all equipment, including hoses, are in good working condition and no leaks are observed. 47. Use non-toxic, biodegradable hydraulic fluids in all equipment that will work instream if/when flowing water will be encountered during construction or in wetland and/or lakes if requested by the Environmental Inspector(s).

Activity/Concern	Potential Mitigation Measures
Pre-Clearing/ Pre-Mowing and Clearing	48. Adhere to mitigation measures provided in Section 8.0 regarding maintaining buffers, pre-clearing, clearing and grubbing within the vicinity of watercourses/wetlands/lakes. 49. Reduce vegetation removal, and particularly riparian vegetation removal for bridges, to only that which is necessary for safety and operational needs.
Buffer Areas	50. Adhere to the measures related to the maintenance of a vegetative mat within the riparian buffer zone on both sides of watercourse or wetland crossings. 51. Ensure disturbance of the right-of-way within the functional riparian area of any watercourse/wetland/lake encountered by the proposed construction right-of-way is reduced.
Shrub Salvage	52. Salvage dormant willow shrubs from the banks of all watercourses (where present) to be disturbed and identified as requiring shrub salvage (outlined in the environmental resource-specific mitigation tables for aquatic or vegetation resources provided in Appendices I and J). Store at the side of the construction right-of-way and use salvaged topsoil/root zone material to cover and protect roots from drying out. Other species such as dogwood, rose and wolf willow may also be used. If salvage of willows from the bank is likely to result in limited success (salvage during non-dormant periods), transplant dormant willows obtained from the adjacent areas during clean-up or use container plant stock from nurseries. Determine if permission from the appropriate regulatory authority is necessary prior to salvaging shrubs from off the construction right-of-way.
Sediment Control	53. Install a temporary sediment barrier (*e.g.,* sediment fences), where warranted, to eliminate the flow of sediment from spoil piles and disturbed areas into nearby watercourses/wetlands/lakes (see Drawing [Sediment Fence] provided in Appendix R). 54. Collect and filter sediment resulting from the washing of gravel and other streambed materials. 55. Inspect temporary sediment control structures (*e.g.,* sediment fences, subsoil berms) installed on approach slopes, on a daily basis throughout crossing construction. Repair the structures, if warranted, before the end of the working day.
Soil Handling and Grading	56. Follow the measures outlined for soil handling and grading in the vicinity of watercourses/wetlands/lakes in Section 8.0.
Welding and Weighting	57. Weld, coat and weigh the pipe prior to commencement of instream construction to the extent feasible. These tasks may be conducted in conjunction with instream construction at crossings of large watercourses. 58. Assemble pipeline in upland areas and utilize "push-pull" or "float" technique to place pipe in trench whenever water and other site conditions allow. 59. Do not perform concrete coating activities near a watercourse/wetland/lake unless suitable isolation from surface drainage and water sources is ensured.

8.7.2 Temporary Vehicle/Equipment Crossings

Contractor Measures

The following activity-specific mitigation measures for construction of vehicle crossings during pipeline construction will be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Schedule	1. Adhere to the RAPs/least-risk windows for construction activities identified in the environmental resource-specific mitigation tables for aquatic resources provided in Appendix I.
Vehicle Crossing Selection	2. Locate vehicle crossings at straight and stable reaches of watercourses. 3. Use the vehicle crossings at watercourses crossed by access roads identified in Section 9.0 within the aquatic resources tables (see Appendix I) and on the Environmental Alignment Sheets. 4. Install crossings structures as identified in the Aquatics Resource-specific Mitigation Tables (see Appendix I). 5. Ensure that upgraded or new construction vehicle crossing structures are appropriate for the watercourse approaches, channel width and configuration, anticipated streamflows during the period of use, planned vehicle loads, and overall period/duration of use. 6. Ensure temporary vehicle crossing structures do not disrupt fish passage at fish-bearing watercourses. 7. Construct or install temporary vehicle access across watercourses and adjacent to wetlands and lakes in a manner that follows provincial and federal guidelines. 8. Install and remove temporary vehicle crossings in a manner that protects the banks of watercourses from erosion and maintains flows. 9. Use existing vehicle crossings at watercourses crossed by access roads identified in Section 9.0 and within the aquatic resources tables (see Appendix I). 10. Install crossing structures as identified in the aquatics resource-specific mitigation tables (see Appendix I). 11. Consider alternate methods of vehicle crossings on a site-specific basis. The decision making process will include the Contractor, the Construction Manager, the Environmental Inspector(s) and the MOC process. Criteria to be considered when making a crossing structure decision will include protection of the riparian vegetation and fisheries values associated with the crossing location as well as applicable legislation. 12. Ensure temporary vehicle crossing structures do not disrupt fish passage at fish-bearing watercourses and do not interfere with or impede flow or navigation at any location.
Bridges	13. Install temporary bridges at locations identified in the environmental resource-specific mitigation tables for Aquatic resources provided in Appendix I. Ensure bridges are clean prior to installation and dispose of soil at an appropriate location (see Drawing [Vehicle Crossing – Ramp and Culvert] provided in Appendix R).

Activity/Concern	Potential Mitigation Measures
Bridges (cont'd)	14. Install, use and remove bridges in accordance with the measures identified in the DFO *Operational Statement for Clear-Span Bridges* (DFO 2008e,f) and *Operational Statement for Bridge Maintenance* (DFO 2008k,l). Leave bridges to permanent facility sites in place. 15. Install the entire bridge including bridge abutments, footings and armouring above the high watermark of the watercourse unless otherwise approved by the appropriate regulatory authorities. Ensure bridge installation does not alter the stream bed or banks or require infilling of the channel. 16. Create approaches to the water crossing perpendicular to the channel of the watercourse. 17. Ensure stormwater from the bridge deck, side slopes and bridge approaches is directed away from the watercourse onto a well vegetated area. 18. Implement erosion control measures as soon as a disturbance of the vegetation mat occurs. 19. Remove bridge immediately after use. If bridge is to remain in place through spring break-up to access final clean-up, it must be designed for spring floods and ice jams. Remove support structures and approach fills. Re-establish and stabilize banks. 20. Remove bar ditch ramps and reclaim temporary access to stable conditions. 21. Stabilize and revegetate areas disturbed during installation and removal of a bridge; install erosion control measures, where warranted, to control surface erosion until vegetation is established.
Temporary Fords	22. Conduct fords during the installation of a vehicle crossing in accordance with the DFO *Operational Statement for Temporary Ford Stream Crossing* (in BC) (DFO 2008m) and *Temporary Stream Crossings* (in Alberta) (DFO 2008c). 23. Ensure the use of a ford is a one-time crossing (over and back) or limit ford to a seasonally dry streambed. 24. Adhere to the instream works reduced risk-timing window when fording in watercourses where water is present. 25. Confine the use of fords to watercourses or segments of watercourses with low, stable banks and a stable substrate composed of materials such as gravel or bedrock. Trans Mountain will not grade the banks to create a ford. 26. Confine fording to periods of low flow when water depth will not impede passage of equipment. 27. Install matting, where warranted, to protect the bed and banks of a watercourse to be forded.
Closed and Open Bottom Structures	28. Use closed bottom structures (*i.e.,* culverts) to provide temporary vehicle access at nonfish-bearing watercourses, or on fish-bearing watercourses within a defined nonfish-bearing reach. Ensure compliance with all respective provincial guidelines (*e.g.,* BC MOE, BC OGC, COP [Alberta]) when installing closed bottom structures. 29. Use open bottom structures (*i.e.,* culverts) on both fish-bearing and nonfish-bearing watercourses. Ensure compliance with all respective provincial guidelines (*e.g.,* BC MOE, BC OGC, COP [Alberta]) when installing open bottom structures.

Activity/Concern	Potential Mitigation Measures
Ice Bridges/Snow Ice/Log Fills	30. Install clean snowfills during frozen conditions at locations identified in the environmental resource-specific mitigation tables for aquatic resources provided in Appendix I, and at all minor and intermittent watercourses (see Environmental Alignment Sheets). 31. Install ice bridges at locations identified in the aquatic resources tables during frozen conditions (see Appendix I). 32. Design, construct and abandon ice bridge and snow fill vehicle crossings at watercourses/wetlands/lakes in accordance with the applicable DFO *Operational Statement for Ice Bridges and Snow Fills*. 33. Construct ice bridges and snow fills from clean snow, ice and local water; do not use soil, gravel, rock, slash, logs or other woody debris. Lift bulldozer blades when salvaging snow from adjacent upland areas to avoid the incorporation of grasses and other vegetation debris in the fill material. 34. Use clear span bridges if ice thickness is insufficient to support an ice bridge. Clear span bridges should be installed perpendicular to the watercourse and should be designed to meet provincial requirements related flood frequency levels unless recommended otherwise by a hydrotechnical engineer. Remove clear span bridges prior to spring break-up. 35. Remove or breach snow or ice bridge to ensure streamflow is maintained under the vehicle crossing. Ensure that removal of access does not disturb the bed or banks of the crossing. Ensure that equipment used during construction of the vehicle crossings is used in a manner that reduces disturbance of the bed and banks, and limits the risk of disrupting streamflow under the ice. 36. Use only clean ice/snow for construction of an ice/snowfill or ice bridge. Approaches to the bridge should be constructed with compacted snow, ice or matting of sufficient thickness to protect the stream channel and banks. Soils are not to be used for ice bridge approaches. 37. Withdraw a maximum of 10% of the instantaneous stream flow at any given time if water extraction is necessary for the construction of a temporary crossing. Pump intakes are to not disturb the streambed. Pumps are to be screened with a maximum mesh size of 2.54 mm and should have a maximum screen approach velocity of less than 0.038 m/s where fish habitat is present. 38. Ensure streamflow, if present, is maintained under the vehicle crossing. Remove or breach snow or ice bridge to ensure they do not impede flow. Ensure that removal of access does not disturbed the bed or banks of the watercourse crossing. 39. The use of log fills is only permitted in nonfish-bearing watercourses. Their use must be in compliance with all respective provincial guidelines (*e.g.,* BC MOE, BC OGC, COP [Alberta]) when installing log fills. 40. Create a v-notch in the centre of the ice bridge or snow/ice fill prior to spring break up in order to allow the crossing to melt from the centre and prevent blocking fish passage, channel erosion and flooding. Where feasible, remove compacted snow from the crossing rather than creating a v-notch. 41. Seed disturbed areas on the banks and approaches as soon as practical with an approved grass cover crop species or native grass seed mix and implement sediment control measures to stabilize watercourse banks and prevent sedimentation of the watercourse, respectively. Follow measures provided in the Reclamation Management Plan (see Appendix C).

8.7.3 Watercourse Crossings

Contractor Measures

The following activity-specific mitigation measures for construction of pipeline crossings of watercourses may be implemented by the Contractor

Activity/Concern	Potential Mitigation Measures
Schedule	1. Adhere to the construction work windows for construction activities provided in the environmental resource-specific mitigation tables for aquatic resources in Appendix I and on the Environmental Alignment Sheets.
Open-Cut Crossings	2. Conduct an open-cut crossing of seasonally dry or frozen to the bottom watercourses and an isolated crossing at select crossings (see Appendix I) in Alberta in accordance with the *Alberta Operational Statement for Isolated or Dry Open-cut Stream Crossings* (DFO 2008a) (see Drawing [Watercourse Crossing – Open Cut Method for Dry/Frozen Watercourses] provided in Appendix R). 3. Conduct typical open cut of seasonally dry or frozen to the bottom watercourses in BC in accordance with the Pacific Region *Operational Statement for Dry Open-cut Stream Crossings* (DFO 2008b). 4. Install pipeline and vehicle/equipment crossing at fish-bearing watercourse crossings during the window of least risk for proposed crossings in BC and outside the RAP for proposed crossings in Alberta, unless otherwise specified in Appendix I. 5. Ensure streamflow, if present, is maintained at all times when trenching through a watercourse. Retain hard plugs at each bank until just prior to pipe installation. Install temporary soft plugs, where necessary, to control water flow and trench sloughing. Ensure the trench is dewatered onto stable vegetated land and not directly into a watercourse. Conduct work from both banks utilizing two backhoes, if necessary, to expedite the crossing (see Drawing [Watercourse Crossing – Open Cut Method for Flowing Watercourses] provided in Appendix R). 6. Salvage the upper 0.5 m (minimum) of clean, granular material, if present, and stockpile separately from the remainder of the trench spoil. Backfill the top of the trench with a minimum of 0.5 m of clean, granular material where granular material was encountered in the trench. Where there is not sufficient clean, granular material or where salvage of the granular material is not practical to complete backfilling, non-native granular material can be used to cap the trench. All imported granular non-native material used for capping should be clean, washed granular material. This material must be obtained from offsite and not obtained from below the ordinary high water level of any watercourse. 7. Return the bed and banks of each proposed crossing as close as possible to their pre-construction contours. Crossings are not to be realigned or straightened in any way nor have their hydraulic characteristics changed. 8. Develop a WQM plan with input from a QAES/QEP to monitor TSS concentrations during the installation and repair of open cut crossings. TSS concentration is to remain within the guidelines provided in Canadian Council of Ministers of the Environment (CCME) (2007) throughout the installation and repair of open cut crossings.

Activity/Concern	Potential Mitigation Measures
Open-Cut Crossings (cont'd)	9. Develop site-specific mitigation and/or reclamation plans where conditions or measures for a typical open cut water crossing (seasonally dry or frozen to the bottom), will not be in accordance with the *Operational Statement for Isolated or Dry Open-cut Stream Crossings* (DFO 2008a) in Alberta or the Pacific Region *Operational Statement for Dry Open-cut Stream Crossings* (DFO 2008b) in BC (*i.e.,* flowing water is expected to coincide with trenched construction). Discussions with DFO will be conducted to identify preferred timing for instream work and to confirm whether a fish habitat compensation/offset plan will be required.
Isolated Crossings	10. Construct the crossing in accordance with the COP (Alberta only) requirements and in accordance with the conditions of the DFO's *Operational Statement for Isolated or Dry Open-cut Stream Crossings* or other DFO conditions (DFO 2008a). 11. Isolated BC pipeline crossings are not included under the Pacific Region DFO's *Operational Statement for Isolated or Dry Open-cut Crossings* (DFO 2008b). 12. Construct the isolation dams of materials that meet the requirements of the applicable COP and Operational Statement conditions, (Alberta only) and are approved by the Lead Environmental Inspector and the Environmental Inspector(s). Earthen isolation dams are prohibited. 13. Implement applicable measures from the Fish Species of Concern Contingency Plan (see Appendix B) should fish species of concern be discovered during construction. 14. Follow the measures noted on Drawings [Watercourse Crossing – Dam and Pump Method] and [Watercourse Crossing – High Volume Pump Method] and [Watercourse Crossing – Flume Method] provided in Appendix R for dam and pump, high volume pump and flume methods. 15. Notify the Lead Environmental Inspector and the Environmental Inspector(s) 72 hours prior to construction of any watercourse crossing, installation of isolation dams or diversions to ensure fish salvage operations are conducted, where warranted. 16. Develop a WQM plan with input from a QAES/QEP to monitor TSS concentrations during the installation and removal of isolation crossings. TSS concentration levels will be monitored using the guidelines provided in CCME (1997) throughout the installation and removal of isolation crossings. In some cases, such as where fisheries concerns are low and flow volumes are minimal at the time of construction, the WQM plan may only require visual monitoring. 17. Ensure maintenance of downstream flow conditions (*i.e.,* quantity and quality) at all times when constructing an isolated crossing. If a pump-around method is used to maintain downstream flow, back-up pumping capacity must be onsite and ready to take over pumping immediately if operating pumps fail. Pumps are to be continuously monitored to ensure flow is maintained at all times until the dam materials are removed and normal flow is restored to the channel. 18. Ensure that isolation bypass water maintains downstream flow and does not cause erosion or introduce sediment into the channel. Methods and options for preventing erosion include: flow dissipaters; protection of the substrate with geotextile; releasing water onto vegetation; and strategically placing erosion control mats immediately adjacent to the watercourse.

Activity/Concern	Potential Mitigation Measures
Isolated Crossings (cont'd)	19. Assign a QAES/QEP to salvage fish with an electrofisher from the isolated area prior to and during dewatering and trenching at isolated water crossings in accordance with the Fish Research License in Alberta and the Fish Collection Permit in BC (see Appendix D) if those permits are determined to be necessary. Note that the application for a Fish Research License and a Fish Collection Permit is to be submitted 10 working days (minimum) prior to the scheduled isolation of the watercourse (AESRD 2013a). Release all captured fish to areas downstream of the crossing that provide suitable habitat. 20. Release captured fish to areas downstream of the crossing that provide suitable habitat. 21. Clean fish salvage equipment (*e.g.,* waders, boots, nets) of soil, and disinfect with 100 mg/L chlorine bleach before using in any watercourse to prevent the spread of pathogens (*e.g.,* whirling disease) and/or invasive plant species. Ensure that washed off soil is disposed of at a location that will prevent the reintroduction of these untreated materials into a watercourse. 22. Conduct amphibian salvage prior to the commencement of heavy equipment activity at known amphibian locations in accordance with amphibian salvage approval/permit conditions. Ensure those conducting the amphibian salvage have the experience/training to meet the approval/permit conditions. 23. Schedule water crossing construction activities to allow for fish salvage to occur prior to dewatering. 24. Confirm with the Environmental Inspector(s) that a QAES or QEP with a Fish Salvage License will be onsite to conduct the fish salvage before and during dewatering between the isolation dams. 25. Complete fish rescue on all isolated watercourse crossings with flowing water and as identified in Aquatic Resources (Appendix I) prior to the start of pipeline installation in a watercourse. 26. Ensure fish are rescued from any temporarily or permanently abandoned reach of channel that is free of debris. 27. Ensure all water intakes are screened in accordance with the DFO's *Freshwater End-of-Pipe Fish Screen Guideline* (1995). Ensure the screens are free of debris during pumping. 28. Ensure that pump intakes avoid or reduce disturbance of the streambed and are screened with a maximum mesh size of 2.54 mm and sized to limit the approach velocity to not exceed 0.038 m/s. To accomplish this, where pumps larger than 15 cm diameter are used, place the intakes in a mesh cage (2.54 mm) to reduce the approach velocity that fish are exposed to and prevent them from being impinged on the intake. Refer to DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline* (1995) for additional information. 29. Ensure that generators and pumps used for the construction of isolated watercourse crossings and/or trench dewatering have secondary containment that can hold a capacity of 125% (minimum) of the fuel tank when stationed, operated or refuelled within 100 m of a watercourse. 30. Dewater the segment of the watercourse between the dams, if feasible and safe to do so. Pump any sediment-laden water out between the dams to well-vegetated lands, away from the watercourse or to settling ponds. 31. Ensure backup pumps are in place should a primary pump fail.

Activity/Concern	Potential Mitigation Measures
Isolated Crossings (cont'd)	32. Ensure that water from flumes, dam and pumps, diversion or other methods does not cause erosion or introduce sediment into the channel. If warranted, place rock rip rap, tarpaulins, plywood sheeting or other materials to control erosion at the outlet of pump hoses and flumes. Supplement the erosion control materials, if warranted, to control any erosion. 33. Salvage the upper 0.5 m (minimum) of clean, granular material, if present, and stockpile separately from the remainder of the trench spoil. Backfill the top of the trench with a minimum of 0.5 m of clean, granular material where granular material was encountered in the trench. Where there is no sufficient clean, granular material or where salvage of the granular material is not practical to complete backfilling, non-native granular material can be used to cap the trench. All imported granular non-native material used for capping should be clean, washed granular material. This material must be obtained from offsite and not obtained from below the ordinary high water level of any watercourse. 34. Remove any accumulations of sediment within the isolation areas that resulted from crossing construction. Spread all sediment and unused trench spoil removed from the watercourse at a location above the high water mark where the materials will not directly re-enter the watercourse. 35. Follow site-specific reclamation or compensation plans at select watercourse crossings, if deemed necessary, following confirmation of construction method and timing.
Trenchless Measures	36. Construct trenchless crossings in accordance with the COP requirements and the conditions of the DFO's *Operational Statement for High-pressure Directional Drilling* (Alberta) (DFO 2008j) and the DFO's *Operational Statement for Directional Drilling* (BC) (DFO 2008n). 37. Conduct investigations prior to the commencement of drilling activities to assess groundwater conditions and risks (*e.g.,* water supply wells located within the LSA) in highly vulnerable aquifers. Modify the drill path of the HDD, if feasible, to reduce the potential effects on groundwater quality and, if warranted, monitor water supply wells in the immediate area before, during and after the HDD. Have plans in place for the supply of alternate water in the event that water quality in the wells is affected. 38. Follow notes on Drawings (Watercourse Crossing – Horizontal Directional Drill) and (Watercourse Crossing – Bore or Punch Method [Grasslands]) and (Watercourse Crossing – Bore or Punch Method [Forested]) provided in Appendix R, for HDD and bore techniques, respectively. 39. Determine which approvals are needed by Trans Mountain in the event that a trenchless crossing fails and an alternate method is necessary and that they are acquired, if necessary. 40. Plan for and use the procedures for a HDD or other trenchless crossing in accordance with those provided in the Horizontal Directional Drilling/Trenchless Planning and Procedures Management Plan (see Appendix C). 41. Excavate the entry and expected exit sites to provide for the containment of drilling mud and cuttings during a HDD. Ensure the excavations are located far enough from the watercourse and in containment berms or tanks that are large enough to contain the anticipated maximum volume of drilling mud above the high watermark of the watercourse.

Activity/Concern	Potential Mitigation Measures
Trenchless Measures (cont'd)	42. Excavate the entry and expected exit sites to provide for the containment of drilling mud and cuttings during a HDD. Ensure the excavations are located far enough from the watercourse and in containment berms or tanks that are large enough to contain the anticipated maximum volume of drilling mud above the high watermark of the watercourse. 43. Cease trenchless crossing work immediately and refer to the Drilling Mud Release Contingency Plan (see Appendix B) in the event that an inadvertent release of drilling mud has occurred and the material is or may enter the watercourse or affect other sensitive environmental or land use features. 44. Follow the drilling mud frac-out monitoring and other measures outlined in the Drilling Mud Release Contingency Plan (see Appendix B) during HDD. 45. Monitor to assess the immediate effects of crossing construction, if warranted. Also monitor sediment release (*i.e.,* turbidity and TSS) throughout the crossing construction period, if required. 46. Ensure that water from dewatering entry and exit sites with a high sediment load is not discharged or allowed to flow into any watercourse/wetland/lake. Remove the sediment (*e.g.,* filter or discharge into a vegetated area) before water is allowed to enter any watercourse/wetland/lake. 47. Ensure surficial materials are hydraulically isolated before drilling to deeper depths. 48. Use current drilling technology to ensure mud or casing seal is effective. 49. Depressurize the aquifer in the vicinity of the HDD area during the subsurface crossing and casing installation operations by drilling relief wells into the confined aquifer to reduce the pressure locally. 50. Seal/cement the annular space located between the casing and the edge of the borehole to eliminate the hydraulic connection for other units.
Irrigation Canals	51. Use a trenchless crossing technique at irrigation canals and ensure canal integrity is maintained. Follow all conditions noted on applicable crossing permits.
Bank Re-Establishment and Protection	52. Return the bed and banks of each crossing as close as feasible to their pre-construction contours (slope and height). Crossings should not be realigned or straightened in any way nor have their hydraulic characteristics changed. Take appropriate measures to reduce the risk of sloughing of the streambanks following construction. The Environmental Inspector(s) will determine onsite whether restoration measures in addition to those identified in the environmental resource-specific mitigation tables for aquatic resources outlined in Appendix I are required to stabilize the banks (*e.g.,* soil wraps, brush layers, willow plantings and matting) and promote the restoration of the pre-construction conditions. 53. Install coir or other biodegradable erosion control fabric approved by the Environmental Inspector(s) on disturbed portions of the banks. 54. Maintain sediment fences or equivalent sediment control structure in place at the base of approach slopes until revegetation of the construction right-of-way is complete.

Activity/Concern	Potential Mitigation Measures
Bank Re-Establishment and Protection (cont'd)	55. Install riprap bank armouring (see Drawing [Streambank Protection – Cobble or Riprap Armouring] provided in Appendix R) along unstable banks with high erosion potential locations as outlined in the environmental resource-specific mitigation tables for aquatic resources provided in Appendix I. 56. Install vegetated soil wraps or cribwalls (see Drawings [Streambank Protection – Cribwalls] and [Streambank Protection – Grass Roll] provided in Appendix R) along unstable banks with high erosion potential to reduce the risk of erosion and to enhance fish habitat at locations as outlined in the environmental resource-specific mitigation tables for aquatic resources provided in Appendix I. 57. Install trench breakers if the banks are composed of organic materials as noted in Section 8.0.
Clean-Up and Reclamation	58. Clean equipment following water crossing construction and bank reclamation work to ensure the equipment does not transfer soil, debris, invasive plants or aquatic pests (*e.g., Myxobolus cerebralis* – the parasite that causes whirling disease in fish) to other watercourses. 59. Commence clean-up immediately following completion of backfill and erosion control activities. Implement measures provided under Clean-up and Reclamation provided in Section 8.0 and the Reclamation Management Plan (see Appendix C).
Fencing	60. Install temporary fencing, if warranted, to allow the revegetation treatments to become established and avoid damage to the banks and riparian area by wildlife/livestock.

8.7.4 Wetland Crossings

Contractor Measures

The following activity-specific mitigation measures for construction of pipeline crossings of wetlands may be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Schedule	1. Adhere to the construction work windows for construction activities provided on the Environmental Alignment Sheets and in the environmental resource specific mitigation tables for wetlands in Appendix K.
Construction Traffic	2. Avoid rutting and admixing of wetland soils during non-frozen soil conditions. Install appropriate ramps using mats (*e.g.,* swamp mats) or geotextile and spoil ramps.
Trenched Crossing	3. Ensure any permits and approvals that are necessary are in place and personnel, equipment and materials are on-hand prior to initiating construction in a wetland as per the Wetland Crossing Plan. Excavate test holes along the trench line to determine mineral soil/organic content and water table depth of the wetland that could influence trench stability. 4. Excavate the trench with wide pad, low-ground-pressure equipment or operate standard equipment from mats. 5. Slope the trench walls to maintain stability. Install additional trench support if sloughing becomes problematic. 6. Leave temporary hard or soft plugs to prevent the flow of water along the trench at locations where the open trench could dewater a wetland or flood adjacent areas. 7. Do not dewater any wetland during isolated crossing construction. 8. Salvage the upper layer of root zone material (maximum of 0.5 m) over the trench area and retain for use in capping the trench following backfilling. 9. Use salvaged surface material or trench spoil as a containment/barrier (see Drawing [Watercourse Crossing – Open Cut Method for Flowing Watercourses] provided in Appendix R) if deep water is encountered and the trench area warrants isolation. Consider using spoil material from the trench line as a containment barrier where salvaged surface material is primarily composed of organic material and is likely not able to support a berm/barrier. Location will be determined by the Environmental Inspector(s). Alternate dam devices such as an Aquadam or meter bags may also be used to isolate the trench area. Pump excess water from work area and trench to opposite side of berm or work ramp. 10. Pump water into stable and well-vegetated areas, when required, during trench dewatering. Monitor discharge areas and change the hose discharge location if adequate natural filtration is no longer feasible and sedimentation could occur. 11. Store excavated material in a manner that does not interfere with natural drainage patterns. If necessary, haul spoil to a nearby location for storage (*e.g.,* for wet spoil that does not stack well). 12. Cure cement coating on the pipe, if used, for a minimum of 3 days before installation due to the potential for alteration of water quality function and toxic effects on wildlife.

Activity/Concern	Potential Mitigation Measures
Trenched Crossing (cont'd)	13. Install trench breakers, where warranted, at the edge of perched wetlands to prevent the pipe trench from acting as a drain (see Drawing [Trench Breaker – Watercourse/Wetland] provided in Appendix R). 14. Salvage fish in fish-bearing wetlands prior to dewatering the isolated section of the wetland.
Backfilling	15. Backfill the trench with excavated trench spoil. Remove any excess trench spoil following crowning to an upland location approved by the appropriate regulatory authorities. 16. Ensure that all wetlands trenched during frozen soil conditions are backfilled prior to spring breakup. 17. Backfill peat and mineral soils in the appropriate order such that peat material, rather than the underlying mineral, soils remain at the surface so that future drainage through the shallow peat material is not impeded.
Trenchless Wetland Crossing	18. Locate bellholes and entry and exit sites back from the high watermark and far enough from the wetland to provide containment of sediment and other deleterious substances above the high watermark. Vegetation removal for the bellholes and entry and exit sites is only to occur within the approved construction right-of-way and workspace. 19. Ensure that water from dewatering bellholes and drill entry and exit sites with a high sediment load is not discharged or allowed to flow into the wetland. Remove the sediment load (*e.g.,* filter or discharge into a vegetated area) before discharge water enters the wetland. 20. Follow the drilling mud frac-out monitoring and other measures provided in the Horizontal Directional Drilling/Trenchless Planning and Procedures Management Plan (see Appendix C) during an HDD.
Reclamation	21. Replace any remaining salvaged upper soil (root zone) material over the trench area. Reclaim the wetland to as close as feasible to its pre-construction profile and ensure no permanent trench crown is left following trench crown subsidence. 22. Implement measures provided in Section 8.0 for clean-up and reclamation of wetlands as well as the measures provided in the Reclamation Management Plan (see Appendix C). 23. Replant salvaged trees/shrubs along the disturbed riparian margins of the wetland as directed by the Environmental Inspector(s) and as identified in the resource-specific mitigation tables for vegetation and wetlands provided in Appendices J and K, respectively.

9.0 ACCESS ROADS FOR PIPELINES

Introduction

The following potential mitigation measures may be implemented, as appropriate, by Trans Mountain its Contractor and/or subcontractors on all access roads during the construction and operation phases of the Project. This includes temporary access roads and shoo-flies to access the construction right-of-way, ancillary sites, borrow sites and construction camps. An Access Road Planning Sheet will be prepared prior to construction to address resource-specific key issues and mitigation measures to be implemented for each site.

Objective

The objective of these mitigation measures is to ensure that new temporary access roads and upgrades to existing roads and trails for use during pipeline construction are selected, designed, constructed, used and, where warranted, reclaimed in a manner that reduces or avoids adverse environmental effects.

Company Measures

The following activity-specific mitigation measures will be implemented by Trans Mountain.

Activity/Concern	Potential Mitigation Measures
Access Road Selection	1. Use existing access roads and trails, where feasible and safe to do so, rather than develop new access.
	2. Align new access roads, where needed, to avoid, to the extent practical, watercourse crossings, steep slopes and sidehill terrain.
	3. Align, if feasible, new access roads or extensions to existing access a minimum of 100 m from watercourses/wetlands/lakes, and a minimum of 30 m back from the edge of terraces, ridges or other elevated landforms, if feasible.
	4. Align new access road or extensions of existing roads to avoid wetlands and peatlands, to the extent feasible.
	5. Ensure new approaches to the highway and secondary roads are aligned perpendicular and with minimal sightline, where warranted and feasible, to limit the potential use of the new access by the public.
Approvals	6. Ensure that any approvals and permits that are necessary for the development of new access roads or upgrades to existing roads/trails are in place prior to commencing access road development activities. Note that approvals may be necessary for the overall access road as well as associated issues or activities (*e.g.,* heritage resources, clearing, vehicle crossings, blasting and water withdrawal).
	7. Notify the appropriate regulatory authority a minimum of 10 days prior to the use of a ford, installation of a clear-span bridge, construction of an ice bridge or snow fill vehicle crossing, or maintenance of a culvert or bridge in accordance with applicable provincial and federal requirements.
	8. Ensure any applicable approvals/permits that are necessary are in place prior to the withdrawal of water to control dust on access roads. Follow measures provided in the Water Withdrawal and Discharge Management Plan (see Appendix C).
Road Grade	9. Develop/upgrade each access road only to the extent necessary to accommodate the intended construction traffic during the period of planned use.
	10. Maintain a maximum slope of 10% at all roads.

Activity/Concern	Potential Mitigation Measures
Resource-Specific Environmental and Socio-Economic Features	11. Align new access roads and complete upgrades to existing access roads during access road development (*e.g.,* clearing, topsoil/root zone material salvage, grading, fill and gravel hauling/placement), in a manner to avoid environmental resources, and noise-related disturbances during sensitive periods within the applicable setback distances and associated timing constraints established by the appropriate regulatory authority, to the extent feasible. 12. Refer to environmental resource-specific mitigation tables for rare plants and plant communities, wildlife species at risk/sensitive species, heritage resources and traditional land use provided in Appendices J, L, M and Q, respectively.
Staking/Flagging/ Fencing	13. Stake/re-stake the access road right-of-way and TWS (including shoo-flies) boundaries, resource-specific features (*e.g.,* archaeological site, traditional land use, rare plant species, wildlife habitat features), all confirmed locations of sensitive environmental resources identified within the resource-specific mitigation tables within the immediate vicinity prior to clearing, where warranted. 14. Post signs, stakes or flagging in the vicinity of sensitive environmental features (*e.g.,* areas prone to weed infestations), where warranted, to alert workers of their presence and ensure their protection adjacent to the access road.

Contractor Measures

The following activity-specific mitigation measures may be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Workspace	15. Obtain approval from the Construction Manager and landowner and determine if approval from applicable regulatory authorities is necessary prior to taking additional workspace in the field, where warranted.
Access Road Development Schedule	16. Pre-clear or pre-mow areas of native vegetation outside the restricted migratory bird activity period (RAP) to reduce the risk of birds nesting on the construction right-of-way where construction is scheduled to occur during the spring/summer period (see Appendix L, Table L-2). 17. See the resource-specific mitigation tables in Appendix L for locations to be pre-cleared and/or pre-mowed. 18. Reduce the amount of clearing, to the extent feasible, to accommodate road width, on side slopes. 19. Schedule hauling of timber potentially infected by a forest parasite (*e.g.,* mountain pine beetle) for the period either before or after the beetle flight period to the extent feasible unless otherwise approved by provincial forestry authorities.
Socio-Economic	20. Ensure that construction vehicles abide by traffic control requirements (see Traffic and Access Control Management Plan in Appendix C) to reduce effects of increased construction traffic to local residents.
Wildlife	21. Report all wildlife incidents to the Environmental Inspector(s) who will take the necessary action, in consultation with the appropriate regulatory authority. Adhere to the measures outlined in the Wildlife Encounter Contingency Plan (see Appendix B).
Vegetation Disturbance	22. Reduce clearing/mowing and grading of native vegetation, where disturbance to native vegetation cannot be avoided.

Activity/Concern	Potential Mitigation Measures
Equipment	23. Ensure that tracked equipment used for winter clearing and for the construction of snow roads is at a maximum gross weight (kg) that does not exceed the capability of the terrain on which it will be used.
Snow Management	24. Ensure snow bladed off roads is not to be windrowed greater than 1 m high and preferably not higher than 0.5 m to allow proper visibility for drivers. If banks must be higher, gaps will be placed to provide for wildlife passage if practical. 25. Leave gaps in snow at obvious drainages, wildlife and trapping trails.
Topsoil or Root Zone Material Salvage	26. Do not salvage topsoil/root zone material from areas of the access road where construction activities will result in extensive mixing of surface and subsoils or excessive damage to the upper soils, as determined by the Environmental Inspector(s). 27. Salvage topsoil/root zone material at new temporary access roads where grading, bar ditches, fill or other materials are necessary. 28. Salvage all topsoil or the upper 15 cm of root zone material, where present, for use during clean-up and closure of new and upgraded access roads as directed by the Environmental Inspector(s). 29. Store all salvaged topsoil and root zone material from the permanent access road bed area in windrows along one or both edges of the access road in a manner that does not alter natural drainage patterns. 30. Implement appropriate weed control and erosion and sediment control measures on topsoil/root zone material windrows (see WVMP in Appendix C).
Access Development	31. Apply appropriate measures (*e.g.,* signs, boundary markers, gates, fences, etc.) to ensure that pipeline construction vehicles remain on the designated access road right-of-way. Adhere to measures provided in the Traffic and Access Control Management Plan (see Appendix C). 32. Source borrow material for access roads from nearby sites, to the extent feasible. 33. Install borrow material, snow or ice to a minimum cover depth of 0.1 m or as authorized by the appropriate regulatory authorities. Dependent on the size of the loads and whether the road will be constructed over mineral or organic soils, the thickness of material used to construct the road may have to be increased. Consider the use of geotextile to conserve borrow materials, snow or ice during access road development.
Drainage and Erosion Control	34. Ensure adequate drainage by maintaining the proper grade and installing culverts to allow for cross drainage. Outslope the crown of the road so that it is a minimum of 15 cm higher than the shoulders to allow the road surface to drain and dry. 35. Top the road with clean gravel, where warranted. Consider using underlay felt liners, geotextile, filter mats or matting if the soil conditions and drainage are poor and there is potential for rutting and erosion. 36. Install/implement drainage and erosion control measures (*e.g.,* check dams, sediment traps, culverts, etc.), as warranted, during the development of new access roads and upgrading of existing roads/trails.

Activity/Concern	Potential Mitigation Measures
Drainage and Erosion Control (cont'd)	37. Monitor and, repair erosion control measures and/or implement supplemental erosion control measures, when the risk of erosion and sedimentation of a watercourse exists.
	38. Seed disturbed side slopes and bar ditches (if present) on new and upgraded roads with an approved grass mix during the development phase as provided in the Reclamation Management Plan (see Appendix C).
	39. If required, notify local road authority of any planting activity.
Culvert Installation	40. Adhere to the conditions listed in the *Forest Road Engineering Guidebook* in BC (British Columbia Ministry of Forests 2002), the *Code of Practice for Watercourse Crossings* (Government of Alberta 2013a) and the *Design Guidelines for Bridge Size Culverts* (Alberta Transportation 2004) in Alberta, as appropriate.
	41. Install culverts, where warranted, to prevent accumulation of runoff water and allow surface water drainage to cross built-up access roads.
	42. Place armouring at both inflow and outflow ends of culverts, if warranted, to prevent erosion.
	43. Ensure that culverts of proper size, number and alignment are in place to handle peak runoff events for the period/duration the culverts will be in place and to reduce water movement along ditches and road surface.
	44. Reduce alteration of natural drainage patterns by aligning culverts with the drainage and at angles other than right angles to the road.
	45. Provide adequate spillways for culverts in unstable areas or where road-fill materials are unprotected.
	46. Provide sediment catch basins at the entrance to major culverts as deemed necessary by the appropriate regulatory authorities.
	47. Install downspouts, where warranted, to transport water down the slope into prepared ditches where the outflow ends of culverts are located near the top of fill slopes.
	48. Do not obtain rock to be used in the construction of aprons (to be installed or repaired at culvert inlets or outlets) from the normal high water level of a watercourse/wetland/lake. Place rocks at a slope similar to the culvert and channel in a manner that will not interfere with fish passage or constrict the channel width.
	49. Flag culvert ends. Periodically monitor culverts for blockages of flow and erosion at the ends. Conduct remedial measures, where warranted, to maintain cross drainage.
Ditches	50. Ensure ditches do not drain directly into a watercourse, unless limited by topography and approved by the appropriate regulatory authority. Install ditch blocks where required.
	51. Rock-line "V" ditches where required on steep grades and slopes, and on scraper or rounded ditches, to minimize erosion and gulling.
	52. Adhere to the CAPP *Environmental Operating Practices for the Upstream Petroleum Industry for British Columbia – Geophysics* (CAPP 2001) and the *Field Guide for Erosion and Sediment Control* (Government of Alberta 2013b) for recommended spacing gaps in berm installation to direct water to ditches.

Activity/Concern	Potential Mitigation Measures
Peatland Areas	53. Use geotextile products and porous polypropylene materials in peatland areas and other poor drainage areas to: • increase the load bearing capacity; • prevent mixing of sub grade and fill; and • allow for the passage of water. 54. Cross peatland areas only with winter roads (within Alberta and interior BC) and avoid permanent construction access. Where this is not feasible, roads crossing peatland must preserve flow patterns within the area by having sufficient and frequent cross drainage to avoid flooding. 55. Enhance vehicle support across peatland areas (within Alberta and interior BC) by driving down the frost line and decreasing the insulating snow cover. This can be achieved by driving snowmobiles up and down the access road right-of-way, or other methods approved by the Environmental Inspector(s), to pack down the snow.
Wetland Areas	56. Ensure that grade preparation does not compromise road stability and drainage. 57. Ensure steps are taken to prevent breaking the surface crust of any peatland surface.
Access Road Use and Maintenance	58. Do not use de-icer or salt for access road maintenance. Prevent sand used for maintenance purposes from entering watercourses by restricting sand application to access roads within 10 m of watercourses/wetlands/lakes. 59. Apply only water or non-toxic and non-persistent chemical products as approved to access roads for dust control at park locations or sensitive areas including agricultural crop production areas, especially berries. 60. Do not apply dust control chemicals to roads during windy conditions or within 300 m of a watercourse/wetland/lake or sensitive agricultural crops (*e.g.,* berries and nursery). Dust control chemicals to be approved by the Lead Environmental Inspector in advance of application. 61. Maintain all side cuts in roads in a stabilized and revegetated condition to the extent feasible. Apply geotechnical or bioengineering techniques, where warranted, to control chronic slumping problems that have the potential to contribute sediment to nearby watercourses. 62. Remove access impediments (*e.g.,* posts, large boulders, fencing) installed on existing roads which have been approved for pipeline construction access. Allow impediment removal for the purpose of facilitating access during active construction in the area. Install temporary blockades after work hours to control public access until the permanent barrier is re-established. Control access during the work day where requested as per the Access Plan to be developed prior to the commencement of construction.
Speed Limits	63. Ensure all construction traffic adheres to posted speed limits on all construction access roads and does not exceed the maximum speed limit of 30 km/hr where speed limits have not been posted in order to reduce the potential for injury to wildlife, reduce dust production and deterioration of road surfaces.

Activity/Concern	Potential Mitigation Measures
Culvert Maintenance	64. Ensure culvert maintenance (*i.e.,* removing debris blockages, controlling erosion at a culvert inlet or outlet) is conducted in accordance with DFO's *Operational Statement for Culvert Maintenance* in Alberta (2008o) and BC (DFO 2008p) and adhere to the conditions listed in the *Design Guidelines for Bridge Size Culverts in Alberta* (Alberta Transportation 2004) and the *Forest Road Engineering Guidebook* in BC (BC MOF 2002), as appropriate. 65. Schedule culvert maintenance to commence within the least-risk window or outside of the applicable RAP (see Appendix I) unless otherwise approved by the appropriate regulatory authority. 66. Remove accumulated debris in a controlled and incremental manner to reduce the risk of flow surges, erosion and/or sedimentation of downstream areas. Remove or otherwise stabilize removed debris to prevent the debris from re-entering the watercourse/wetland/lake. 67. Ensure the Environmental Inspector(s) are present during dam removal/modification activities and prepare a monitoring report of the activities. 68. Consider the use of culvert screening, PVC piping, fencing or other beaver deterrents at culvert locations that are prone to damming by beaver. 69. Monitor the effectiveness of culverts in handling surface drainage across temporary access roads following installation to ensure that surface drainage is not disrupted; implement remedial measures (*e.g.,* steaming of culverts), when warranted, to ensure that icings do not result in flooding or damage to vegetation in proximity to a culvert.
Access Road Closure	70. Block access to the public along new temporary roads located within sensitive areas with fences and locked gates. Where warranted, man the gates when hauling or construction activities are scheduled to occur during sensitive periods. Monitor road use and, where warranted, implement additional/alternative measures to ensure access is blocked.
Access Road Reclamation	71. Remove and reclaim new temporary access roads developed for the Project unless otherwise directed by the appropriate regulatory authority or landowner, where warranted. Follow all reclamation measures outlined in the Reclamation Management Plan (see Appendix C). 72. Close new access roads no longer needed by Trans Mountain's personnel. Where warranted and requested by the appropriate regulatory authority or private landowner, implement measures to deactivate and reclaim the access road including: • remove vehicle crossings at watercourses and reclaim associated disturbances; • remove cross drainage culverts and excavate a shallow ditch; • block off the access with the use of permanent fences with locked gates, boulders, ditches, rollback or other method suitable for the site; • recontour the road right-of-way and replace salvaged topsoil/root zone material; • install permanent erosion control structures such as cross ditches and berms; and • seed disturbed areas with an approved cover crop and/or grass mix and, where warranted, install biodegradable erosion control measures.

EXAMPLE ACCESS ROAD PLANNING SHEET

The following is an example of the information that will be included on access road planning sheets to be prepared for each road.

ACCESS ROAD OVERVIEW

Access Road:

Name: _____ **Nearest RK or Landmark:** _____

Land Reservation: _____ **Use Period:** _____ **to** _____

UTMs: _____

Access Road Status (new/existing): _____

_____

Environmental/ Socio-Economic/ Issue(s): _____

_____

_____

_____

Permit Requirement(s): _____

APPLICABLE KEY MITIGATION MEASURES

Access Road Siting (*e.g.*, pump station, borrow site, highway to construction right-of-way etc.)

Water Crossing: **Yes: ____ No: ____**

Vehicle Crossing Type:

Instream Period of Least Risk:

RAP:

Clearing:

Blasting: **Timing Constraint:**

Soil Salvage and Grading:

Source Material:

Washing Requirements (*e.g.*, weeds)

Reclamation:

Key EPP References:

Water Crossings – Section 8.0

10.0 TEMPORARY CONSTRUCTION CAMPS

Introduction

Trans Mountain may use temporary camps at various locations during construction Camps will typically consist of worker accommodations, dining facilities, appropriate emergency medical facilities, electrical power generation, fuel storage, and facilities for sewage gathering or treatment, and waste incineration and management facilities.

The mitigation measures provided below may be applicable to all work areas throughout the construction and operational phases of the temporary construction camps. A Temporary Construction Camp Planning Sheet will be prepared prior to construction to address resource-specific key issues and mitigation measures to be implemented for each site.

Objective

The objective of these potential mitigation measures is to ensure that:

- potential environmental effects associated with the construction, operation and reclamation of temporary construction camps will be reduced or avoided;
- all environmental resources are properly identified and marked in the field before the initiation of construction at each camp site to avoid or reduce potential effects;
- construction camp boundaries are properly delineated to prevent inadvertent trespass;
- all access to and from the construction camps is properly marked and controlled; and
- wastes arising from the construction, operation and reclamation of the temporary construction camps are properly stored and disposed of.

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern		Potential Mitigation Measures
Temporary Construction Camp Selection	1.	Locate new temporary construction camps on flat, well-drained mineral soils (avoid gravel pits unless sewage will be contained), on previously disturbed areas and near existing infrastructure, where feasible. Temporary construction camps can be either standalone sites or co-locate with existing construction camps, storage yards or Contractor yards. Co-locating camps and yards will avoid environmental resources, noise-related disturbances during sensitive periods within the applicable setback distances and associated timing constraints established by the appropriate regulatory authority, to the extent feasible. Adhere to applicable measures related to ancillary sites provided in Section 12.0.
Access Roads	2.	Adhere to the measures related to access road construction provided in Section 9.0.
Approvals	3.	Ensure any approvals and permits that are necessary for the development of new temporary construction camps are in place prior to commencing construction camp development activities. Note that approvals may be necessary for the overall temporary construction camp as well as associated issues or activities (*e.g.,* heritage resources, traditional land use and clearing). Where industry camps are used by the Contractor, the camp owner is responsible for upgrade approvals.

Activity/Concern	Potential Mitigation Measures
Resource-Specific Environmental and Socio-Economic Features	4. Identify locations where resource-specific environmental features are present on or adjacent to temporary construction camp sites that may influence soil handling or grading as well as the schedule for the construction and/or use of a specific temporary construction camp.
Staking/Flagging/ Fencing	5. Re-stake/flag the site and TWS boundaries, specific resource features (*e.g.,* archaeological site, traditional land use, rare plant species, wildlife habitat features), all confirmed locations of sensitive environmental resources identified within the resource-specific mitigation tables within the immediate vicinity prior to clearing, where warranted. 6. Post signs in the vicinity of sensitive environmental features, where warranted, to alert workers of their presence and ensure their protection on and adjacent to the temporary construction camp.
Riparian Areas	7. Ensure that selected sites for temporary construction camps and staging areas are located outside of riparian buffers.
Flood Level	8. Ensure that selected sites for camps and staging areas are above the highest annual flood level (200-year flood), where practical.
Fire Prevention	9. Ensure that selected sites for camps and staging areas are located in previously cleared areas or natural clearings, wherever feasible, and at a recommended distance of not less than 30 m to the closest standing timber.
Site Fencing	10. Install temporary fencing around construction camps to reduce the attraction of wildlife and to provide security for the site.
Lighting	11. Direct lighting for camps, downward and, where feasible, positioned to avoid or reduce interference of wildlife and, if applicable, annoyance of nearby residents and land users.

Contractor Measures

The following potential mitigation measures are to be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Workspace	12. Obtain approval from the Construction Manager and landowner and determine if approval from appropriate regulatory authorities is necessary prior to taking additional workspace in the field.
Potable Water	13. Haul potable water to the construction camps or source from onsite wells in accordance with approval condition.
Water Withdrawal and Discharge Procedures	14. Ensure that water withdrawal from surface water or groundwater will not result in detrimental effects to the hydrologic regime. 15. Refer to the Water Withdrawal and Discharge Procedures Management Plan (see Appendix C). 16. Contractor to follow resource-specific mitigation in Appendices.
Waste Disposal	17. Adhere to all federal, provincial and municipal waste legislation and regulations. 18. Ensure the waste water disposal facilities are operated by qualified personnel.

Activity/Concern	Potential Mitigation Measures
Waste Disposal (cont'd)	19. Collect, transport, store and dispose of solid waste in such a manner that: • insects and wildlife are not attracted; • disease vectors are eliminated; • health and safety hazards do not result; • unsightly conditions do not develop; • odour emissions are avoided or reduced; and • secondary pollution problems do not develop due to runoff, leachates or emissions. 20. Ensure wastes are recycled where practical. 21. Store kitchen waste indoors prior to incineration. 22. Burn combustible garbage in a camp incinerator designed and operated in accordance with applicable provincial requirements. Compact and haul non-combustible garbage to approved disposal sites. 23. Cool any ashes generated by the incinerator prior to burial. 24. Transport solid waste in vehicles with a trailer cover. 25. Process as required and dispose of sewage and grey water generated by construction camps in accordance with provincial legislation and requirements.
Sewage Handling - BC	26. Design and operate sewage facilities in accordance with the BC *Sewage Disposal Regulations* and the BC *Industrial Camp Regulations* under the *Public Health Act*. Sewage facilities in camps of more than 100 people are subject to requirements of a permit issued by the regional Health Authority.
Sewage Handling - Alberta	27. Implement sewage treatment at temporary construction camps as outlined in the *Alberta Private Sewage Systems Standard of Practice* (Alberta Private Sewage Codes and Standards 2009).
Fuel Storage Facilities at Construction Camps	28. Storage of fuel at construction camps will be limited to quantities required only for the only several days of construction activities. Fuel, oil or hazardous materials required to be stored onsite will be stored within secondary containment that is to be located greater than 300 m from a watercourse, wetland or lake.
Fuel Delivery to Construction Camps	29. Deliver fuel to the storage site at the construction camps by truck from bulk fuel suppliers. Ensure that several days of fuel supply are in place for at least the camp and essential equipment to allow for road closure or slow deliveries due to weather or road conditions.
Equipment Storage at Construction Camps	30. Use equipment shop and warehouse buildings to perform equipment and vehicle maintenance and overhauls during winter construction seasons. 31. Use buildings and/or van trailers with modular loading docks to store consumables, tools and parts. 32. Use warehouse buildings and/or trailers to store equipment parts, welding consumables, tools and miscellaneous materials that must not be stored outside.
Individual Construction Camp Legislation	33. Restrict or prohibit leisure hour access to areas where environmentally sensitive habitats, heritage resource sites, or other resources, have been specifically identified and formalized in camp legislation as areas not to be disturbed.

Activity/Concern	Potential Mitigation Measures
Reclamation	34. Refer to the Reclamation Management Plan (see Appendix C) for measures related to the reclamation of the temporary construction sites and sewage lagoons. Adhere to mitigation measures provided in Section 8.0 for Clean-up and Reclamation. 35. Remove all buildings, trailers, machinery, equipment, materials, litter and storage containers from the area. 36. Deactivate and reclaim any temporary access roads from existing access to the camps (see Section 9.0). 37. Salvage timber and remove vegetative debris not disposed of after initial clearing of the site, except at sites located in recent cutover areas. At these sites, the debris can be disposed of by spreading it back over the site. 38. Replace topsoil/root zone material if it was salvaged during construction. 39. Revegetate the site with grasses, shrubs and trees native to the area and appropriate for the site. Where necessary, the compacted soil must be de-compacted prior to seeding. Where the cutover is previously reforested, make sure reclamation includes the establishment of appropriate seedlings.

EXAMPLE TEMPORARY CONSTRUCTION CAMPS PLANNING SHEET

The following is an example of the information that will be included on temporary construction camp planning sheets.

TEMPORARY CONSTRUCTION CAMP OVERVIEW

Construction Camp Site:

Name: _____ **Nearest RK:** ____

Reservation No.: _____ **Use Period:** ____ **to** _____

UTMs: _____

Hectares: _____

Site Status (new/previously disturbed): _____

Access Road Status (new/existing): _____

Environmental / Socio-Economic Issue(s): _____

APPLICABLE KEY MITIGATION MEASURES

Equipment Siting (*e.g.*, sewage lagoon, fuel storage, generator(s): _____

Clearing: _____

Wildlife: **Timing Constraint:** _____

Soil Salvage and Grading: _____

Sewage Lagoon: _____

Fuel Storage: _____

Reclamation: _____

11.0 BORROW SITES

Introduction

Borrow material will be required for ancillary facilities (construction camps and access roads), the construction right-of-way including imported fill, right-of-way preparation, subdrains, and shoo-fly access protection. Sand and gravel may also be used to produce cement. In some cases, borrow material will be processed to meet a specific demand (*e.g.*, production of cement). The following measures will be considered by the Trans Mountain, the Contractor and the subcontractor:

- quantities and locations where borrow material is required may change;
- borrow sources may not have sufficient quantity or quality of material once they are explored prior to development and additional sources may be required; or
- environmental, ownership and permitting concerns may arise over specific borrow sources.

The potential mitigation measures provided are applicable to all work areas throughout the development, operation and, when warranted, reclamation of borrow sites. Trans Mountain, the Contractor and subcontractors will follow applicable regulatory requirements provided for the use of borrow materials current at the time of construction. A borrow site planning sheet will be prepared by the Contractor and reviewed by Trans Mountain prior to construction to address resource-specific key issues and mitigation measures to be implemented for each site.

Objective

The objective of the following potential mitigation measures is to ensure that potential adverse environmental effects associated with development, operation and, when warranted, reclamation of borrow sites for the Project are reduced or avoided.

Contractor Measures

The following activity-specific mitigation measures will be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Approvals and Permits	1. Ensure any approvals and permits that are necessary for the development of new or upgrades to existing borrow sites are in place prior to commencing borrow site development activities. Note that approvals may be necessary for the overall borrow site as well as the associated issues or activities (*e.g.,* heritage resources, traditional land use and clearing).
Resource-Specific Environmental and Socio-Economic Features	2. Identify locations where resource-specific environmental features are present on or adjacent to the borrow site that may influence soil handling or grading as well as the schedule for the construction and/or use of the borrow site. 3. Select new borrow sites and expand existing borrow sites in a manner to avoid environmental resources, noise-related disturbances during sensitive periods within the applicable setback distances and associated timing constraints established by the appropriate regulatory authority, to the extent feasible (see Appendices E to Q for applicable resource-specific mitigation tables).

Activity/Concern	Potential Mitigation Measures
Staking/Flagging/ Fencing	4. Re-stake/flag the site and TWS boundaries, specific resource features (*e.g.,* archaeological site, traditional land use, rare plant species, wildlife habitat features), all confirmed locations of sensitive environmental resources identified within the resource-specific mitigation tables within the immediate vicinity prior to clearing, where warranted. 5. Post signs in the vicinity of sensitive environmental features, where warranted, to alert workers of the presence of these features and to ensure the features on and adjacent to ancillary sites are protected.
Noise Emissions	6. Ensure that borrow site activities adhere to local noise bylaws unless otherwise approved by municipal authorities.
Pit Development Plan	7. Review the Pit Development Plan (to be developed by the pit operator and provided under separate cover after approval of the Project) and ensure all conditions and approvals are in place prior to the commencement of pit development.
Access Roads	8. Adhere to the measures related to access road construction provided in Section 9 in this EPP.
Pit Development Plan	9. Follow the Pit Development Plan to be developed and provided under separate cover for each new borrow site and each existing borrow site where expansion of the site is planned.
Site Fencing	10. Install temporary fences around borrow sites to reduce the attraction of wildlife and provide security for the site.
Lighting	11. Direct lighting for borrow sites, downward and, where feasible, positioned to avoid or reduce interference of wildlife and, if applicable, annoyance of nearby residents and land users.
Visual Screen	12. Maintain an undisturbed vegetation screen between a new borrow site and an adjacent road.
Clearing and Disposal	13. Extend clearing a minimum of 15 m beyond the perimeter of the excavation area. Adhere to the measures related to clearing and disposal of vegetation provided in Section 8.1.
Timber Salvage	14. Salvage merchantable timber, if present, at new borrow sites and existing borrow sites to be expanded unless timber salvage is otherwise waived by the appropriate regulatory authority.
Grubbing, Salvageable Timber and Slash Disposal	15. Refer to Section 8.1 for protection measures associated with grubbing, salvageable timber and slash disposal.
Topsoil/Root Zone Material Salvage	16. Salvage topsoil/root zone material, subsoils (*e.g.,* B and C soil horizons) and overburden, to a maximum depth of 1.2 m, where present, from new borrow sites and portions of existing borrow sites where the excavation is to be expanded, from material stockpile sites and material processing or other equipment sites. Extend soil salvage a minimum of 5 m beyond the planned rim of the excavation, material stockpile site, material stockpile site or other equipment site. 17. Store salvaged topsoil/root zone material, subsoil and overburden berms immediately along the upslope boundaries of the borrow pit or elsewhere that will avoid disruption of natural drainage and subsequent disturbance during operation of the site. 18. Seed the topsoil/root zone material with a short-term cover crop species, unless otherwise directed by the Environmental Inspector(s), to reduce the risk of erosion or creation of weed habitat.

Activity/Concern	Potential Mitigation Measures
Fuel Storage	19. Store above ground fuel storage tanks exceeding 4,600 L capacity in accordance with applicable *National Fire Code of Canada* (Government of Canada 2010) requirements, as outlined in the Fire Contingency Plan (see Appendix B). Adhere to conditions for Petroleum Storage Tanks (AESRD 2013b) and conditions listed in *A Field Guide to Fuel Handling, Transportation and Storage in British Columbia* (BC Ministry of Water, Land and Air Protection 2002). 20. Do not use underground fuel storage.
Waste Disposal	21. Adhere to the waste disposal measures outlined in the Waste Management Standard (see Appendix C).
Dust Control	22. Spray water, when warranted, on access roads, material storage piles and work areas within borrow sites to minimize dust emissions. Adhere to the measures provided in Section 10.0 for access roads. Install dust skirts on stockpiling and loading equipment to limit dust emissions where the potential for generation of large quantities of fugitive dust exists. 23. Use bypass routes through and around communities, where feasible, with vehicle speed limits enforced. 24. During stockpiling and loading at borrow sites, the drop height will be limited to reduce or avoid the potential for dust generation.
Excavation Depth	25. Ensure the excavation of borrow material does not extend within 1 m (minimum) of a water table.
Drainage	26. Grade borrow sites, where feasible, to maintain natural surface drainage or drainage structures. Install/construct ditches or berms to provide surface drainage and direct stormwater around the borrow site.
Retention/Settling Ponds	27. Create retention ponds, where warranted, using the BC *Dam Safety Review Guidelines* (BC MFLNRO 2012a), *Canadian Dam Safety Guidelines* (Canadian Dam Association 2007), *Stormwater Management Guidelines* for the Province of Alberta (Alberta Environmental Protection 1999), and *Aggregate Operators Best Management Practices Handbook for British Columbia* (BC Ministry of Energy and Mines 2002) as a guide to hold sediment laden stormwater runoff until the sediment has settled. 28. Conduct discharge of water from retention ponds as outlined in the Water Withdrawal and Discharge Procedures Management Plan (see Appendix C). 29. Size settling ponds created, where warranted, to hold wash water and allow sediment to settle to allow a capacity of 110% (minimum) of the volume of the wash water.
Water Withdrawal and Discharge	30. Ensure applicable approvals are in place prior to the withdrawal or discharge of water used for washing or arising from other operations at borrow sites. 31. Follow all approval conditions related to the withdrawal or discharge of water associated with the operation of borrow sites. 32. Ensure that withdrawal rates do not exceed 10% of the natural flow rate of the source watercourse unless otherwise approved by the appropriate regulatory authority.

Activity/Concern	Potential Mitigation Measures
Water Withdrawal and Discharge (cont'd)	33. Suspend or reduce rate of water withdrawal in the event that the approved minimum flow or depth of water in the watercourse/wetland/lake is reached during a water withdrawal, until the water flows or depths exceed the approved levels. 34. Discharge water from a settling pond, retention pond or other storm water site onto the borrow site if feasible. Avoid discharging this water into a watercourse/wetland/lake without the approval of the Environmental Inspector(s) and acquisition of applicable approvals. 35. Discharge locations will be preferentially selected to dewater onto stable terrain areas rather than directly into a watercourse/wetland/lake where the water will be filtered through vegetation and soils prior to returning to a watercourse/wetland/lake. Locations for dewatering will be into bar ditches, if feasible, or onto non-arable lands. Sediment reduction methods will be implemented on the bed, banks and approaches to the water source or discharge site, if warranted, to protect downstream fish, fish habitat and water users from increased sedimentation or reduced water quality. Discharge locations will be monitored to ensure that no erosion, flooding or icing occurs. 36. Water energy will be limited with the use of a dissipater and protective rock riprap, sheeting, tarpaulins or other equivalent materials to reduce or avoid the potential for erosion of soils during water discharge activities. The rate of discharge will also be reduced if downstream or terrestrial flooding appears to be imminent, particularly when discharge occurs during frozen soil conditions. 37. Do not exceed the provincial or federal water quality limits (*e.g.,* CCME 1999) of wash or other water discharged from a borrow site directly into a watercourse/wetland/lake that supports fish or provides fish habitat.
Flood Plain Sites	38. Avoid developing new borrow sites in flood plains. Existing and new borrow sites in upland environments will be selected for use before a new pit is developed in a flood plain. 39. Avoid stockpiling materials excavated from a borrow site on ice, in a wetland or on a flood plain that shows evidence of active lateral migration as determined by the appropriate regulatory authority. 40. Maintain 100 m minimum buffer zone between the channel zone and the active portion of the borrow site located on a flood plain. 41. Ensure that the depth of excavation within an active flood plain does not extend into the water table. 42. Remove borrow equipment and/or construct dikes prior to a flooding event to avoid flows through a borrow site. 43. Prohibit the storage of fuels, lubricants and other materials hazardous to fish and wildlife at borrow sites located on flood plains. 44. Ensure that borrow sites located on an active flood plain are not located on the outside of watercourse bends or adjacent to actively eroding banks.

Activity/Concern	Potential Mitigation Measures
Noise Emissions	45. Consider the placement and orientation of equipment to be used at a borrow site during the preparation of the Pit Development Plan (to be developed and provided under separate cover) for each borrow site in order to reduce the noise disturbance of residents in the vicinity of the borrow site and sensitive wildlife. 46. Ensure that borrow site activities adhere to local noise bylaws unless otherwise approved by municipal authorities.
Reclamation	47. Reclaim all borrow sites unless otherwise directed by the appropriate regulatory authority issuing approvals/permits for the borrow site and in accordance with the Pit Development Plan (to be provided under separate cover). 48. Grade slopes created during the development or operation of upland borrow sites to stable angles (approximately 1:3; rise over run) or as specified in the applicable Pit Development Plan (to be developed and provided under separate cover) or borrow site approval conditions. 49. Remove the dikes of settling and retention ponds, if present, and recontour the area. Remove or rip clay liners to re-establish natural drainage. 50. Conduct grading and recontouring of any existing borrow sites located on a flood plain in a manner that does not accelerate channel relocation. 51. Replace salvaged overburden, if present, then subsoil and then any salvaged topsoil/root zone material. Evenly spread over portions of the borrow pit where salvage occurred for each borrow site. 52. Seed and revegetate borrow sites to be reclaimed in accordance with the respective Pit Development Plan (to be developed and provided under separate cover) and Reclamation Management Plan (see Appendix C). 53. Re-establish vegetation similar to that present at borrow sites prior to development at borrow sites to be reclaimed. 54. Recontour and re-establish temporary access roads used or constructed to borrow sites following use in conjunction with closure of the borrow sites (see Section 9.0). 55. Remove approaches to the borrow site access road from applicable highways or secondary roads.

EXAMPLE BORROW SITE PLANNING SHEET

The following is an example of the information that will be included on borrow site planning sheets to be prepared for each borrow site.

BORROW SITE OVERVIEW

Borrow Site:	**Site No.:** _____	**Reservation No.:** _____	**UTM:** Northing: _____ Easting: _____	**Nearest RK:** _____	**Hectares:** _____

Borrow Site Development Period: _____ to _____

Type of Material:

Extraction/Hauling Period(s): _____ to _____

Site Status (new/previously disturbed): _____

Access Road Status (new/existing): _____

Environmental / Socio-economic Issue(s): _____

_____

_____

_____

APPLICABLE KEY MITIGATION MEASURES

Equipment Siting (*e.g.*, crusher, settling pond, lighting): _____

_____

Clearing: _____

_____

Blasting: **Timing Constraint:** _____

Wildlife: _____

Soil Salvage and Grading: _____

_____

Fuel Storage:

Washing Requirements and Source Water:

Settling Pond:

Reclamation:

Key EPP References:

Access Roads - Section 9.0

Water Withdrawal and Discharge Procedures Management Plan – Appendix C

12.0 ANCILLARY SITES

Introduction

The following mitigation measures will be implemented by Trans Mountain, its Contractor and/or subcontractors during construction of ancillary sites to support pipeline construction. Due to the remote location of portions of the Project area, ancillary sites are necessary at various locations throughout construction. Ancillary sites, including pipe storage areas and Contractor yards (*e.g.*, construction staging, material storage, equipment rig-up and marshalling areas, setting up temporary construction trailers, fabrication work, safety and environmental training), will be selected within previously disturbed areas, to the extent feasible. An Ancillary Site Planning Sheet will be prepared prior to construction to address resource-specific key issues and mitigation measures to be implemented for each site.

Objective

The objective of the following mitigation measures is to ensure that temporary ancillary sites needed to support pipeline construction are located, designed, constructed, used and, where warranted, reclaimed in a manner that reduces or avoids adverse environmental effects.

Company Measures

The following activity-specific mitigation measures are the responsibility of Trans Mountain.

Activity/Concern		Potential Mitigation Measures
Ancillary Selection	1.	Combine ancillary sites, with fuel sites to the extent feasible, to reduce the overall Project footprint and centralize supply points.
	2.	Locate ancillary sites either as standalone sites or co-locate with Contractor yards and/or temporary construction camps. Adhere to applicable measures related to temporary construction camps provided in Section 10.0.
Reduce Disturbances	3.	Avoid creating new disturbances and use of treed areas or native grasslands when selecting sites, to the extent feasible.
	4.	Avoid disturbance to native vegetation, where feasible. Where disturbance of native vegetation cannot be avoided, reduce grading to promote the restoration of native vegetation following use of the site.
	5.	Maintain a minimum setback of 100 m from watercourses/wetlands/lakes, and a minimum setback of 30 m back from the edge of terraces, ridges or other elevated landforms.
	6.	Select new ancillary sites to avoid wetlands.
Approvals and Permits	7.	Ensure any approvals and permits that are necessary for the development of new or upgrades to existing ancillary sites to be used for pipe storage are in place prior to commencing ancillary site development activities. Note that approvals may be necessary for the overall ancillary site as well as associated issues or activities (*e.g.,* heritage resources, traditional land use, and clearing).
Resource-Specific Environmental and Socio-Economic Features	8.	Identify locations where resource-specific environmental features are present on or adjacent to the ancillary site that may influence soil handling or grading as well as the schedule for the construction and/or use of the ancillary site.
	9.	Select new ancillary sites and complete upgrades to existing ancillary sites in a manner to avoid environmental resources and noise-related disturbances during sensitive periods within the applicable setback distances and associated timing constraints established by the appropriate regulatory authority, to the extent feasible.

Activity/Concern	Potential Mitigation Measures
Resource-Specific Environmental and Socio-Economic Features (cont'd)	10. Refer to environmental resource-specific mitigation tables for rare plants and plant communities, wildlife species at risk/sensitive species, heritage resources and traditional land use provided in Appendices J, L, M and Q, respectively.
Staking/Flagging/ Fencing	11. Re-stake/flag the site and TWS boundaries, specific resource features (*e.g.,* archaeological site, traditional land use, rare plant species, wildlife habitat features), all confirmed locations of sensitive environmental resources identified within the resource-specific mitigation tables within the immediate vicinity of a specific resource feature prior to clearing, where warranted. 12. Post signs in the vicinity of sensitive environmental features, where warranted, to alert workers of the presence of these features and to ensure the features on and adjacent to ancillary sites are protected.
Fire Prevention	13. Ensure that ancillary sites are located in previously cleared areas or natural clearing, wherever feasible, and at a recommended distance of not less than 30 m to the closest standing timber.
Lighting	14. Direct lighting for borrow sites downward and, where feasible, positioned to avoid or reduce interference of wildlife and, if applicable, annoyance of nearby residents and land users.

Contractor Measures

The following activity-specific mitigation measures will be implemented by the Contractor.

Activity/Concern	Potential Mitigation Measures
Soil Handling and Grading – Ancillary Sites	15. Salvage topsoil/root zone material from all ancillary sites where grading is necessary or where heavy traffic is anticipated during non-frozen soil conditions. 16. Salvage the upper 15 cm of topsoil/root zone material at previously undisturbed ancillary sites or as directed by the Environmental Inspector(s). 17. Salvage topsoil/root zone material if expansion of the site is to occur outside of the presently disturbed area. 18. Cut and fill the Development Zone, where practical, to level the surface to be developed. Grade the surface to facilitate water drainage into water conveyance features (*e.g.,* ditches and culverts). 19. Ensure graded material does not spread off-site.
Erosion Control	20. Install temporary erosion and sediment control structures, where warranted. Install sediment fences in select areas around the perimeter of an ancillary facility site to restrict sediment laden runoff from flowing into a watercourse/wetland/lake, if warranted.
Timber Salvage	21. Salvage merchantable timber, if present, at new ancillary sites and existing ancillary sites to be expanded unless timber salvage is otherwise waived by the appropriate regulatory authority.

Activity/Concern	Potential Mitigation Measures
Fuel Storage	22. Use borrow material to level the fuel storage site, where warranted.
	23. Store above ground fuel storage tanks exceeding 4,600 L capacity in accordance with applicable *National Fire Code of Canada* (Government of Canada 2010) requirements, as outlined in the Fire Contingency Plan (see Appendix B). Adhere to conditions for Petroleum Storage Tanks (AESRD 2013b) and conditions listed in *A Field Guide to Fuel Handling, Transportation and Storage in British Columbia* (BC Ministry of Water, Land and Air Protection 2002).
Snow Management	24. Windrow excess snow to the edge of the site. Store mixtures of snow and soil in a manner that prevents sedimentation of watercourses/wetlands/lakes during spring breakup.
Reclamation	25. Follow the measures provided in the Reclamation Management Plan (see Appendix C).

EXAMPLE ANCILLARY SITE PLANNING SHEET

The following is an example of the information that will be included on ancillary site planning sheets to be prepared for each site. Note that not all of the features listed below will be applicable for each ancillary site.

ANCILLARY SITES OVERVIEW

Ancillary Site:	**Site No.:**	**Reservation No.:**	**UTM:**	**Nearest RK:**	**Hectares:**
	_____	_____	Northing: _____ Easting: _____	_____	

Site Use Period: _____ to _____

Planned Use: _____

_____

Site Status (new/previously disturbed): _____

Access Road Status (new/existing): _____

Environmental/ Socio-economic Issue(s): _____

_____

_____

_____

_____

APPLICABLE KEY MITIGATION MEASURES

Equipment Siting (*e.g.*, lighting, wind sock for helipads, pipe etc.):

Clearing:

Blasting: **Timing Constraint:**

Wildlife:

Soil Salvage and Grading:

Source Material:

Fuel Storage:

Reclamation:

Key EPP References:

Access Roads - Section 9.0

13.0 REFERENCES

13.1 Personal Communications

TERA wishes to acknowledge those people identified in the Personal Communications for their assistance in supplying information and comments incorporated into this report.

Barret, S. Resource Stewardship Manager, British Columbia Ministry of Forests, Lands and Natural Resource Operations. Surrey, BC.

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Worobec, D. Land Manager, Progress Land Services. Spruce Grove, AB.

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APPENDIX A

CHECKLIST

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ONSITE CHECKLIST FOR PIPELINE WATERCOURSE CROSSINGS

Project Name: _____
Project Owner: _____
Pipeline Contractor: _____
Chief Inspector: _____

Watercourse Name: _____
Legal Location: _____
Onsite Checklist Completed By: _____

Pipeline Crossing Method: _____
Date Instream Construction Started: _____
Date Instream Construction Ended: _____
Duration of Time Each Day that Work Occurred in the Waterbody: _____

Date (yy/mm/dd)	Time

PHOTOGRAPHS[1] OF THE CROSSING PRIOR TO RIGHT-OF-WAY CLEARING AND PIPELINE CROSSING INSTALLATION

Roll No.	Photo No.	Comments - Required Photos
		View immediately upstream from the crossing.
		View immediately downstream from the crossing.
		View of left bank (approach to crossing) taken from right bank*.
		View of right bank (approach to crossing) taken from left bank*.

Roll No.	Photo No.	Comments - Additional Photos

***** The left bank is on your left hand side when facing downstream. Use a compass to determine the directions of the left and right banks.

PHOTOGRAPHS[1] OF THE CROSSING AFTER PIPELINE CROSSING INSTALLATION

Roll No.	Photo No.	Comments - Required Photos
		View immediately upstream from the crossing.
		View immediately downstream from the crossing.
		View of left bank (approach to crossing) taken from right bank*.
		View of right bank (approach to crossing) taken from left bank*.

Roll No.	Photo No.	Comments - Additional Photos

***** The left bank is on your left hand side when facing downstream. Use a compass to determine the directions of the left and right banks.

1 Retain photos and onsite checklist for one-year-after the abandonment of the pipeline crossing.

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ONSITE CHECKLIST FOR VEHICLE WATERCOURSE CROSSINGS

Project Name: _____
Project Owner: _____
Pipeline Contractor: _____
Chief Inspector: _____

Watercourse Name: _____
Legal Location: _____
Onsite Checklist Completed By: _____

Vehicle Crossing Method: _____
Date Instream Construction Started: _____
Date Instream Construction Ended: _____
Duration of Time Each Day that Work Occurred in the Waterbody: _____

Date (yy/mm/dd)	Time

PHOTOGRAPHS[1] OF THE CROSSING PRIOR TO RIGHT-OF-WAY CLEARING AND VEHICLE CROSSING INSTALLATION

Roll No.	Photo No.	Comments - Required Photos
		View immediately upstream from the crossing.
		View immediately downstream from the crossing.
		View of left bank (approach to crossing) taken from right bank*.
		View of right bank (approach to crossing) taken from left bank*.

Roll No.	Photo No.	Comments - Additional Photos

***** The left bank is on your left hand side when facing downstream. Use a compass to determine the directions of the left and right banks.

COMMENTS

1 Retain photos and onsite checklist for one-year-after the abandonment of the vehicle crossing.

APPENDIX B

CONTINGENCY PLANS

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1.0 CONTAMINATION DISCOVERY CONTINGENCY PLAN

Recognition and Response

Identification of Contamination

Soil, surface water and groundwater contamination can be recognized by one or more of the following:

- hydrocarbon odor;
- visual sheen;
- visual free product (oil or other product); and/or
- visual staining.

Stop work in the immediate area where contamination is identified, during the construction phase of the Project, to allow an assessment to be undertaken of the contaminated area.

Notification Framework

Upon the identification of contamination, work in the immediate area will cease immediately and the onsite supervisor, the Lead Environmental Inspector and the Environmental Inspector(s) will be notified, if feasible. The Lead Environmental Inspector(s) will notify the Environmental Compliance Manager, without delay, of the discovery. The Environmental Compliance Manager will ensure the timely notification to the appropriate provincial/federal authorities and the NEB.

Health and Safety

Upon discovery of previously unknown contamination, the health and safety of personnel and the public is the first priority. Contractors and personnel onsite will suspend all work in the immediate area, shut equipment down and immediately notify the onsite supervisor, Lead Environmental Inspector and the Environmental Inspector(s). Appropriate personal protective equipment that is stored on site, including respiratory protection, will be worn and all reasonable measures will be taken to ensure that health and safety of anyone in the immediate area is preserved. Personnel and Contractors will employ all measures and requirements outlined in KMC's Environment, Health and Safety Policy as well as any measures or requirements.

Interim Mitigation

The Lead Environmental Inspector(s) must be consulted when determining what mitigative measures are required and employed. In all instances, the migration of the contamination must be minimized. Mitigation measures may include:

- segregating contaminated soil for later sampling/analysis and disposal;
- placing any contaminated soil onto an impermeable surface;
- in cases where precipitation may cause runoff, contaminated soil will be covered with an impermeable cover, if practical;
- construct berms to control runoff, in cases where runoff is imminent;
- stopping contaminated water discharge; and
- storing contaminated water in tanks for later sampling/analysis and disposal.

Contamination Management Requirements

Excavations in which contaminated soil or groundwater has been discovered must not be backfilled until authorization has been given by the Construction Manager and the Environmental Inspector(s).

Contaminated soil and water must not be transported off-site or disposed of until analytical results have been received as per federal and provincial regulations. The Construction Manager and the Lead Environmental Inspector(s) will provide notification as to when excavations can be backfilled.

2.0 FIRE CONTINGENCY PLAN

Fire Prevention Measures

The Contractor will develop a Fire Contingency Plan (Volume 4C, Section 5.2.7) and a Fire Prevention Plan (Volume 4C, Section 5.2.8) with minimum guidelines in the TMEP Health and Safety Management Plan (HSMP). This plan will be used in conjunction with the Fire Contingency Plan and the Fire Prevention Plan during all phases of pipeline construction.

The following standard measures will be adhered to during construction of the construction right-of-way and associated facilities.

- Prior to commencement of construction, the Contractor will designate one of his staff as Fire Boss. The Fire Boss will be familiar with fire suppression techniques, equipment and procedures.

- All Lead Activity Inspectors and Contractors' vehicles will carry fire-fighting equipment such as pulaskis, shovels, backpack pumps or components of a water delivery system (pump and hose) in sufficient quantities so that each worker has access to at minimum, one hand tool with which to carry out fire suppression work. In addition, all motorized equipment must carry a fully charged fire extinguisher. The Fire Boss will ensure that fire extinguishers are present and fully charged.

- The Fire Boss will ensure that equipment is cleaned periodically to reduce the build-up of debris in areas which could pose a fire hazard such as the belly pans of crawler tractors.

In the Event of a Wildfire

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

- Commence fire suppression measures immediately upon detection of a fire provided that current fire behaviour allows personnel to safely proceed.

- Report location of fire as well as size, wind direction, fuels burning and immediate values at risk to the Fire Boss.

- The Fire Boss will report all wildfires immediately and relay general fire information to the appropriate provincial, municipal or federal responding authority.

- All equipment and personnel shall be made available to control the fire. Suppression efforts will take into consideration fire behaviour, safety, training, and fitness of personnel as well as equipment availability.

- The Fire Boss will inspect the fire as soon as possible and take charge of directing suppression measures until relieved by a responding authority official.

- Moveable material, particularly explosive or flammable materials, vehicles, etc. will be promptly moved to a safe location whenever there is a possibility of being endangered by fire.

- Fire suppression efforts shall continue until the fire is extinguished or until otherwise notified by the appropriate jurisdictional authority (*e.g.,* AESRD, British Columbia Forest Service, etc.).

- The Fire Boss will ensure that all burning embers are extinguished and will monitor burn area for smouldering material. If available, employ infrared scanning equipment to detect any residual hot spots.

To Report a Wildfire:

Alberta 310-FIRE (3473)
British Columbia 800-663-5555 (or *5555 on most cellular networks)

General Fire Information

When a fire is encountered adjacent to or on the construction right-of-way, make note of the following fire and site conditions prior to reporting the fire:

- crew contact information;
- location of the fire;
- fuel the fire is burning in (trees, grass, etc.);
- approximate size of the fire;
- how quickly the fire is spreading;
- colour of the smoke; and
- values at risk (lives, structures, etc.)

3.0 DRILLING MUD RELEASE CONTINGENCY PLAN

An accidental release of drilling mud adjacent to or into a watercourse could adversely affect the environment. The following contingency plan has been developed to ensure that appropriate measures are in place to reduce the risk of adverse effects during the use of an HDD or other trenchless methods that involve drilling muds.

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

The Contractor will have an instream drilling mud release contingency plan in place and must be approved by Trans Mountain. The Contractor must comply with the requirements of the plan.

3.1 Pre-Job Planning

It is recommended that the Lead Environmental Inspector(s) and the Environmental Inspector(s) and the Construction Manager, the Drilling Contractor, and the Drilling Inspector(s), in consultation with water quality monitors, determine how to manage the various risks associated with potential frac-out scenarios. For example, containing or cleaning up drilling fluids that come to the surface in terrestrial or near shore areas should only be attempted if they are not likely to result in additional effects to the environment that cannot be adequately mitigated, and if risks to worker health and safety can be avoided or mitigated. Similarly, in the event a frac-out occurs mid-channel, where depths, flow conditions and/or ice conditions may limit containment and the benefits of removal efforts, and where safety risks are higher, clean-up efforts are less likely to be possible. The Lead Environmental Inspector(s) and the Environmental Inspector(s) will discuss with DFO, BC MOE and AESRD the potential for clean-up and containment efforts that may be useful to confirm whether specific response actions should be utilized.

The results of these discussions will be provided to the appropriate construction personnel. A pre-job meeting will be held prior to construction between the Drilling Contractor, the Lead Environmental Inspector(s), the Environmental Inspector(s), the Construction Manager, the Drilling Inspector(s) and the water quality monitors to ensure that all parties are familiar with all aspects of the crossing, including the response plan. Substitute personnel shall also be briefed prior to the start of their work on the construction site.

3.2 General Measures

Ensure that supervisory personnel are aware of this plan prior to the commencement of drilling activity.

- Arrange for access beyond the boundaries of the Project's surface rights agreement along the drill path to monitor, contain and clean up potential frac-out releases.

- Install surface casing at the entry point to a depth that extends beyond the coarsest material, if warranted.

- Ensure that drilling mud composition is limited to bentonite mud drilling systems, fresh water and, if warranted, other inert additives. No toxic additives will be used. Provide Material Safety Data Sheets (MSDS) to the Environmental Inspector(s) for approval or to any licensing, inspecting, monitoring or regulatory authority upon request.

- Construct a sump at the entry point and a subsoil berm downslope of the exit point with a capacity adequate to capture anticipated volumes of drilling mud that could be released during pullback and other drilling operations. Construct a sump with the above-noted capacity at the exit point, after the pilot hole has been completed.

- Install surface casing at the exit point if coarse-textured near surface deposits could interfere with drilling mud circulation.

- Develop a clean-up plan prior to drilling. The plan is to be customized and completed by the Lead Environmental Inspector(s) and the Environmental Inspector(s) and the Construction Manager, the Drilling Contractor, Drilling Inspector(s) and water quality monitors, in consultation with DFO, BC MOE and AESRD. Acquire the appropriate approvals to access the release area if off right-of-way and for mud pump-off.

- Close earthen entry and exit sumps that will contain drilling mud immediately after completion of drilling and remediate to meet the Alberta Energy Regulator (AER) Directive G-050 *Drilling Waste Management Guidelines,* ID 99-05 and IL 96-13 (AER 2012) and the *BC Oil and Gas Handbook, Drilling Waste Management Chapter Guidelines* (BC OGC 2012).

Emergency Response Equipment

Note: not all equipment will be required depending on the size of watercourse and season of construction.

- The following equipment will be maintained onsite in sufficient quantities during drilling operation to contain any inadvertent drilling mud releases:
    - spill kit;
    - excavator(s);
    - steel plates for terrestrial or near shore containment;
    - 3” gas pumps c/w sufficient lengths of leak free hose and suction heads and priming buckets;
    - fuel;
    - drip trays for trash pump containment;
    - 6” electric pumps c/w sufficient lengths of leak free hose and suction heads;
    - meshed intake covers for any pumps to be used instream - screening size will adhere to DFO’s *Freshwater Intake End-of-Pipe Fish Screen Guideline* (1995);
    - portable gen-sets for heat and power;
    - extension cords;
    - sandbags;
    - appropriate geotextile filter fabric;
    - steel wire;
    - T-bar posts;
    - post pounders;
    - straw bales;
    - light towers;
    - flashlights;
    - shovels;
    - propane torch(es);
    - axes;
    - Aquadams;

  - personal floatation devices for response crew working within 3 m of flowing water;
  - 6 mm polyethylene; and
  - geotextile booms.

- Maintain the following equipment, as dictated by the applicable season, at a stand-by location in sufficient quantities during drilling operation to supplement or replace response gear onsite:
  - ATV to transport gear downstream over ice;
  - auger(s);
  - chainsaw kit for ice removal;
  - additional metal sheeting or flume device for instream isolation of surfacing drilling fluid;
  - additional sandbags and other containment materials; and
  - reserve pumps and sufficient leak-free hoses.
- Maintain vacuum truck(s) onsite during pullback operations or as necessary.
- Maintain the appropriate water quality sampling equipment onsite during drilling operation.
- Ensure that a minimum of three sets of hand-held, two-way radios with spare batteries, are onsite and available for use in monitoring operations (see Communication Protocol below).

Emergency Response

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

The following mitigation measures will be implemented to reduce the risk of adverse effects on nearby watercourses/wetlands/lakes during drilling operations.

- Suspend drilling operations immediately if excessive loss of drilling mud or change in annulus pressure is noted and conduct a detailed examination of the drill path and surrounding area for evidence of a release to the surface.
- Immediately notify the Construction Manager and the Lead Environmental Inspector(s) and the Environmental Inspector(s) if a drilling mud release is observed.
- If the amount of mud released is not great enough to allow practical collection, allow the mud release to dry and dissipate naturally.
- If the drilling mud release enters a watercourse/wetland/lake, the Environmental Compliance Manager will immediately notify the engineering staff, the NEB and other appropriate regulatory authorities for spill reporting as identified below. The Environmental Compliance Manager will also notify affected landowners and tenants and other regional or provincial agencies, as required. Any drilling mud release that enters waters or that may cause or is causing an adverse effect is reportable to:
  - the NEB;
  - Regional Director (Alberta) or Regional Water Manager (BC) (District Water Act Approvals Manager);
  - Federal Fish Habitat Biologist (DFO);

  - Provincial Fisheries Biologist (AESRD in Alberta or BC MOE in BC);
  - local Field Service/Emergency (24 hours);
  - appropriate compliance branch (*i.e.*, AESRD in Alberta or BC Ministry of Agriculture in BC);
  - Emergency/Complaint Hotline (24 hours) (*e.g.*, Environmental Emergency Hotline if in Alberta, BC MOE Environmental Emergency Reporting Hotline if in BC, and DFO Observe, Record and Report Hotline);
  - Qualified Aquatic Resource Specialist (*i.e.*, QAES [Alberta] or QEP [BC]);
  - the Lead Environmental Inspector(s) and Environmental Inspector(s); and
  - the Construction Manager.

- If a terrestrial drilling mud release occurs that is greater than 1.5 m3, the Lead Environmental Inspector(s), or designate, will immediately notify the NEB and appropriate regulatory authorities.
- Contain and further prevent drilling mud from entering the watercourse/wetland/lake from near shore areas by installing a berm of subsoil, sandbags or other material approved by the Lead Environmental Inspector(s) and the Environmental Inspector(s).
- Conduct water quality sampling as directed by the Lead Environmental Inspector(s) and Environmental Inspector(s). WQM personnel will not be required to assist in the containment or clean-up, but rather will continue monitoring water quality and document the extent and potential effect of the instream release.
- After appropriate discussion with others on the Project team, the Lead Environmental Inspector(s) and the Environmental Inspector(s) will notify the appropriate regulatory authorities and communicate the response plan being pursued within 24 hours of the aquatic frac-out. A report, summarizing the events leading up to the aquatic release, as well as measures taken following the release to reduce effects on the environment, shall be completed by the Lead Environmental Inspector(s) and the Environmental Inspector(s) and submitted to the DFO and the NEB, AESRD (Regional Director of Water Management within 7 days of the release) in Alberta and the BC MOE in BC.
- If the frac-out location is limited to a near shore area (either instream or in the riparian zone), containment/clean-up options include (but are not limited to) the following. A revised response may be developed by the Lead Environmental Inspector(s) and the Environmental Inspector(s) after considering the situation and conditions.

Instream

- Divert stream flow around the mud release, to the extent practical.
- Install sediment fencing around the exit point, if feasible.
- Remove mud from the watercourse by pumping, shovels or with a backhoe.
- Dispose of mud in accordance with applicable and current requirements.

Consider the following options for diverting stream flow from the mud release area.

- Install Aquadams on the upstream side of the release point on larger watercourses.
- Construct a dam and pump set-up on smaller watercourses.
- Install a flume to divert water past the release area.
- Install coffer dams made of sand bags or sheet metal.

- Attempt to contain the release point within an area isolated with Aquadams or sheet metal, etc.

Consider the following options for removal of mud from instream.

- Use trash pumps or hydrovac truck. If trash pumps are used, ensure that the pump-off area does not drain directly into a watercourse or construct a holding area. If a hydrovac truck is used, ensure that all activities comply with the guidelines in the applicable regulations.

- In consultation with the NEB, mud will be left in place if current stream flow levels inhibit removal operations or removal will result in unacceptable terrain or instream damage.

Terrestrial

- Contain the mud release immediately to limit the area affected and prevent the mud from entering the watercourse/wetland/lake.

- Dispose of mud at an approved facility, as agreed with the NEB or other applicable local authority.

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

- If accessible by heavy equipment, immediately construct berms or excavate a sump for containment.

- If not accessible by heavy equipment, construct bale and filter cloth weirs and a containment area, where appropriate.

- Before allowing filtered water to enter the watercourse, ensure that the TSS level is within 10 mg/L of the background TSS levels (CCME 2007).

- The inspection staff will prepare a report summarizing the events leading up to the release as well as measures taken following the release to reduce effects on the environment. The report will be submitted to the NEB as soon as feasible.

Plans for Potential Continuance of Drilling

Drilling will only be allowed to resume if the potential for substantial adverse effects on the environment is low, as determined by the project management, inspection staff, a Qualified Aquatic Resource Environmental Specialist (QAES [Alberta]) or a Qualified Environmental Professional (QEP [BC]), drilling or geotechnical consultant (if warranted) and the Drilling Contractor, and as approved by the NEB. Planning and procedures for continuance of drilling are also provided below.

- Implement measures to prevent the further release of drilling mud into the watercourse. Appropriate measures will vary depending on the lessons learned during the previous drill attempt.

- Progressively implement the following measures to prevent the further release of drilling mud into the watercourse.

    - Ensure that appropriate structures, materials, equipment and personnel are in place and available in the event of a subsequent release of drilling mud.

    - Reduce drilling mud pressures, if practical.

    - Plug fissures/fracture with non-toxic sealers or plugging agents pumped into the drill hole and left undisturbed for an appropriate period of time whereupon drilling will be resumed. If the sealing agents are not successful, drilling will be suspended and the plan reviewed and revised.

    - Employ downhole cementing to either seal off the problem zone for redrilling, or seal off a large portion of the existing drill hole to a point where a new drill path (generally at a lower elevation) can be attempted. If these measures are unsuccessful, then drilling will be suspended and the plan reviewed and revised.

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

Communication Protocol

Communication between drill operation personnel, WQM crews and the Environmental Inspector(s) will be maintained continuously during construction. Hourly (or another set frequency) check-ins between the monitoring and drill operation crews will ensure safety for those working in or around water. This protocol will also promote regular two-way updates of turbidity conditions, drilling pressure data, fluid return reports and operational changes. In the event that a substantial or unexplained loss of drilling pressure is observed, it shall be communicated to all monitoring staff (terrestrial and aquatic) immediately. To facilitate this protocol, hand-held two-way radios, programmed to the drill crew's operating frequency, shall be available to the monitoring and inspection staff (provided by the Drilling Contractor).

4.0 FLOOD AND EXCESSIVE FLOW CONTINGENCY PLAN

Notify the Environmental Inspector(s) or the Construction Manager that contingency measures have been initiated as a result of flooding or excessive stream flow along the route, so that a record of the location, timing and reason for implementation of the contingency plan is maintained. See also Soil Erosion and Sediment Control Contingency Plan (Section 8.0 of this appendix). The Lead Environmental Inspector(s) or the Environmental Inspector(s) will notify the appropriate regulatory authorities (*i.e.*, AESRD, DFO, BC MOE, NEB, etc.), as soon as practical, that contingency measures have been implemented (Appendix D).

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

If the potential for increased sediment concentrations, or sedimentation in a watercourse due to Contractor activity is predicted, the Soil Erosion and Sediment Control Contingency Plan (see Section 8.0 of this appendix) will be implemented. At watercourses where an isolated crossing method is preferred, the 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, heavy precipitation or snow melt events are anticipated prior to commencing watercourse crossing construction.

- Assess the capability to handle the forecasted flow rate with the crossing method. If use of the crossing method is determined by Trans Mountain to be still feasible, the crossing will proceed.
- Defer water crossing construction to a later time when flows have subsided, if determined by Trans Mountain that the crossing method is not feasible.
- Alternatively, where the forecasted flow rates and window limitations combine to preclude the crossing method, request the appropriate authority (*e.g.*, DFO, AESRD, BC MOE, NEB) for permission to use the recommended 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.

- Withdraw all equipment or tanks containing fuel, oil or other hazardous materials from potential flood areas.
- Relocate all topsoil/root zone material piles at the direction of the Environmental Inspector(s).
- Relocate subsoil piles, to the extent feasible, to a position above the anticipated high water level.
- Remove all stationary and mobile equipment deployed at the crossing site to a safe area above the anticipated high water level.
- Remove any instream flume or dam equipment that may impede stream flow, if safe work conditions allow.
- Restrict the use of bridges and other vehicle crossing structures until it is determined whether adequate free-board is present on bridges and adequate capacity is available in culverts. Take corrective measures, if warranted, to avoid flooding of adjacent lands.

5.0 FISH SPECIES OF CONCERN CONTINGENCY PLAN

Prior to the beginning of any field activities, if there is a high likelihood that federally-listed species at risk could occur in the Project area, determine if a Species at Risk Permit advance from DFO is necessary under the *Species at Risk Act*. Additionally, there may be specific conditions on Fish Licenses in BC and Fish Research Licenses in Alberta regarding provincial species at risk that will be known in advance and adhered to during construction.

In the event that sensitive fish habitats are discovered during subsequent surveys or supplemental fish and aquatic habitat studies, the discovery will be assessed by a Qualified Aquatic Resource Specialist (QAES in Alberta or a QEP in BC) based on the following criteria:

- location of the fish habitat feature with respect to the crossing;
- the timing of construction versus the timing constraints for the fish species (see DFO for the Pacific and Central and Arctic Regions, AESRD in Alberta, BC MOE (adapted from *Fish-Stream Crossing Guidebook* [BC MFLNRO 2012b] in BC); and
- the potential for an alteration of construction activities to limit disturbance.

Once the assessment is completed, Trans Mountain, in consultation with the QAES/QEP, the NEB, DFO and provincial fish biologists, will discuss resource-specific mitigative options. The mitigative measures available include the following.

- Abide by timing constraints for sensitive life history periods (see DFO for the Pacific and Central and Arctic Regions, AESRD in Alberta and BC MOE in BC).
- Alter vehicle crossing methods to minimize disturbance (*i.e.*, use existing bridges or install temporary bridge as per appropriate DFO Operational Statements for Alberta and BC).
- Alter construction activities to partial bypass or trenchless crossing techniques (*e.g.*, horizontal HDD, bore).
- Implement temporary and/or permanent sediment control measures (*e.g.*, geotextiles, sediment fences, temporary berms) to prevent increased sediment loading.
- Re-establish bank cover by planting shrubs (appropriate area COP for Alberta and BC MOE, BC Standards and Best Practices for Instream Works [BC Ministry of Water, Land and Air Protection 2004a], Standards and Best Practices for Instream Works: Habitat Enhancement and Restoration [BC MOE n.d.{b}]).
- If deemed warranted and if required, for an authorization for the harmful alteration, disruption or destruction of fish habitat, compensate loss of habitat and monitor to confirm that compensation was effective.

The water crossing summary tables provided in Appendix I outline appropriate mitigation to be implemented at each applicable watercourse crossing and will be updated as necessary.

6.0 HERITAGE RESOURCES DISCOVERY CONTINGENCY PLAN

Note: Personnel are NOT permitted to collect and/or keep any artifacts. All heritage resources identified must be catalogued, collected by Trans Mountain and submitted to the appropriate regulatory authority.*

The following procedures provide contingency measures for the discovery of heritage resources prior to and during construction of the construction right-of-way and their associated components (*e.g.,* borrow sites).

Heritage Resources Discovery Prior to Construction

In the event that archaeological, historical or palaeontological resources are discovered during the AIA or HRIA, the following measures will be implemented.

- Carry out an assessment to determine the effects of the operation or activity on the identified heritage resources.
- Prepare and submit a report containing the assessment of the effects of the operation or activity described above to the applicable Minister, the NEB and/or the appropriate regulatory authority in accordance with the permit.

Conduct all salvage, preservation or mitigative measures or any other action deemed appropriate by the applicable Minister, the NEB and/or appropriate regulatory authority.

Prior to construction of the Project, the AIA/HRIA will specify mitigation measures to be implemented at each heritage resource site identified. Mitigation measures to be implemented will be provided on the Environmental Alignment Sheets or will otherwise be communicated to the Contractor to ensure their implementation.

The mitigative measures that may be implemented include the following.

- Avoid the site by amending the development footprint. Clearly mark these sites using fencing or flagging.
- Mitigate the site by the collection of artifacts, maps, photographic documentation and completion of an Archaeological Site Inventory Form.
- Have a qualified Heritage Resource Specialist (archaeologist or palaeontologist) present to monitor topsoil/root zone material salvage and grading operations.
- Install geotextile or matting (*i.e.*, swamp mat[s]) to protect the site if on extra TWS or an access road.
- Conduct an excavation to retrieve scientific information and establish an adequate record of the site according to applicable heritage resources guidelines.

Heritage Resource Discovery During Construction

In the event that heritage resource sites are discovered during construction, implement the measures listed below.

- Suspend work immediately in the vicinity (*i.e.*, within 30 m) of any newly identified archaeological, palaeontological or historical resource sites (*e.g.*, modified bone, pottery fragments, fossils, etc). Work at that location may not resume until the measures below are implemented. Clearly mark the site using fencing and flagging.

- Notify the Lead Environmental Inspector(s), who will notify the Construction Manager, the Lead Activity Inspector(s) and a qualified Heritage Resource Specialist and, if warranted, the appropriate regulatory authority. If an organic specimen is discovered in frozen ground, the Environmental Inspector(s) will attempt to preserve the frozen state until the appropriate qualified Resource Specialist is onsite or has been contacted.

- A qualified Heritage Resource Specialist will develop, if warranted, an appropriate mitigative plan in consultation with the Lead Environmental Inspector(s), the Lead Activity Inspector(s) and the Construction Manager, and/or appropriate regulatory authority, as well as the applicable Aboriginal communities. The mitigative measures available include those listed below:

    - site avoidance - may include amending the development footprint or temporarily covering the site using geotextile pads, matting or subsoil ramps;

    - systematic data recovery - scope of work may range from artifact collection, mapping and site documentation, to salvage excavations; and

    - surveillance/monitoring - assign a qualified Heritage Resource Specialist to monitor the remainder of the topsoil/root zone material salvage and grading operations in the vicinity of the discovery.

Human Remains Discovered During Construction

In the event that human remains are discovered during construction, implement the following measures listed below.

- Suspend work immediately in the vicinity of the newly identified human remains. Work at that location may not resume until the measures below are implemented.

- Notify the Lead Environmental Inspector(s), who will notify the Construction Manager, the Lead Activity Inspector(s) and a qualified Heritage Resource Specialist and, if warranted, the local police and appropriate regulatory authority.

- If there is potential for disturbance to the site due to trafficability or high public visibility, assign employees to stand watch until a qualified Heritage Resource Specialist arrives.

- Stake or flag off the location to prevent further disturbance.

- Cover any exposed bones with clean plastic sheeting, tarpaulin, blanket or other covering until a qualified Heritage Resource Specialist is present.

- Do not backfill. If excavated fill has been loaded into a truck, empty the excavated fill at a nearby secure location for a qualified Heritage Resource Specialist to inspect.

- The Contractor will only resume work in that area once the archaeological and forensic studies are complete, clearance has been granted by the appropriate regulatory authority, and Trans Mountain has been advised that work can continue.

7.0 RARE ECOLOGICAL COMMUNITIES OR RARE PLANT SPECIES DISCOVERY CONTINGENCY PLAN

In the event that potential ecological communities or rare plants (vascular plant or bryophyte [moss or liverwort or lichens]) are discovered on or within 30 m of the construction right-of-way or associated components (*e.g.*, borrow sites), follow the measures outlined below.

- Notify the Environmental Inspector(s).
- Note the location of the potential rare plant or ecological community relative to the construction right-of-way.
- Send a photograph of the potential rare element and any additional details regarding the element and the site to a resource specialist.
- If feasible, avoid further disturbance to the location or within 10 m of the location until a qualified Vegetation Resource Specialist has been consulted.
- A qualified Vegetation Resource Specialist may deem it necessary to visit the site and will, regardless of whether a site visit is warranted, determine if site-specific mitigation is required, then develop an appropriate site-specific mitigation plan in consultation with Trans Mountain following the Rare Ecological Community and Rare Plant Population Management Plan (see Appendix C).

8.0 SOIL EROSION AND SEDIMENT CONTROL CONTINGENCY PLAN

Where soil erosion by wind or water is evident during the construction phase of the pipeline and associated components (*e.g.,* borrow sites), all necessary Contractor equipment and personnel will be made available to control the erosion. During the construction phase, the Lead Environmental Inspector(s) in consultation with the Environmental Manager, Environmental Compliance Manager and, if required, the NEB, will determine appropriate procedures to be implemented to control soil erosion and other soil handling problems encountered. The Lead Environmental Inspector(s) will notify the NEB as soon as practical that contingency measures have been implemented. A record will be made of the location, timing, reason for implementation and measures implemented.

One or more of the following erosion control options listed below will be implemented, if warranted, where soil erosion is observed. Similar procedures to control erosion will be followed during the operational phase.

Water Erosion

- Mitigate for erosion or allow for mutual decision to be made by the Contractor and the Construction Manager and the Environmental Inspector(s) to shut-down construction until the risk of erosion has been reduced or conditions improve.
- Install sediment fences near the base of slopes.
- Construct/install temporary berms of subsoil, logs, timber, coir logs, sandbags or straw bales during construction activities.
- Salvage topsoil/root zone material and store away from the area to be regraded.
- Construct temporary cross ditches if approved by landowner and is practical for the area.
- Regrade rills and gullies.
- Replace salvaged topsoil/root zone material.
- Implement one or a combination of the following long-term mitigative techniques, as warranted:
    - 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 rollback and walk down;
    - apply erosion control blanket, mulch or tackifier to hold soil;
    - reseed and hand rake an annual cover crop, hydroseed or apply seed, install erosion control blankets; and
    - transplant native shrubs, plant willow stakes or use other bioengineering techniques.

Wind Erosion

Topsoil/Root Zone Material

- Mitigate for erosion or allow for a mutual decision to be made by the Contractor and the Construction Manager and the Environmental Inspector(s) to shut-down or relocate construction activities until winds dissipate and conditions improve.
- Consider using the following techniques if wind erosion of the topsoil/root zone material windrow is of concern:
    - apply water to the topsoil/root zone material windrow;

- windrow snow over the topsoil/root zone material windrow;
- tackify (at rate recommended by the distributor) the topsoil/root zone material windrow; or
- pack the topsoil/root zone material windrow with suitable equipment.

Consider using the following techniques if wind erosion is of concern after topsoil/root zone material replacement:

- seed with an annual or biannual cereal or short-lived perennial grass cover crop species;
- conduct straw crimping (contact Agricultural Fieldman or Crop Specialist in Alberta or the BC Ministry of Agriculture Representative in BC for local, high quality straw suppliers);
- apply hydromulch or tackifier;
- use a packing roller (*e.g.*, Accuroller) to lightly compact sandy or pulverized soils;
- import small diameter slash for use as rollback;
- walk down slash;
- apply locally available manure and cultivate; and
- install wind fences.

Soil Erosion/Sedimentation at Streambanks

Depending on the rate of flow, water will transport particles of varying size and quantity. The faster the flow, the larger the size of the particle and the greater the amount of particles transported. Particles are deposited when the particle load is excessive for the level of flow, causing sedimentation.

In the Event of Potential Sedimentation

The Environmental Inspector(s) will notify the Lead Environmental Inspector(s) that contingency measures have been initiated and will maintain a record of the location, timing and reason for implementation of the contingency plan. The Lead Environmental Inspector(s) will notify the NEB as soon as practical that contingency measures have been implemented. In the event that unacceptable levels of sedimentation of a watercourse/wetland/lake are occurring during water crossing construction or in-water works, suspend instream/in-water construction activities and review the measures presented in the Water Crossing Construction Monitoring Management Plan (see Appendix C).

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

- 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, flooding of the work area or damage to sensitive aquatic species and/or habitat.
- Install additional sediment fencing to prevent sediment-laden water from entering watercourses, wetlands or lakes.
- Excavate cross ditches to divert run-off away from watercourses, wetlands and lakes.
- Construct berms of subsoil, sandbags, rock, timber, straw bales, coir logs or hay bales on approach slopes and/or banks to divert runoff from the construction right-of-way and onto well-vegetated lands or sediment retention ponds. The location and method of erosion and sediment control, will be determined by the Environmental Inspector(s).

- Install erosion control blanked or coir matting on disturbed areas such as the banks and approach slopes to assist in the control of erosion and potential for sedimentation of watercourses, wetlands and lakes.

- Import sand bags and place strategically to help stabilize and add height to the banks in order to prevent flooding of nearby areas, especially where vegetation has been removed.

- Implement additional measures to control erosion and sedimentation of watercourses, wetlands and lakes in the Flood and Excessive Flow Contingency Plan (Section 4.0 of this appendix).

- Implement one or a combination of the following mitigative techniques for long-term protection measures:

    - plant rooted stock plants in the spring or fall;

    - transplant dormant shrubs and trees from areas adjacent to or within the vicinity of the crossing location (see Drawing [Typical Bank Overhang] provided in Appendix R);

    - apply erosion control blanket following seeding;

    - install log cribwall bank protection (see Drawing [Streambank Protection – Cribwalls] provided in Appendix R);

    - reinforce banks with rock rip-rap/cobble armouring (see Drawing [Streambank Protection – Cobble or Riprap Armouring] provided in Appendix R), vegetated geogrid or rock gabions (see Drawing [Typical Gabion Baskets] provided in Appendix R); or

    - reconstruct the stream profile to remove scour holes or instream obstructions.

9.0 SOIL HANDLING CONTINGENCY PLAN

During construction, the following problems may arise, which may result in loss of soil productivity if not addressed. Mitigation measures are suggested which may lessen the effects associated with construction.

Little or no Topsoil/Root Zone Material on Cultivated Lands

- Salvage plow layer to colour change or to 15 cm, whichever is greatest.

Little or no Topsoil/Root Zone Material on Native Grassland, Tame Pasture or Hay

- Salvage topsoil/root zone material to colour change or to 15 cm, whichever is greatest

Stony Subsoils or Topsoil/Root Zone Material

- Attempt to use conventional equipment to salvage topsoil/root zone material.
- Employ excavator, if above measures are ineffective.

Shallow Bedrock

- Bedrock is not to be backfilled into the upper 0.5 m of the trench.
- Import clean additional or replacement backfill, if warranted, from locations approved by the appropriate regulatory authority.

Unstable Trench Walls

- Salvage extra width of topsoil/root zone material if storage of extra subsoil is required.

Uneven Boundary Between Topsoil/Root Zone Material and Subsoil

- Utilize equipment capable of fine depth adjustments when salvaging topsoil/root zone material.

Soil Pulverization

- Refer to the Soil/Sod Pulverization Contingency Plan (Section 10 of this appendix).

Uneven Surface on Native Grassland, Hay or Tame Pasture

- Consider salvaging subsoil pile area on hay and tame pasture
- Use equipment with fine depth control to backfill subsoil in contact with sod layer
- Consider use of prairie protector on clean-up bucket or grader blade
- Minimize scalping of sod layer

10.0 SOIL/SOD PULVERIZATION CONTINGENCY PLAN

Where warranted, the NEB will be notified as soon as practical that contingency measures have been implemented during construction.

Criteria for Implementation

Pulverization may occur on unsalvaged, well-sodded lands, particularly on sandy soil and on cultivated lands with clay textured soils. The Soil/Sod Pulverization Contingency Plan will be implemented where sod integrity on hay and/or tame pasture lands or topsoil/root zone material has been disturbed to the extent that the soil/sod will not infill naturally in a reasonable time frame, or there is an unacceptably high risk of soil erosion.

The following contingency measures will be implemented where pulverization is occurring and topsoil/root zone material was not fully salvaged from the working area of the right-of-way. Locations along the construction right-of-way where these measures apply will be determined by the Environmental Inspector(s) in consultation with the landowner and/or applicable regulatory authority.

- Provide alternative access to the right-of-way to avoid areas prone to soil/sod pulverization.
- Minimize traffic along the right-of-way in areas where soils are/sod is prone to pulverization.
- Use equipment with wide pad tracks during soils handling (*i.e.*, salvaging and replacing topsoil/root zone material).
- Salvage a wider area of topsoil/root zone material.
- Implement other suitable mitigation depending on conditions encountered during construction (*e.g.*, availability of extra TWS, soil moisture levels, land use, etc.).

Implement the following measures if the backfill assessment indicates that droughty conditions are present and the ditch subsoil is excessively dry.

- Wet the ditch subsoil prior to backfilling.
- Backfill the ditch subsoil in separate lifts.
- Compact the backfilled subsoil between each lift.

Refer to Section 8.4 of the pipeline EPP for additional considerations regarding backfilling and compacting in lifts.

Implement the following measures during clean-up and reclamation activities along portions of the construction right-of-way where soil/sod pulverization occurred prior to contingency measures being implemented.

- Lightly cultivate the affected areas in two directions with a spike cultivator or a scarifier mounted on a grader, or equivalent.
- Ensure that the area of cultivation is approximately 1 m wider than the disturbed area.
- Harrow the area to prepare a seed bed.
- Drill or broadcast seed the area, as appropriate, and lightly harrow the area again to cover all seed and compact the seed bed.
- Straw crimp, if necessary, on erosion prone soils.

11.0 SPILL CONTINGENCY PLAN

The Construction Manager or designate, and the Lead Environmental Inspector(s) and Environmental Inspector(s) will immediately notify Trans Mountain via the 24-hour Emergency Line, which is operated by KMC, and the Environmental Compliance Manager will notify the appropriate provincial/federal authority as required by law when a reportable event occurs during the construction of any component of the TMEP. If this is not possible, notification will be made as soon as practical.

Spills may need to be reported to provincial agencies, when applicable. The timeline in which the reporting is to take place is dependent on the size of the spill. An immediately reportable spill (major spill) is defined as a release of a substance that is likely to be an imminent environmental or human health hazard and/or meets or exceeds reportable volumes. Major spills will be immediately reported to the appropriate federal/provincial authority by the Environmental Compliance Manager. Any spills with volumes that are not immediately reportable (minor spills) are not required to be immediately reported to the applicable federal/provincial authority. Rather, these spills will be tracked and documented by the Environmental Inspector(s) and submitted to Trans Mountain for inclusion in their spill-tracking databases.

If there is any doubt that the quantity spilled exceeds reportable levels, the spill will be reported to Trans Mountain via the 24-hour Control Centre Emergency Line who will determine if the spill should be reported to the appropriate provincial/federal authority. Crucial information that will be provided to the 24-hour Control Centre Emergency Line, if feasible, includes: name and telephone number of the caller, date and time of the call, material(s) spilled, location of the spill, estimated quantity spilled, cause of spill, actions taken to-date, assistance required, injuries, and weather conditions (KMC 2012a,b).

In Alberta, a reportable spill is defined by the Alberta *Environmental Protection and Enhancement Act* as:

- the release has caused, is causing or may cause impairment of or damage to the environment, human health or safety, or property;
- the amount exceeds the quantities or emission levels set out for the substance (see MSDS);
- the release is into a watercourse or into the groundwater or surface water in any quantity; and/or
- the release is 200 L or more (Transport Canada 1992 immediate reporting quantity for flammable liquids [class 3]) (see Attachment B2).

In BC, a reportable spill is defined by the BC *Environmental Management Act* as:

- A release of 100 L or more (BC MOE) (see Attachment B3).

Any sites contaminated by a spill will be assessed, remediation will be designed and disposal sites will be identified in accordance with the NEB Remediation Process Guide (2011). This document will be provided to the Construction Manager or designate, and the Lead Environmental Inspector(s) and the Environmental Inspector(s) as part of the Environmental Education Program. Emergency contacts are presented in Appendix D.

11.1 Introduction

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 Trans Mountain's Waste Management Standard provided in Appendix C.

11.2 General Measures

The following are general measures to be adhered to during construction of the TMEP.

- Appropriate spill equipment will be maintained at all work sites. The risk potential for site-specific spills will be used to determine the appropriate type of response equipment to be stored onsite and suitable location for storage.

- Specific instructions regarding applicable contacts and appropriate response actions to be taken in the event of a spill will be posted in the field construction offices.

11.3 Initial Response

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

- Ensure personal safety and the safety of others onsite and don appropriate personal protective equipment. In the event of a spill of a hazardous material, the first person on the scene will execute the actions presented in the Spill Scene Checklist (Attachment B4).

- When notified of a spill, the Construction Manager, or designate, or the Environmental Inspector(s) will immediately ensure that:

    - action is taken to control danger to human life;

    - an onsite Emergency Response Coordinator is designated;

    - the appropriate provincial disaster services, local police and/or RCMP, and emergency services have been notified through KMC's call down system;

    - the necessary equipment and personnel are mobilized, and measures are being implemented to stop the source of the spill, if safe to do so, and commence clean-up; and

    - Trans Mountain is immediately notified of the spill via the 24-hour Control Centre Emergency Line; and the Environmental Compliance Manager will immediately notify applicable provincial and federal agencies, and the NEB of the spill.

- The Contractor will make all resources available to contain and clean-up the spill.

- Once the emergency contacts are made and the initial efforts to contain and clean-up the spill are underway, Trans Mountain will notify the Project's Environment Compliance Manager.

11.4 General Spill Containment Procedures

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

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

- Ensure personal safety and safety of others onsite. The first person on the scene will execute the actions listed in the Spill Scene Checklist.

- Assess the safety hazards of the situation and don appropriate personal protective equipment.

- Remove sources of ignition, if safe to do so.

- Identify the product, stop source and physically contain spill as soon as safe to do so.

- Avoid use of water or fire extinguishing chemicals on non-petroleum product spills since many chemicals react violently with water and chemical extinguishing agents may release toxic fumes. In addition, chemicals may be soluble in water and dispersal makes containment and clean-up more difficult.

- Minimize traffic on contaminated soils.

- Use natural depressions or berms constructed with materials and equipment in proximity to the site to physically contain a spill on land. Deployment of booms will be necessary on water.

- Clean-up will not be attempted without advice from the Environment Manager.

11.4.1 Spills Occurring During Transportation

The general guidelines listed below will be followed for the containment of materials spilled during transportation.

- Contain spilled product.

- Pump tanker truck or transportation vessel dry (into appropriate containers).

- Remove tanker truck or transportation vessel from site.

- Recover spilled product.

- Clean up contaminated area.

- Dispose of sorbent pads, heavily contaminated soil and vegetation at an approved facility. On lightly contaminated soil areas where remediation is feasible, add amendments, repeat as required, sample soil and seed as appropriate. Repeat as required.

11.4.2 Spills Adjacent to or into a Watercourse or Wetland

The general guidelines listed below will be followed for spills adjacent to or into a watercourse or wetland.

- Construct berms and/or trenches to contain spilled product prior to entry into a watercourse or wetland.

- Deploy booms, skimmers, sorbents, etc., if feasible, to contain and recover spilled material from a watercourse or wetland.

- Pick up spilled product.

- Clean up contaminated area including downstream shorelines.

- Dispose of heavily contaminated soil and vegetation at an approved facility. On lightly contaminated soil areas consider in situ restoration where feasible; fertilize and then cultivate beyond depth of contamination. Repeat as required.

11.4.3 Spot Spills

Effects from small spot spills can generally be minimized and will not result in the suspension of activities if appropriate actions are implemented, All small spills of fuels or hazardous materials must be reported immediately to an Environmental Inspector(s).

- An Environmental Inspector(s), in consultation with the Environment Lead, will determine appropriate methods to remove or reclaim contaminated soils. Soil and vegetation heavily contaminated with petroleum products will be disposed of at an approved facility.

- Locations where spot spills occur are to be recorded to ensure that post-construction environmental monitoring of the site can be conducted, if warranted.

- In lightly contaminated soil areas where in situ restoration is feasible; soil will be fertilized, incorporated by hand or cultivated to a depth below the depth of contamination, then repeated as required.

12.0 TRADITIONAL LAND USE SITES DISCOVERY CONTINGENCY PLAN

12.1 Traditional Land Use Sites Identified Prior to Construction

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

- the location of the TLU site with respect to the area of development;
- the relative importance of the TLU site to the community; and
- the potential for an alteration of construction activities to reduce or avoid sensory disturbance.

The types of accepted mitigation listed below have been successful in mitigating effects on TLU sites. Alternative site-specific mitigation strategies may also be recommended by communities. The mitigative measures that may be implemented will be dependent on the type of site identified.

Hunting

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

Successful and accepted mitigation for hunting sites may include:

- adhering to species-specific timing constraints, to the extent feasible;
- leaving breaks in the pipeline trench to allow animals to cross; and
- limiting the use of chemical applications.

Trapping

Aboriginal individuals continue the practice of trapping and snaring for food and pelts. These traps and snares may or may not be located within registered trap lines.

To avoid accidental damage where the pipeline transects a trap line, mitigative measures may include:

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

Fishing

The practice of traditional fisheries relate to the species harvested, fishing techniques, and the nature of specific reaches of lakes and rivers. Fishing methods may include but are not limited to: angling, gigging, spear-fishing, dip netting, gill netting, and the construction and use of fish traps and weirs. While fishing activities vary with changes in seasonal water flow and variation in fish stocks, fisheries often exhibit habitual repeated use. Fishing areas include watercourses/wetlands/lakes often in proximity to staging areas and/or access points to the waters. Secondary fishing activities relate to the processing of harvests, and may include processing yards, smokehouses, drying racks and fish-grease rendering features.

Standard and effective mitigative measures for fishing areas may include:

- recording and mapping of fishing locales; and

- strict adherence to the regulations, standards and guidelines set by provincial and federal regulatory authorities for watercourse crossings.

Plant Gathering

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

To avoid the disruption of plant gathering activities, mitigative measures include:

- limiting the use of chemical applications;
- replacement of plant species during reclamation; and
- avoidance of the site.

Trails and Travel ways

Travel corridors are essential for conducting traditional activities and accessing cultural landscape features. Trails include well-defined ATV and snowmobile corridors, navigable waterways, river portages, and historic foot, dog sled and pack horse pathways.

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

- detailed recording and mapping to within 100 m on both sides of the construction right-of-way; in partnership with community representatives, a decision is then made about the relative importance of the trail and, if warranted, how best to maintain and control access; and
- other mitigation options include signage or scheduling construction during periods of least effect.

Habitation Sites

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

Successful and proven mitigative measures for habitation sites include:

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

Gathering Places

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

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

Sacred Areas

These areas include burials, vision quest locations, rock art panels, birth locations and ceremonial places, among others. A particular element is often only a small component of a larger spiritual complex, which can encompass topographic features and may, by its very nature in the context of Aboriginal spirituality, be inestimable and irreplaceable.

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

12.2 Traditional Land Use Sites Discovered During Construction

In the event that Sacred TLU sites are identified during construction of the pipeline or associated components (*e.g.,* borrow sites), the following measures will be implemented.

- Suspend work immediately in the vicinity of any newly discovered Sacred site. Work at that location may not resume until the measures below are conducted.
- Notify the Lead Environmental Inspector(s) and the Environmental Inspector(s), who will notify the Construction Manager, the Lead Activity Inspector(s), the Aboriginal Manager and a qualified Heritage Resource Specialist.
- A qualified Heritage Resource Specialist will assess the site and develop an appropriate mitigation plan using the information listed above.
- Any potentially affected Aboriginal community will be informed of the discovery and the mitigation to be implemented.

13.0 WET/THAWED SOILS CONTINGENCY PLAN

Trans Mountain will assign Environmental Inspector(s) with sufficient training and soils-related experience 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 construction activities on lands with excessively wet/thawed soils will be made by the Construction Manager in consultation with the Lead Environmental Inspector(s), the Lead Activity Inspector(s) and the Environmental Inspector(s). A record of the location, timing and reason for implementation of the Wet/Thawed Soils Contingency Plan will be maintained by the Environmental Inspector(s). In the event that activities are suspended, the NEB will be notified as soon as practical by the Lead Environmental Inspector(s) and the Environmental Inspector(s), if warranted.

The Environmental Inspector(s) will be responsible for monitoring and ensuring that all procedures are implemented, and will liaise with the NEB to obtain input. Trans Mountain believes that it is critical in addressing wet/thawed soils contingency plans to maintain effective communication between the Contractor and the NEB. Therefore, if necessary, a meeting will be held in the field to ensure that all parties involved mutually understand the concerns.

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 material into the subsoil; soil structure damage during soil handling; or compaction and associated pulverization of surface material due to heavy traffic.

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

- rutting of topsoil/root zone material to the extent that admixing may occur;
- excessive wheelslip;
- excessive build-up of mud on tires and cleats;
- formation of puddles; and/or
- tracking of mud as vehicles leave the construction right-of-way.

Where construction activities have the potential to, or are causing the aforementioned issues, the Lead Environmental Inspector(s) and the Environmental Inspector(s), in consultation with the Construction Manager and Contractor, will suspend that phase of the construction activity until soil conditions dry out/freeze, or effective mitigation procedures have been implemented.

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

Wet Soil Contingency Measures

- Mitigate for wet soil conditions or allow for a mutual decision to be made by the Contractor, Construction Manager and the Environmental Inspector(s) to delay construction until soils dry out.
- Restrict construction traffic, where feasible, to equipment with low-ground-pressure tires or wide pad tracks.
- Prevent rubber-tired traffic from driving along the construction right-of-way or construction site.
- Postpone work in highly sensitive areas and shift effort to low sensitivity areas.
- Restrict work to non-problem areas, such as well-drained soils, until conditions improve.

- Salvage an additional width of topsoil/root zone material in potential problem areas; note that topsoil/root zone material salvage will not be permitted during wet soil conditions.

- Salvage topsoil/root zone material from the construction right-of-way to prevent mixing and rutting (note that topsoil/root zone material salvage cannot be conducted when soils are excessively wet).

- Install geotextiles or matting in problem areas.

- Suspend construction activities and traffic in areas with wet soil conditions until the soils dry out. Grade the travel lane smooth to prevent puddling and expedite drying. Suspension of construction activities outside of the construction right-of-way will be based on discussions between the Construction Manager, the Lead Activity Inspector(s), the Lead Environmental Inspector(s) and the Environmental Inspector(s), the Contractor, and, if warranted, the NEB. Recommencement of work must be authorized by the Construction Manager, in consultation with the Lead Environmental Inspector(s), the Lead Activity Inspector(s) and the Environmental Inspector(s), once soils dry out or freeze.

Thawed Soil Contingency Measures

- Restrict construction traffic, where feasible, to equipment with low-ground-pressure tires or wide pad tracks.

- Prevent rubber-tired traffic from driving on or along the construction right-of-way or construction site.

- Restrict work to non-problem areas, such as frozen or well-drained soils, until conditions improve.

- Limit construction activities and traffic, if thawed ground conditions are encountered, to the evening or early morning when the ground is frozen.

- Install geotextiles or matting in problem areas.

- Employ frost inducement measures such as snow packing or plowing to increase the load-bearing capacity of thawed ground.

- Salvage topsoil/root zone material from the construction right-of-way to prevent mixing and rutting (note that topsoil/root zone material salvage cannot be conducted when soils are excessively wet).

- Suspend construction activities and traffic in areas with thawed soils until the soils dry out or refreeze.

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

Partial Suspension of Construction Activities and Traffic

The primary concern during wet/thawed soil conditions is the potential for rutting, compaction and loss of soil structure in the topsoil/root zone material. Depending upon the land use and width of topsoil/root zone material salvage conducted, some construction activities may be conducted and traffic allowed to travel along the right-of-way or construction site during wet/thawed soil conditions while others are suspended. Tables B.13-1 and B.13-2 provide criteria to be used in determining how to mitigate for wet or thawed soil conditions or allow for a mutual decision by the Contractor, Construction Manager and the Environmental Inspector(s) to suspend activities until soils dry out.

TABLE B.13-1

CRITERIA FOR THE SUSPENSION OF ACTIVITIES DUE TO EXCESSIVELY WET SOIL CONDITIONS

Land Use	Topsoil/Root Zone Material Salvage Status	Construction Activity	Suspend Activity for Environmental Issue?
Cultivated and Poorly-sodded Hay and Tame Pasture	No salvage conducted	Soils handling (topsoil/root zone material salvage/replacement)	Yes
	No salvage conducted	Pipe stringing	Yes
	Trench and subsoil area salvaged	Pipe stringing	No, if stringing truck traffic is restricted to the salvaged area
	Trench and subsoil, and work area salvaged	Pipe stringing	No
	No salvage conducted	Welding	Yes
	Trench and subsoil area salvaged	Welding	Yes
	Trench and subsoil, and work area salvaged	Welding	No
	Trench and subsoil area salvaged	Trenching	No
	Trench and subsoil area salvaged	Lowering-in	Yes
	Trench and subsoil, and work area salvaged	Lowering-in	No
	Trench and subsoil area salvaged	Backfilling	No, if backfilling with backhoes or clean-up bucket Yes if bulldozers are used
	Trench and subsoil, and work area salvaged	Backfilling	No
	Trench and subsoil area salvaged	Testing	Yes, testing would not be initiated but would continue if filling with test water has begun
	Trench and subsoil, and work area salvaged	Testing	No
	Topsoil/root zone material replaced	Testing	Yes, testing would not be initiated but would continue if filling with test water has begun
	Topsoil/root zone material replaced	Clean-up	Yes, heavy traffic not permitted; No, quad traffic likely acceptable
Well-sodded Lands; Hay and Tame Pasture	No salvage conducted	Soils handling (topsoil/root zone material salvage/replacement)	Yes
	No salvage conducted	Pipe stringing	Yes
	Blade width salvage conducted	Pipe stringing	No, if stringing truck traffic is restricted to the salvaged area
	Blade width and work area salvaged	Pipe stringing	No
	No salvage conducted	Welding	No, activity to be closely monitored and suspended, if warranted
	Blade width salvage conducted	Welding	No, activity to be closely monitored and suspended, if warranted
	Blade width and work area salvaged	Welding	No
	Blade width salvage conducted	Trenching	No
	Blade width salvage conducted	Lowering-in	No, activity to be closely monitored and suspended, if warranted
	Blade width and work area salvaged	Lowering-in	No
	Blade width salvage conducted	Backfilling	Yes
	Blade width and work area salvaged	Backfilling	Yes
	Blade width salvage conducted	Testing	No
	Blade width and work area salvaged	Testing	No
	Topsoil/root zone material replaced	Testing	Yes, testing would not be initiated but would continue if filling with test water has begun
	Topsoil/root zone material replaced	Clean-up	Yes, heavy traffic not permitted; No, quad traffic likely acceptable

TABLE B.13-1 Cont'd

Land Use	Topsoil/Root Zone Material Salvage Status	Construction Activity	Suspend Activity for Environmental Issue?
Treed/Forested	No salvage conducted	Soils handling (topsoil/root zone material salvage/replacement)	Yes
	Topsoil/root zone material salvage in all areas outside of the construction right-of-way that will require grading	Materials storage and staging area	No
	Topsoil/root zone material replacement	Clean-up	Yes, heavy traffic not permitted; No, quad traffic likely acceptable

TABLE B.13-2

CRITERIA FOR THE SUSPENSION OF ACTIVITIES DUE TO THAWED SOIL CONDITIONS

Land Use	Topsoil/Root Zone Material Salvage Status	Construction Activity	Suspend Activity for Environmental Issue?
Cultivated and Poorly-sodded Hay, Tame Pasture and Shrub	No salvage conducted	Soils handling (topsoil/root zone material salvage/replacement)	Yes
	No salvage conducted	Pipe stringing	Yes
	Blade width salvaged	Pipe stringing	No, if stringing truck traffic is restricted to the salvaged area
	No salvage conducted	Welding	Yes
	Blade width salvaged	Welding	Yes
	Blade width salvaged	Trenching	No
	Blade width salvaged	Lowering-in	Yes
	Blade width salvaged	Backfilling	Yes
	Blade width salvaged	Testing	Yes, testing would not be initiated but would continue if filling with test water has begun
	Topsoil/root zone material replaced	Testing	Yes, testing would not be initiated but would continue if filling with test water has begun
	Topsoil/root zone material replaced	Clean-up	Yes, heavy traffic not permitted; No, quad traffic likely acceptable
Well-sodded Lands; Hay and Tame Pasture	No salvage conducted	Soils handling (topsoil/root zone material salvage/replacement)	Yes
	No salvage conducted	Pipe stringing	Yes
	Blade width salvage conducted	Pipe stringing	No, if stringing truck traffic is restricted to the salvaged area
	No salvage conducted	Welding	No, activity to be closely monitored and suspended, if warranted
	Blade width salvage conducted	Welding	No, activity to be closely monitored and suspended, if warranted
	Blade width salvage conducted	Trenching	No
	Blade width salvage conducted	Lowering-in	No, activity to be closely monitored and suspended, if warranted
	Blade width salvage conducted	Backfilling	Yes
	Blade width salvage conducted	Testing	No
	Topsoil/root zone material replaced	Testing	Yes, testing would not be initiated but would continue if filling with test water has begun
	Topsoil/root zone material replaced	Clean-up	Yes, heavy traffic not permitted; No, quad traffic likely acceptable

TABLE B.13-2 Cont'd

Land Use	Topsoil/Root Zone Material Salvage Status	Construction Activity	Suspend Activity for Environmental Issue?
Treed/Forested	No salvage conducted	Soils handling (topsoil/root zone material salvage/replacement)	Yes
	Topsoil/root zone material salvage in all areas outside of the construction right-of-way that will require grading	Materials storage and staging area	No
	Topsoil/root zone material replacement	Clean-up	Yes, heavy traffic not permitted; No, quad traffic likely acceptable

14.0 WILDLIFE ENCOUNTER CONTINGENCY PLAN

In the event of an encounter with wildlife during construction either at the construction site or on the commute to and from the construction site, follow the measures provided below.

- Report any incidents (*e.g.*, aggressive behaviour, nuisance behaviour, obtained food or garbage) with wildlife to the Environmental Inspector(s) who will immediately notify the appropriate regulatory authority and, if warranted the local police detachment (see Appendix D).

- Report any trapped, injured or dead animals onsite to the Environmental Inspector(s) who will notify the appropriate regulatory authority to consult on appropriate action.

- Report the location and details of collisions with wildlife to the Environmental Inspector(s), who will notify the appropriate regulatory authority and, if warranted, the local police detachment (see Appendix D).

- Once the preceding contacts have been made, the Environmental Inspector(s) will communicate the information to the Construction Manager.

- The Environmental Inspector(s) will document all wildlife encounters during construction in a detailed record. This record will include, at a minimum: date; weather conditions; location; wildlife species encountered; the type of encounter (*e.g.*, passive, aggressive, etc.); and, if applicable, any actions taken by Project staff to address the situation. Wildlife encounter records will be kept on file by Trans Mountain and provided to the appropriate regulatory authority and Aboriginal communities upon request.

15.0 WILDLIFE SPECIES OF CONCERN DISCOVERY CONTINGENCY PLAN

The following procedures provide contingency measures for the discovery of wildlife species of concern prior to and during construction. Wildlife species of concern include provincial or federally-listed species.

Wildlife Species of Concern Discovery Prior to Construction

In the event that wildlife species of concern or their site-specific habitat is discovered during wildlife or other studies along the construction right-of-way or other associated components (*e.g.,* borrow sites), the discovery will be assessed and appropriate mitigation measures will be determined by a qualified Wildlife Resource Specialist and as identified in Appendix L. The wildlife or habitat will be assessed based on the following criteria:

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

The mitigation measures to be implemented will be determined by a qualified Wildlife Resource Specialist and may include the following.

- Abide by seasonal timing constraints and the recommended setback distances.
- Abide by daily timing restrictions on construction activities.
- Narrow down the area of disturbance and protect the site using fencing or clearly mark the site using flagging (see Drawing [Narrowing Down Fencing] provided in Appendix R).
- Extend road or watercourse/wetland bores to avoid or reduce effects on the site.
- Inform all users of access restrictions in the vicinity of flagged or fenced sites.
- Realign the route or shift the development (*i.e.*, access road, ancillary site, etc.) within the staked boundaries to avoid the site.
- Install nest boxes or platforms or otherwise replace or enhance habitat during reclamation or restoration.
- Determine if a permit and/or regulatory consent is necessary, relocate individuals (*i.e.*, amphibians) or features (*i.e.*, unoccupied stick nests), if practical, and monitor the post-construction response.

The locations of important wildlife and wildlife habitat encountered along the construction right-of-way or associated components (*e.g.,* borrow sites) and appropriate mitigation to be implemented at each known site have been identified in Appendix L and on the Environmental Alignment Sheets. The pipeline EPP and the Environmental Alignment Sheets will be amended to reflect important wildlife environmental features on or in the vicinity of the construction right-of-way or construction site and will incorporate any new discoveries prior to construction.

Wildlife Species of Concern Discovery during Construction

Wildlife species of concern and their habitat characteristics that have the potential to occur within the Project area will be identified through the Environmental Education Program. The Lead Environmental Inspector(s) and the Environmental Inspector(s) will be provided with detailed information on identifying wildlife species of concern and their site-specific habitat.

In the event that wildlife species of concern or their site-specific habitat is discovered during construction, the discovery will be assessed and appropriate mitigation measures will be determined. Appropriate mitigation measures include:

- Suspend work immediately in the vicinity of any newly discovered wildlife species of concern. Do not resume work at that location until the measures below are implemented.
- Notify the Lead Environmental Inspector(s) and the Environmental Inspector(s) who will notify the Construction Manager.
- The Lead Environmental Inspector(s) will assess the discovery and either allow construction to resume or, in the event of a confirmed or potential discovery, proceed by notifying:
    - the appropriate regulatory authority; and
    - a qualified Wildlife Resource Specialist.

A qualified Wildlife Resource Specialist will assess the discovery and determine the appropriate mitigation measures to be implemented in consultation with the Environmental Manager and the appropriate regulatory authority. The Wildlife Resource Specialist will visit the site, if warranted.

ATTACHMENT B1

NATIONAL ENERGY BOARD DETAILED INCIDENT REPORT

National Energy Board
Calgary, Alberta

Appendix 1
DETAILED INCIDENT REPORT

Type or print in black pen

Board Use Only

NEB Incident No. _____ Date Received _____ NEB Investigator _____

Investigator's Comments _____

_____

_____

Secretary
National Energy Board
444 Seventh Avenue S.W.
Calgary, Alberta T2P 0X8 • Fax: (403) 292-5503

PART A - OPERATOR INFORMATION

Name of Company _____

Address of Company _____

_____

Pipeline Name _____

PART B - TIME, WEATHER AND LOCATION OF INCIDENT

Date *(month)* _____ *(day)* _____ *(year)* _____

Hour *(24 hour system & time zone)* _____

Weather *temperature*: *^{0}C precipitation*: _____ *windspeed & direction*: _____

CSA Class Location ☐1 ☐2 ☐3 ☐4

Location (provide specific location using a chainage description (MLV, kmP), land survey description or prominent landmarks)

_____

_____

_____

_____

PART C - ORIGIN OF SPILL/RELEASE

Facility Involved:

☐ Line Pipe ☐ Tank Farm ☐ Pump Station ☐ Compressor Station ☐ Regulator/Meter Station ☐ Gas Plant

☐ Other Related Facility *(specify)* _____

Equipment Involved:

☐ Pipe ☐ Valve ☐ Pressure relief device ☐ Fitting ☐ Compressor ☐ Pump ☐ Pressure vessel ☐ Tank

☐ Instrumentation

☐ Other *(specify)* _____

PART D - SPILLS AND RELEASES *(Report LVP and HVP spills only if in excess of 1.5 m^3)*

☐ Gas ☐ LVP ☐ HVP ☐ Toxic Substance

Name of product/substance _____

Volume spilled/released _____ m^3 Volume recovered _____ m^3

Was there a fire? ☐ Yes ☐ No Was there an explosion? ☐ Yes ☐ No

PART E - IMMEDIATE CAUSE FOR INCIDENTS ON OPERATING PIPELINES (*Immediate Cause: means unsafe acts or unsafe conditions*)

☐ Failed pipe ☐ Operator personnel error ☐ Other *(specify)* _____

☐ Failed weld ☐ External loading or natural forces Refer to Part H

☐ Corrosion Refer to Part G ☐ Equipment malfunction/failure Refer to Part I

PART F - LINE PIPE DATA

Type of Failure _____

Nominal Diameter (mm) _____ Wall Thickness (mm) _____ Date of Manufacture _____

Weld Process _____ SMYS (MPa) _____

Pipe Specification ☐ Z 245 ☐ Other *(specify)* _____ Pipe Location: ☐ Below Ground ☐ Above Ground

Maximum Operating Pressure (kPa) _____ Pressure at Time of Incident (kPa) _____

Latest Presure Test Date _____ Maximum Test Pressure (kPa) _____ Test Duration (hrs) _____

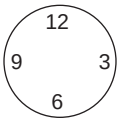
PART G - CORROSION FAILURES

Corrosion location: ☐ Internal ☐ External

Type of Corrosion *(specify)* _____

Type of Coating _____

Circumferential Position Looking Downstream (mark an X)



PART H - FAILURES DUE TO EXTERNAL LOAD OR NATURAL FORCES

☐ Damage by operator or its contractor ☐ Damage by other parties ☐ Earth movement ☐ Lightning/Fire

☐ Other (*specify*) _____

Name or Contractor/Other Party _____

Address _____

Telephone ( ) _____ Name of Representative _____

PART I - EQUIPMENT MALFUNCTION/FAILURE

Equipment _____ Manufacturer _____ Model# _____

Year Equipment Installed _____ Year Equipment Manufactured _____

PART J - ESTIMATE OF TOTAL INCIDENT COST *(Including repair, cleanup and restoration)*

$

PART K - REPAIR DESCRIPTION *(Description of all repairs to the pipeline made necessary by the incident and date of return to service of the pipeline)*

PART L - INJURY AND FATALITY DESCRIPTIONS

☐ Number of Fatalities ☐ Number of Serious Injuries

Serious Injury - includes an injury that results in: fracture of a major bone, amputation of a body part, loss of sight - one or both eyes, internal haemorrhage, third degree burns, unconsciousness, or loss of a body part or function of a body part

NAME	AFFILIATION	FATALITY OR INJURY DESCRIPTION AND CURRENT PATIENT CONDITION
	☐ Company Employee ☐ Contractor ☐ Public	
	☐ Company Employee ☐ Contractor ☐ Public	
	☐ Company Employee ☐ Contractor ☐ Public	
	☐ Company Employee ☐ Contractor ☐ Public	
	☐ Company Employee ☐ Contractor ☐ Public	
	☐ Company Employee ☐ Contractor ☐ Public	
	☐ Company Employee ☐ Contractor ☐ Public	
	☐ Company Employee ☐ Contractor ☐ Public	

PART M - IMMEDIATE INCIDENT CAUSE OF SERIOUS INJURY/FATALITY *(Immediate Cause - means unsafe acts and conditions)*

☐ Defective/inadequate safety devices, tools or equipment

☐ Improper operation of safety devices, tools or equipment

☐ Improper loading or placement

☐ Hazardous environment (gases, dust, smoke, fumes or vapours)

☐ Congested work area/disorderly workplace

☐ Other *(specify)*

PART N - NARRATIVE OF INCIDENT

Provide a complete description of the incident, including events leading up to, and following the incident. Also include additional information as specified in the guidelines to section 52 of the Onshore Pipeline Regulations. Attach any additional information that may supplement the narrative such as 1) drawing of the incident site 2) photographs 3) schematics 4) maps 5) reports (metallurgical, NDT, inspection, pressure test, etc.)

Attach additional sheets of narrative as required.

PART O - WITNESS INFORMATION

NAME _____ TELEPHONE NO. ( ) _____

_____ ( ) _____

_____ ( ) _____

_____ ( ) _____

_____ ( ) _____

PART P - BASIC CAUSES OF INCIDENT ***(Identify all basic causes contributing to the incident. Basic Cause - means the real or root causes of why the unsafe acts and unsafe conditions as described in the immediate cause occurred. Several Basic Causes may be assigned for one incident.)***

☐ Inadequate training ☐ Inadequate work standards or procedures ☐ Inadequate materials, tools or equipment

☐ Inadequate design/maintenance ☐ Non-compliance with work standards or procedures

☐ Other *(specify)* _____

Additional comments on selected basic cause: _____

_____

_____

_____

PART Q - CORRECTIVE ACTIONS TAKEN TO PREVENT SIMILAR INCIDENTS ***(If no corrective action taken, state reasons why)***

_____

_____

_____

_____

_____

_____

_____

_____

PART R - NAME OF PERSON CONDUCTING A COMPANY INCIDENT INVESTIGATION

Name _____

Title _____

Telephone ( ) _____ Fax ( ) _____

PART S - NAMES OF OTHER AGENCIES INVESTIGATING INCIDENT

Agency _____ Agency _____

Telephone _____ Telephone _____

Contact Name _____ Contact Name _____

Agency _____ Agency _____

Telephone _____ Telephone _____

Contact Name _____ Contact Name _____

PART T - NAME AND TITLE OF COMPANY REPRESENTATIVE FILING REPORT

Name _____ Signature _____

Title _____

Telephone ( ) _____ Fax ( ) _____ Date *(time)* _____ *(month)* _____ *(day)* _____ *(year)* _____

ATTACHMENT B2

SPILL SCENE CHECKLIST

Note: The following activities will be taken by the first person on the scene of a hazardous material spill or release or a spill of other potentially deleterious material into a watercourse or wetland or environmentally sensitive area, if feasible.

(a) Ensure personal safety and safety of others onsite and don appropriate personal protective equipment. _____

(b) If possible without further assistance, assess the safety hazards of the situation, control danger to human life and identify the composition (see Spill Report Form - next page) of the spilled material via the MSDS sheets that are available for each controlled substance. _____

(c) If feasible and safe to do so, remove any sources of ignition, cut off the source of the spill and initiate a release response plan (*i.e.,* control, contain and clean up). While efforts have been initiated to contain the spill, immediately notify the Trans Mountain Construction Manager, or designate and Environmental Inspector(s). If the Environmental Compliance Manager, or designate, cannot be immediately contacted, notify Trans Mountain's 24-hour Emergency Line. These people will, as required, contact the appropriate authority as well as applicable federal and provincial agencies and the NEB. _____

(d) Once the source has been cut off, attempt to contain the spilled material. _____

(f) If any of the above actions are beyond the capabilities at hand, do not hesitate to ask for qualified assistance. _____

(e) Take not of details such as time, location, material, volume, corrective actions, etc., for reporting criteria. _____

(f) In Alberta, a written report must be submitted directly to the Monitoring Division of the Alberta Energy Regulator within 7 days of verbally reporting an unrefined or refined product release, if the release has caused, is causing, or may cause adverse effect on the environment. If the release is fully contained onsite, or there are no adverse effects, then a written report is not required. In Alberta, a spill of 200 L or greater must be reported for all Class 3 (Flammable Liquids) spills. _____

(g) In BC, an immediate verbal report is required to the BC MOE 1-800-663-3456 (24-hour emergency line). Where requested to do so by an environment officer, a written report shall also be filed with the department. In BC, a spill of 100 L or greater must be reported for all Class 3 (Flammable Liquids) spills. _____

APPENDIX C

MANAGEMENT PLANS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ATTACHMENTS

1.0 ACID ROCK DRAINAGE MANAGEMENT PLAN

(PLACE HOLDER – To be developed prior to construction)

2.0 AGRICULTURAL MANAGEMENT PLAN

2.1 Agricultural Soil Pathogens - Clubroot Disease and Potato Cyst Nematode

2.1.1 Introduction

Trans Mountain acknowledges and understands the potential effects associated with the introduction and/or spread of clubroot disease and potato cyst nematode on cultivated lands as well as the health and biosecurity considerations of animal and nursery farms during pipeline construction activities. As such, Trans Mountain will implement appropriate mitigation measures to prevent the introduction and/or spread of clubroot disease and potato cyst nematode as well as health hazards associated with farming operations that are in line with prevention strategies being implemented by regulatory authorities, the counties/municipalities and the landowner.

Clubroot is a soil-borne disease caused by the plant pathogen *Plasmodiophora brassicae,* which affects canola, mustard and cole crops in the cabbage (*Brassicaceae*) family. It is considered a pest under Alberta's *Pest and Nuisance Control Regulation* and was first detected in Alberta in canola near Edmonton in 2003 and is known to sporadically affect cole crops in lower mainland BC. Clubroot disease is spread through resting spores in the soil, which can survive in a dormant state for up to 20 years. Symptoms will vary depending on the growth stage of the crop and when infection occurs. Infection at the seedling stage can result in wilting, stunting and yellowing of plants. In later stages, infected plants will ripen prematurely and seeds will shrivel, reducing yield and quality of crop. A common physical feature and identifier of clubroot is gall formation on the roots of affected plants (Alberta Agriculture and Rural Development 2010).

Potato cyst nematodes are small invertebrate roundworms that attach themselves to the roots of host crops of the nightshade (*Solanaceae*) family (*i.e.,* potatoes, tomatoes and eggplant). They can inhibit the development of host plants, causing substantial growth retardation and, under severe outbreaks, damage to the roots and early senescence of the plants. The two common species of potato cyst nematodes found in Canada are golden nematode (*Globodera rostochiensis*) and pale potato cyst nematode (*Globodera pallida*). These soil-borne pests are primarily spread through the movement of cyst-infested soils. A potato cyst nematode infection does not result in obvious or unique symptoms. However, secondary symptoms such as reduced root system growth due to nutrient deficiencies and water stress, wilting, yellowing and reduced plant size are common indicators of what may be a cyst infection. If a severe potato cyst nematode infection is present in the crop, extensive plant death leading to yield loss can occur (Canadian Food Inspection Agency 2012).

Potato cyst nematodes are considered pests under Alberta's *Pest and Nuisance Control Regulation* and regulated by the Canadian Food Inspection Agency under the *Plant Protection Act*. Currently, there are no regulations in place restricting access to potentially infected fields. However, if potato cyst nematode is confirmed at a given location, the Canadian Food Inspection Agency may put the field under regulation. Potato cyst nematode regulated fields are monitored for access and equipment/vehicle sanitation. Furthermore, any equipment moving off a Canadian Food Inspection Agency regulated field needs a Canadian Food Inspection Agency Movement Certificate.

There are three key publicly available documents that guide the approach for pipeline construction and/or equipment sanitation in Alberta and BC with regard to clubroot disease and potato cyst nematode spread prevention: 1) *Best Management Practices for Clubroot Disease Management* (CAPP 2008); 2) *Alberta Clubroot Management Plan* (Alberta Agriculture and Rural Development [AARD] 2010); and 3) *Best Management Practices for Preventing Potato Cyst Nematode Contamination* (Canadian Food Inspection Agency 2012).

Known Occurrences

TERA, on behalf of Trans Mountain, contacted Parkland and Yellowhead counties in Alberta and Fraser-Fort George, Thompson-Nicola, Fraser Valley and the Greater Vancouver regional districts in BC, which are traversed by the construction right-of-way, in order to gather information on clubroot occurrences as well as to discuss any concerns or information the regulatory authority representatives may have with regard to clubroot disease.

Table C2.1-1 summarizes the results of consultation regarding clubroot disease in the counties and regional districts traversed by the construction right-of-way.

In addition, through landowner consultation, Trans Mountain has identified one cultivated field near Spruce Grove, Alberta that may be potentially contaminated with potato cyst nematode (Table C2.1-2).

TABLE C.2.1-1

SUMMARY OF COUNTY AND REGIONAL DISTRICT AREAS WITH KNOWN CLUBROOT OCCURRENCES ALONG THE PROPOSED PIPELINE CORRIDOR

County/ Municipal District/ Regional District	Information Source	Method of Engagement	Date of Consultation Activity	Consultation Outcomes
Parkland County, Alberta	James Leskiw, Supervisor, Agricultural Agronomics	Email/Phone	April 17 to 22, 2013	Clubroot disease has been identified at 149 locations in Parkland County. Follow the *Alberta Clubroot Management Plan* (AARD 2010).
Yellowhead County, Alberta	Sonja Pichette, Agricultural Services Coordinator	Email	April 17 to 23, 2013	Yellowhead County has three fields with confirmed clubroot disease in the Evansburg North area. Once a detailed route with specific locations is confirmed, contact Ms. Pichette for exact clubroot locations. The county strongly recommends communicating with landowners for specific clubroot cleaning protocols. Follow the *Alberta Clubroot Management Plan* (AARD 2010).
Fraser Valley, BC	Vippen Joshi, Diagnostic Plant Pathologist	Email	March 5, 2013	Clubroot found in cole crops. No regulations or standard practices in place for clubroot. Follow the *Alberta Clubroot Management Plan* (AARD 2010).

TABLE C.2.1-2

SUMMARY OF KNOWN POTATO CYST NEMATODE OCCURENCES ALONG THE PROPOSED PIPELINE CORRIDOR

Location	Information Source	Method of Engagement	Date of Consultation Activity	Consultation Outcomes
Near Spruce Grove, Alberta	Dennis Worobec, Land Manager (Progress Land Services). Cheryl Dembicki-Lep, Plant Programs Specialist Inspector.	Email	February 4 to March 8, 2013.	Progress Land Services was informed of a potato field being under Canadian Food Inspection Agency investigation for potato cyst nematode. Canadian Food Inspection Agency is not currently regulating this location. Please follow *Standard Practices for Preventing Potato Cyst Nematode Contamination* (Canadian Food Inspection Agency 2012).

Risk of Contamination

Cultivated fields that are (or have been) planted to canola or potatoes are at a higher risk for clubroot disease or potato cyst nematode, respectively, than forested or undisturbed pasture land. Activities conducted on subsoil or frozen, snow-covered lands are at lower risk than activities conducted on topsoil. Field approaches, headlands and low wet areas possess a higher potential for clubroot disease and potato cyst nematode, however, occurrences are not limited to these locations. Generally, the risk of clubroot disease is higher along the eastern (Parkland County, Alberta) end of the construction right-of-way, where there are many confirmed cases of clubroot and lower western BC (Greater/Metro Vancouver Regional District, BC). The risk of spreading potato cyst nematode is low, as the contamination is not yet confirmed and limited to a single location.

The levels of risk for the Project activities spreading clubroot disease and potato cyst nematode are listed below.

- The highest risk activities on a pipeline construction site are activities that involve topsoil disturbance and work on recently disturbed topsoil (*e.g.*, topsoil salvage and replacement, harrowing or seeding).

- Activities that occur on the surface of topsoil (*e.g.*, pre-construction surveys) also involve some risk, however, at a lesser scale.

- Activities that occur on subsoil, where topsoil has been salvaged (*e.g.*, trenching, backfilling, etc.), are considered to be very low risk. Similarly, activities on gravel or road surfaces are very low risk.

Prevention Strategy

The philosophy behind preventing the spread of clubroot disease and potato cyst nematode is to ensure that topsoil from one field that may be contaminated with a soil-borne disease is not transported to any other cultivated fields. The best available mitigation is to clean equipment involved in topsoil handling, such that topsoil is not carried from land to adjacent land, and/or from county/regional district to county/regional district.

Cleaning Station Types

As presented in the *Alberta Clubroot Management Plan* (Alberta Agriculture and Rural Development 2010), the *CAPP Best Management Practices for Clubroot Disease* (CAPP 2008) and the Canadian Food Inspection Agency *Best Management Practices for Preventing Potato Cyst Nematode Contamination* (Canadian Food Inspection Agency 2012), clubroot disease and potato cyst nematode prevention involves a phased sanitation approach. Specifically, the rough cleaning, fine cleaning and disinfection phase are all part of the clubroot and potato cyst nematode management program.

- Rough Cleaning - Scrape off any soil or crop debris from openings, tires and wheels (*i.e.,* manually with a shovel, brush or broom). Air compressors are another form of rough cleaning that further assists in the removal of soil.

- Fine Cleaning – Pressure wash vehicles, paying extra attention to areas where soil can accumulate (*i.e.,* tires or undercarriage). Turbo nozzles and the addition of an industrial detergent may enhance the degree of soil removal.

- Disinfection – Mist equipment and/or vehicles with 1-2% bleach solution. Where feasible, allow contact with bleach solution for approximately 15 to 20 minutes (keep areas wet by re-applying).

Cleaning Station Location Selection

Cleaning stations, including the type and location, will be identified prior to construction. Equipment cleaning is important not only for the prevention of the spread of soil-borne diseases, but also for the prevention of the spread of Noxious weeds. As a result, cleaning station locations will be influenced by the results of the pre-construction weed survey. County/regional district consultation and landowner requests will also influence the cleaning station types and location. At minimum, it is anticipated at this time that fine cleaning and disinfection will be required at county/regional district boundaries and prior to leaving the location under Canadian Food Inspection Agency potato cyst nematode investigation.

The Environmental Alignment Sheets will identify preliminary cleaning station locations based on pre-construction weed survey findings and preliminary consultation results. However, stations may be moved, added or removed by the Environmental Inspector(s) to reflect the most up-to-date and appropriate mitigation measures for Project activities. In the event that clubroot disease or potato cyst nematode is identified during the course of construction along the construction right-of-way, the situation will be reassessed and appropriate mitigation measures will be taken (*i.e.,* additional cleaning stations).

2.1.2 General Clubroot and Potato Cyst Nematode Mitigation

- Work and traffic on topsoil will be minimized between quarter-sections and during wet conditions, to the extent feasible. Extra caution will be taken regarding topsoil transfer on slightly wet soil and working in very wet soil conditions will be avoided, where possible.

- Avoid the use of straw, hay or topsoil imported from infested or suspicious areas.

Foot Traffic

- When travelling on foot, remove excess topsoil from footwear and any equipment (*e.g.,* shovels) before moving between cultivated quarter-sections. When working in high risk areas or when requested by the landowner, this may include wearing disposable booties.

Vehicles and Equipment

- All equipment will be fine cleaned and disinfected prior to mobilization to the construction right-of-way.
- Ensure that all vehicles, ATVs and equipment driving on topsoil (*i.e.,* before topsoil has been salvaged or after topsoil has been replaced) or involved in topsoil handling activities, arrive daily, onsite, in a clean condition.
- During construction activities, equipment involved in clearing/brushing and topsoil handling will be cleaned at designated cleaning stations, either with compressed air or with a power wash plus disinfectant misting. Cleaning station locations and type will be identified prior to construction.
- If work is conducted in a high risk clubroot area/county and then equipment is mobilized to start work in a different area/county, a thorough cleaning will be performed prior to starting again on the new location.
- Rough cleaning using shovel and sweep cleaning to remove obvious clumps of soil is recommended between cultivated fields and quarter-sections (*e.g.,* at changes in land use and/or at road crossings) as a minimum measure in high risk locations such as Parkland County, Alberta to prevent movement of topsoil from one landowner to the next.

Communication/Documentation

- The above clubroot and potato cyst nematode prevention strategy, including expectations and cleaning station locations, will be communicated to the Contractors via the Environmental Education Program, EPP and associated Environmental Alignment Sheets.
- Trans Mountain will document process changes and updates that arise during construction (*i.e.,* landowner requests and updates to consultation with respect to clubroot disease and potato cyst nematodes) such that any revisions to the cleaning protocol can be communicated to the Contractor.
- The Contractor will develop a documentation process to track compliance with the cleaning protocols in terms of what equipment/vehicles were cleaned, how and where.

2.2 Nursery, Poultry, Dairy and Livestock Operations

2.2.1 Introduction

Nurseries

Nurseries in BC have two biosecurity programs that are in place for most nursery operations. The Clean Plants program is a voluntary program administered by the Canadian Nursery Certification Institute. This program requires nurseries to identify and implement appropriate biosecurity and traceability systems based on the level of risk at the nursery.

The second program is the Canadian Nursery Certification Program that is an export certification program developed, managed and audited by the CFIA. This program has very stringent biosecurity, internal and external audit, and traceability requirements.

Poultry Operations

The Biosecurity Management Plans of poultry facilities must be adhered to during the Project to protect the livestock on farms traversed by the construction right-of-way.

Poultry operations have a controlled access zone (CAZ) which is the area of land (including buildings) constituting the poultry-production sector on the premises (*i.e.,* yard around the poultry building) that is

accessible through a securable and controlled access point (CAP). A CAP is a visually defined entry point through which workers, equipment, feed truck, etc. can enter. Poultry operations may have one or more CAPs, which are typically in the form of a locked gate.

The restricted access zone (RAZ) is the area inside the CAZ that is used, or intended to be used, to house poultry, including semi-confined and range production, and where personnel and equipment access is more restricted than in the CAZ. The RAZ is sometimes referred to as the "production area" or "restricted area". Generally the RAZ is located inside a barn or other facility where birds are housed. Entry to the RAZ is through a CAP (*i.e.,* sanitation area or dressing room) where personnel may be required to don coveralls and/or change their foot wear. The RAZ **will not** be accessed prior to or during pipeline construction.

Dairy and Livestock Operations

Biosecurity for dairy and livestock operations is mandated nationally for out of country equipment and personnel. Nationally, the Canadian Food Inspection Agency restricts direct travel from foreign countries to Canadian farms until after a specified waiting period. As well clothing and footwear must be disinfected.

Known Occurrences

There are four locations where poultry farms are found adjacent to the construction right-of-way and where access to the CAZ may be required. It is not expected that TMEP personnel will need to enter the RAZ, as the buildings and production areas are outside the construction right-of-way. However, in case of organic poultry production the RAZ will extend to the poultry pasture. Trans Mountain has identified one organic turkey operation, at KP 1074.8, where TMEP personnel may need to access the production areas within an organic turkey pasture.

2.2.2 Nursery Operations

Pipeline construction through nurseries has the potential to disrupt irrigation, drainage and water recycling systems. Large outdoor container nurseries contain very sophisticated facilities that include automated container movement, planting and harvesting equipment, as well as complicated irrigation, drainage and return water recycling systems.

Field nurseries contain shrubs and trees growing within the field soil, irrigation main, sub-main, laterals, and drain lines would be disturbed during construction.

Pre-Construction Mitigation

- Provide ample notice to the nursery operator, especially of a highly sophisticated nursery, in order to find an alternative location and to separate above ground infrastructure. Ample notification could be as long as 2 years.

- Personnel must identify themselves to the nursery owner or manager who will inform them of the required biosecurity requirements (at a minimum will be sterilized footwear) as identified in the nursery's Biosecurity Management Plan for pre-construction work (*e.g.,* removal and re-establishment of nursery infrastructure at another location on the property, weed management, staking, surveying, etc.) on the construction right-of-way prior to topsoil salvage (see Subsection 1.1.1).

Construction Mitigation

- Place biosecurity signs at access points to the construction right-of-way prior to topsoil salvage on nursery lands to ensure biosecurity measures are implemented prior to leaving nursery lands or entering a nursery with equipment or vehicles that have the potential to contain soil or vegetation debris containing *Phytophthora morum*.

- Parking lots will be outfitted with disinfectant foot baths or mats and clear signage will be posted.

- All work around nurseries will have restricted access of vehicles and staff. Setting up parking areas on public roads or along the construction right-of-way outside the nursery property will be implemented, where required.

- Avoid importing plants, soil or organic matter onto nursery lands during pipeline construction.

- Ensure equipment has been washed and sterilized if it has been in another nursery. If it has not been in another nursery, normal procedures for topsoil salvage will be followed as outline in the EPP. When working on subsoil, washing and sterilization of equipment will be required when equipment has been on another nursery.

- Maintain a detailed record of sanitation activities conducted on the construction right-of-way on nursery lands.

- Re-establish nursery infrastructure to the pre-construction state.

- Replace potted or trenched-in dormant plants, re-establish plant support structures and drip irrigation systems and drainage or recycling systems.

Post Construction Mitigation

- Complete consultations with the nursery as part of the Post-Construction Environmental Monitoring (PCEM) Program to determine if infrastructure is operating efficiently following removal and re-establishment during construction as well as to determine if *Phytophthora morum* has been identified within nursery plants.

Special Equipment/Materials

- The following special materials and equipment may be necessary:

  - *Phytophthora morum* cleaning stations including air compressor, shovels and possibly high pressure water/steam (*i.e.,* water tank and pressure washer and skid plate matting) and chemical misting of equipment or personnel footbaths;

  - signs identifying biosecurity requirements for each nursery traversed by the Project to identify issues/key mitigation to construction personnel;

  - the required expertise to remove and re-establish nursery infrastructure in a timely, efficient and technically competent manner; and

  - specialized equipment and technical personnel required to facilitate the removal of nursery plants from the temporary storage area and back into the production field, re-establish plant support systems and irrigation and drainage systems in a timely, efficient and technically competent manner.

Further Information

- Section 7.0 of the EPP provides additional information related to equipment and vehicle cleaning prior to entering or leaving fields.

- Follow mitigation measures outlined for equipment cleaning (see Drawing [Equipment Cleaning - Compressed Air and High Pressure Water] in Appendix R) as well as the Agricultural Management Plan (see Appendix C).

- Known locations where specific mitigation related to *Phytophthora morum* and infrastructure removal s to be implemented are identified on the Environmental Alignment Sheets.

- The Line List will identify known lands that are nurseries and any special biosecurity management and other mitigation measures requested by the landowner on those lands.

2.2.3 Poultry, Dairy and Livestock Operations

Pipeline construction through livestock facilities has the potential to disrupt water supply, manure handling, and animal enclosures. Local beef and dairy farmers are sensitive to equipment that is

transported directly to their farm from out of province locations. Such equipment must be washed and disinfected prior to entering the farm property if it has not been previously cleaned.

Pre-Construction Mitigation

- Provide ample notice to the farm operator to arrange for the relocation of animal enclosures, the removal from the premises of livestock sensitive to sound and vibration, and the continuation of livestock watering facilities and infrastructure. Schedule construction operations around farm practices that are sensitive to disturbance (such as milking of dairy cows). Ample notification could be as long as 2 years.

Poultry

- Provide 4 to 6 months notice to the poultry farm operator to allow them to arrange to lease out their quota in case barns must be emptied (area up to 150 m from the centre of the pipe).
- Surveyors must access via the CAP and identify themselves to the farm owner or manager who will inform them of the required biosecurity which, at a minimum, will be sterilized footwear.
- All personnel entering dairy and livestock operations from foreign farms will have disinfected clothing and footwear.
- Any equipment transported from other province locations will be washed and disinfected prior to entering the farming operation.

Construction Mitigation

- Rebuild livestock enclosure and re-install water supply.
- Allow for manure handling and transport during the construction phase (dairy).

Poultry

- Place biosecurity signs at access points to the construction right-of-way.
- Parking lots will be outfitted with disinfectant foot baths or mats and clearly signed.
- Ensure equipment has been washed and sterilized if it has been within the CAZ of another poultry farm prior to or after topsoil salvage within the CAZ.
- If personnel were previously on another poultry farm and within the RAZ, they will have a complete change of clothes before entering the CAZ.
- Maintain a detailed record of sanitation activities conducted on the construction right-of-way on the CAZ.
- All work around poultry farms will have restricted access of vehicles and staff. Setting up parking areas on public roads or along the construction right-of-way outside the CAZ will be implemented, where required.

Post-Construction Mitigation

- Complete consultations with farm operators, farm owner or manager as part of the PCEM Program to determine if infrastructure is operating efficiently following removal and re-establishment during construction.

Special Equipment/Materials

The following special materials and equipment may be necessary.

- Specialized equipment and technical personnel required to facilitate the removal of livestock from the construction right-of-way and back into the re-build enclosures, re-establish water supply systems and irrigation in a timely, efficient and technically competent manner.

Poultry

- Cleaning stations including shovels, compressed air, high pressure water/steam (*i.e.*, water tank and pressure washer and skid plate matting) and chemical misting of equipment.

- Signs identifying biosecurity requirements for each poultry farm will be required to identify issues/key mitigation measures to construction personnel.

Further Information

- Known locations where specific mitigation measures related livestock infrastructure is to be implemented are identified on the Environmental Alignment Sheets.

Poultry

- Section 7.0 of the EPP provides additional information related to equipment and vehicle cleaning prior to entering or leaving fields. Normal topsoil management and weed control procedures, as identified in the EPP, will apply on poultry farms outside the CAZ.

- Follow mitigation outlined in the equipment cleaning drawing (see Drawing [Equipment Cleaning – Compressed Air and High Pressure Water] in Appendix R) as well as the Environmental Alignment Sheets.

- The Line List will identify poultry farms and any special biosecurity management measures requested by the landowner on those lands.

2.3 Agricultural Lands and Farming Operations

The following provides a summary of the key mitigation measures to be implemented during construction. These issues include:

- organic farms;
- berry crops (*e.g.* blueberries, raspberries, cranberries and Saskatoon berries);
- dry natural grazing lands;
- sub-surface drains; and
- irrigation.

2.3.1 Organic Farms

Issues and Mitigation Measures

The potential for introduction of weeds by construction equipment and vehicles is one of the greatest concerns with organic farms since these farms do not use herbicides and, consequently, any introduced weeds will likely require a substantial amount of physical effort and cost to control.

Organic farms typically require three or more years that are herbicide, pesticide, chemical fertilizer and other contaminant-free to obtain their certification as "organic". In some cases, a field may not be designated as organic although the farmer may have initiated the certification process. Due to the length of time required to obtain an organic certification, lands will be encountered that are in the process of becoming certified organic. Therefore, any circumstances (*e.g.,* accidental application of herbicide) that results in starting the process again from year zero or require the farmer to physically control introduced weeds will result in substantial effort and costs to the landowner.

Lands used for organic farms are generally some of the lands with the highest agricultural capability in the area.

An inadvertent application of herbicide, fertilizer or spill of fuels/lubricants, etc. on these lands during construction would likely result in a loss of certification status and substantial long-term reduced earning potential for the entire field.

Construction activities may also result in the creation of weed habitat (*e.g.,* on topsoil/root zone material windrows), which could result in increased weed content on immediately adjacent lands and reduced crop values on the land.

Pre-Construction Mitigation

- Conduct weed surveys on all agricultural lands along the pipeline route and develop mitigation measures based on the results of the surveys.

- Identify on the Environmental Alignment Sheets and the Line List known locations where organic farms and farms transitioning into organic are encountered and also note any special requests related to cleaning of equipment.

Construction Mitigation

- Clean all construction equipment prior to its arrival on the construction right-of-way in order to minimize the spread of weeds. Determine the type of cleaning required based on information in the Line List and the Environmental Alignment Sheets. The use of shovel cleaning supplemented by high pressure air wash stations is the method recommended at most locations along the route where a wash station is required, however, organic farm landowners may request high pressure water or steam cleaning. Equipment that leaves the organic field and returns is to be re-cleaned.

- Install signs to notify construction personnel of the organic farm lands as well as key traffic restrictions, cleaning requirements, refuelling/servicing restrictions and prohibited materials.

- Restrict traffic on the affected fields to equipment/vehicles actively involved in construction on those fields.

- Ensure one-way vehicle travel along the construction right-of-way. Inspector(s) may be used to monitor traffic and vehicle cleaning to minimize the number of cleaning stations and reduce the risk of weed introduction.

- Prohibit refuelling/servicing of equipment/vehicles on organic fields unless otherwise approved by the landowner.

- Prohibit the installation of waste collection receptacles or portable toilets on the organic fields.

- Ensure a tarp is used when working on organic fields to collect all bevel shavings.

- Salvage topsoil/root zone material from the full right-of-way during non-frozen conditions where localized weed infestations are encountered and contain the subsoil pile containing Noxious weeds to prevent mixing with the surrounding soil during regrading and final clean-up.

- Monitor topsoil/root zone material piles for weed growth during the course of construction and implement corrective measures (*e.g.,* hand pulling) if warranted. The use of herbicides will be prohibited.

- Install additional erosion and sediment control measures prior to or during wet conditions and extreme weather events, to ensure the protection of sensitive environments. Where necessary, cover soil stock piles with a suitable material (*i.e.,* geotextile, polyethylene tarps, etc.) and secure properly to reduce the risk of nutrient leaching and sedimentation from these locations.

- Record any sites where equipment is cleaned due to concerns associated with weeds and monitor during the following growing season. Control weed growth using physical measures, if warranted.

- No application of fertilizer on organic fields will be permitted unless otherwise requested by the landowner.

Post-Construction Mitigation

- The post-construction environmental monitoring program will assess weed type and density, as well as recommend any corrective measures to manage weeds.

Special Equipment/Materials

- The following special materials and equipment may be necessary:

  - weed cleaning stations including air compressor, shovels and possibly high pressure water/steam (*i.e.,* water tank and pressure washer and skid plate matting) and extra temporary workspace; and

  - signs to identify issues/key mitigation to construction personnel.

Further Information

- Section 7.0 of the EPP provides additional information related to minimizing weed introduction that apply to all lands.

- Follow weed mitigation measures outlined in the equipment cleaning drawing (see Drawing [Equipment Cleaning – Compressed Air and High Pressure Water] in Appendix R) the Line List, the WVMP (see Appendix C) and the Environmental Alignment Sheets.

- Known locations where specific mitigation related to weed control/prevention is to be implemented are identified on the Environmental Alignment Sheets.

- The Line List will identify known lands that are organic farms and any special weed control or traffic management measures requested by the landowner on those lands.

2.3.2 Berry Crops (Blueberries, Raspberries, Cranberries and Saskatoon Berries)

Issues and Mitigation Measures

Pipeline construction through berry crops has the potential to disrupt:

- irrigation and drainage systems;

- water management and harvesting systems;

- artificially layered soil systems in cranberry bogs; and

- plant support structures.

Pre-Construction Mitigation

- Provide ample notice to the farm operator to arrange for the dormant digging and potting or trenching-in, storage and maintenance (*e.g.,* watering, pruning and pest management) of berry plants that are removed from the construction right-of-way. Ample notification could be as long as 2 years.

Construction Mitigation

- Monitor for dust especially during the flowering, fruit-set and ripening periods and implement dust suppressing methods in consultation with the land owner/farm operator, where required.

- Replace potted or trenched-in dormant plants, re-establish plant support structures and drip irrigation systems; for cranberries, repair/replace containment dykes and layered soil systems.

Post-Construction Mitigation

- Complete consultations with the farm operator as part of the PCEM Program to determine if plants are re-establishing and infrastructure is operating efficiently following removal and re-establishment during construction.

Special Equipment/Materials

- The following special materials and equipment may be necessary:

  - dust suppression equipment, such as water trucks, for the application of water on work and travel areas or the application of tackifier on topsoil storage piles; and

  - specialized equipment and technical personnel required to facilitate the removal of berry plants from the temporary storage area and back into the production field, re-establish plant support systems and irrigation in a timely, efficient and technically competent manner.

Further Information

- Known locations where specific mitigation related to dormant berry plant and infrastructure removal is to be implemented are identified on the Environmental Alignment Sheets.

- The Line List will identify known lands that are berry production fields and any special mitigation identified by the landowner on those lands.

2.3.3 Dry Natural Grazing Lands (Interior British Columbia)

Issues and Mitigation Measures

The potential for introduction of weeds by construction equipment and vehicles and the loss of topsoil/root zone material due to soil erosion by wind and water are some of the greatest concerns with dry pasture lands as weed management is difficult to implement in these areas and surface soils are often low in soil organic matter and nutrients, and are difficult to revegetate.

Livestock grazing is controlled by fencing and the location of water resources within pastures. Construction activities may temporary limit the use of pastures and pasture areas (often large areas) if movement corridors and water resources are cut-off.

As a result of generally low plant available soil moisture on dry pasture lands, vegetation cover re-establishment on construction disturbances can take up to seven years for grass to attain full production. In addition, establishing grass vegetation attracts livestock and causes excessive trampling and damage to right-of-way vegetation without proper fencing.

Pre-Construction Mitigation

- Conduct a weed survey on all native pasture and grasslands along the pipeline route and develop mitigation measures based on the results of the survey.

- Implement weed management (*i.e.,* using proper application of chemical, mechanical or manual measures, or a combination of all) at locations identified within the pre-construction weed survey to a level that is consistent with weed management observed adjacent to the eventual construction right-of-way to reduce the potential for weed infestations following construction.

- Develop seed mixes for use during construction reclamation in consultation with a Grassland Ecologist Resource Specialist to ensure suitable grass species are selected to facilitate long-term vegetation cover establishment.

- Determine through consultation with landowners and land users where temporary water resource developments will be required in pastures and where temporary fencing will be located to prevent the over-grazing of establishing vegetation on the construction right-of-way.

Construction Mitigation

- Clean all construction equipment prior to its arrival on the construction right-of-way in order to minimize the spread of weeds. Determine the type of cleaning required based on information in the Line List.

- Implement construction weed management based on the results of the weed survey prior to construction.

- Assess the wind erosion hazard, competency of the sod and potential for soil pulverization due to droughty soils. Notify the Contractor, if measures applicable to droughty, wind erodible soils or where the biological soil crust has been disturbed (*i.e.,* Lac du Bois area), will apply to avoid or reduce the effect of soil pulverization and wind erosion (see Soil/Sod Pulverization Contingency Plan in Appendix B).

- Retain sod and the vegetation mat on all lands if a competent sod layer exists. In these areas, grade only where safety considerations dictate in order to reduce disturbance to sod and the vegetation mat. Grading of well-sodded lands will not be permitted on level terrain in these areas.

- Salvage topsoil in areas of equipment and vehicle travel where it is determined that soils may be prone to pulverization (see Soil/Sod Pulverization Contingency Plan in Appendix B).

- Tackify or apply water or pack the topsoil windrow with a sheep foot packer or other approved equipment, if the assessment by the Environmental Inspector(s) indicates that soils are likely to be prone to erosion by wind (see Soil Erosion and Sediment Control Contingency Plan in Appendix B).

- Where sod/topsoil was salvaged to facilitate grading, install subsoil cross ditches and berms on steep and moderate slopes on pasture lands in order to prevent runoff along the construction right-of-way and subsequent erosion. Exact locations of berms will be determined in the field, however, general locations where berms will be installed are shown on the Environmental Alignment Sheets. Tie berms into existing erosion control structures on adjacent right(s)-of-way. Install berms immediately downslope of all trench breakers installed on slopes (see Drawing [Cross Ditches and Diversion Berms] provided in Appendix R).

- Install temporary sediment fence, where warranted, to control sedimentation prior to final clean-up and the establishment of permanent erosion and sediment control measures (see Drawing [Sediment Fence] provided in Appendix R).

- Avoid scalping of the sod layer during topsoil replacement on pasture lands. Use specialized equipment (*e.g.,* clean-up bucket) that limits the risk of scalping during the final pass of topsoil replacement and is approved by the Environmental Inspector(s) and the Environmental Inspector(s).

- Determine the extent of disturbance to pasture lands (*e.g.,* compaction, rutting, etc.) and prepare the surface prior to seeding as per discussions with the Lead Environmental Inspector(s) and the Environmental Inspector(s).

- Install erosion control blanket, coir/straw logs, tackifier/hydromulch, crimped straw or a cover crop (annual/biannual cereal or short-lived perennial grass species) on exposed moderately to highly erodible soils where there is potential for water or wind erosion prior to re-establishment of vegetation.

- Revegetation of lands in the Agricultural Land Reserve in BC must be done in accordance with General Order 293/95, Oil and Gas Exploration, Well Sites and Pipelines in the ALR.

- Seed lands outside of the ALR in BC with native and non-native seed mixes developed for the Project that is based on vegetation field survey data.

- Install temporary fences, if warranted, to restrict livestock grazing and trampling of the seeded construction right-of-way until vegetation becomes established or less palatable.

Post-Construction Mitigation

- The post-construction environmental monitoring program will assess for weed infestations, soil erosion and vegetation establishment, as well as recommend any corrective measures to manage weeds, reduce soil erosion and promote vegetation cover establishment.

Special Equipment/Materials

- The following special materials and equipment may be necessary:

  - weed cleaning stations including air compressor, shovels and possibly high pressure water/steam (*i.e.,* water tank and pressure washer and skid plate matting) and extra temporary workspace;

  - signs to identify issues/key mitigation to construction personnel;

  - erosion and sediment control materials (*e.g.,* hydromulcher/tackifier, erosion control blanket, coir logs, straw/straw spreader/crimper, sediment fencing and cover crop seed/seed applicator); and

  - suitable temporary fencing to restrict livestock access to the construction right-of-way during the revegetation period.

Further Information

Section 7.0 of the EPP provides additional information related to minimizing weed introduction that apply to all lands.

Follow weed mitigation measures outlined in the equipment cleaning drawing (see Drawing [Equipment Cleaning – Compressed Air and High Pressure Water] in Appendix R), the Line List, the WVMP (see Appendix C) and the Environmental Alignment Sheets.

Known locations where specific mitigation related to weed control/prevention is to be implemented will be identified on the Environmental Alignment Sheets.

The Line List will identify known lands that are organic farms and any special weed control or traffic management measures requested by the landowner on those lands.

2.3.4 Sub-surface Drains

Issues and Mitigation Measures

Inadvertent damage to sub-surface drains is one of the greatest concerns for landowners with sub-surface drain systems. Damaged tiles could result in ineffective drainage which can lead to accessibility restrictions and loss of crops. Repairs and restoration of sub-surface drain systems can result in substantial effort and costs to the landowner.

- Pre-construction Mitigation identifies fields with sub-surface drains and prepares a surveyed right-of-way profile prior to construction. The survey will be used in restoring these lands to their pre-construction contours so that drainage and farm operations are not disrupted following reclamation.

- Determine sub-surface drain locations and conduct a depth survey (depths required).

Construction Mitigation

- Excavate the trench so that the pipeline may be laid over or under the tile with a minimum clearance of 30 cm. Although a sub-surface drain specialist will be retained to address sub-surface drain repair, the specific method of repair will be established in consultation with the landowner.
- For sub-surface drains that are cut:
  - retain a sub-surface drain specialist to make all repairs;
  - identify the location of the damaged tile at the trench and at both sides of the construction right-of-way;
  - install a temporary flume if needed to maintain drainage;
  - cap the ends to prevent drains clogging with soil or debris; and
  - keep caps in place until the damaged tile is repaired.
- Determine if any sub-surface drains crossed during trenching activities were damaged prior to backfilling.
- Use a sewer rod or pipe snake to probe open ends of tiles and repair any damaged tiles by inserting a competent support (*e.g.,* length of solid pipe) around the tile to prevent settling. If damage is extensive, remove broken tile and replace with new tile.
- Repair sub-surface drains damaged during construction to pre-construction condition or better, and secure connections with existing tile.
- Backfill around sub-surface drains in lifts and compact each lift.

Post-Construction Mitigation

- Prepare a surveyed construction right-of-way of reclaimed lands and compare with the pre-construction profile. Recontour if warranted.
- Provide the landowner with a copy of the as-built drainage plans specific to the repaired or reclaimed areas.
- Inspect and monitor the site during the first growing season to address differential settlement on the trench and subsurface drainage around the pipe.

Special Equipment/Materials

- The following special equipment may be necessary:
  - sewer rod or pipe snake.

Further Information

- Known locations supporting sub-surface drain systems will be identified on the Environmental Alignment Sheets.
- The Line List will also identify known lands that support sub-surface drains and any special management measures requested by the landowner on those lands.

2.3.5 Irrigated Lands

Issues and Mitigation Measures

There are four types of irrigation crossed by the pipeline, namely flood irrigation, wheel move, pivot and drip irrigation.

Inadequate subsoil compaction is one of the greatest concerns for landowners with irrigation systems. For landowners with flood irrigation, a change in the contour of the land crossed by the construction right-of-way due to compaction issues could result in ineffective irrigation, erosion of the trench and loss of crops. Lost time associated with a sunken wheel at the location where the pivot crosses the construction right-of-way could result in flooding and irreparable damage to crops at critical growth stages. Although mitigation on irrigated lands will be addressed during pre-construction, construction and post-construction periods, specific mitigation methods will be established in consultation with the landowner.

Pre-Construction Mitigation

- Prepare a surveyed construction right-of-way profile prior to construction on flood irrigated lands. The survey will be used in re-establishing these lands to their pre-construction contours so that irrigation operations are not disrupted following reclamation.

- Develop a strategy for the reconnection of the main irrigation water supply to high value perennial nursery, berry or field crops where the construction right-of-way has isolated a portion of the production field.

Construction Mitigation

- Schedule construction to avoid the irrigation season, if feasible, and unless otherwise approved by Trans Mountain and the landowner.

- Install trench breakers on flood irrigated lands, where warranted, to force groundwater seepage along the pipeline trench to the surface.

- Install temporary sack trench breakers on long slopes on flood irrigated fields, where warranted, when built during frozen conditions.

- Minimize the time the trench is left open during frozen conditions to avoid backfilling frozen subsoil.

- Backfill the trench on flood irrigated land in two (minimum) separate lifts. Compact after each lift.

- Ensure that no trench crown is left on flood irrigated lands and that the right-of-way and border dikes are returned to their pre-construction profile.

- Backfill the trench on pivot irrigated lands using appropriate trench compaction measures to avoid trench subsidence and to ensure grades are re-established to pre-construction profile. Special attention to the pivot wheel crossing locations will be required to avoid future disruption of irrigation equipment operation. This may include compacting in lifts at these locations or the installation of a special crossing plate or other bridging material, if approved by the landowner.

- Re-establish permanent field sprinkler or drip irrigation systems in high-value production fields (*e.g.,* nurseries, berry crops, etc.).

Post-Construction Mitigation

- Inspect and monitor the trench on flood irrigated lands before and during the first irrigation season to determine the success of the trench compaction and right-of-way profile re-establishment.

- Inspect and monitor the trench on pivot irrigated lands before and during the first irrigation season to determine the success of the trench compaction and levelling.

Special Equipment/Materials

- The following special equipment may be necessary:

  - specialized trench packing equipment on pivot irrigated lands; and

  - steel plates, if warranted, at pivot wheel crossings of the trench.

Further Information

- Known locations of irrigated lands will be identified on the Environmental Alignment Sheets.
- The Line List will identify known irrigated lands and any special management measures requested by the landowner on those lands.

3.0 HORIZONTAL DIRECTIONAL DRILLING/TRENCHLESS PLANNING AND PROCEDURES MANAGEMENT PLAN

Objectives

The objective of the HDD/Trenchless Planning and Procedures Management Plan is to ensure that the planning, design and use of HDD and other trenchless methods are conducted in a manner that maximizes the potential for success of the method, satisfies regulatory authorities and reduces or avoids the potential for adverse effects on aquatic and terrestrial resources and users.

Management Approach

For construction of the pipeline, HDD technology may be used for watercourse/wetland/lake crossings, as well as valley crossings, sensitive wildlife habitat and road and railway crossings. Typically, HDD installation will involve the following four main steps:

- pre-site planning to determine the feasibility of the method through existing geological data and conducting field investigations, with drill entry and exit locations determined;
- drilling a pilot hole along the predetermined drill path;
- expanding the pilot hole by reaming; and
- pulling back pre-fabricated and pretested 914 mm (NPS 36) OD pipe.

Pre-Construction

All necessary approvals and permits will be determined prior to commencing an HDD or other trenchless crossing method and will be conducted in accordance with applicable Operational Statements unless otherwise approved by the NEB. Notifications will be provided to the NEB and updated HDD schedules will be continually provided, if warranted, to apprise of construction progress.

Trans Mountain will hold a pre-construction HDD meeting with its Contractors, the Lead Environmental Inspector(s) and the Environmental Inspector(s) and other supervisory personnel and WQM staff to ensure that personnel are aware of the issues associated with the upcoming trenchless crossing. Personnel will be informed of environmental concerns and will have an open forum to raise and answer questions regarding the crossing method. Points of discussion will include monitoring requirements and contingency plans (as outlined in the Drilling Mud Release Contingency Plan in Appendix B). Specifically, personnel will be reminded of:

- monitoring requirements for early indicators of potential issues;
- the contingency plan in place, including a response plan in the event of an inadvertent release of drilling mud (*i.e.,* frac-out) and their respective roles and responsibilities;
- the method, location and volume/rate for the disposal of the drilling fluid and cuttings;
- the contingency (alternative) crossing method for the particular watercourse/wetland/lake in case the HDD method is unsuccessful; and
- notification requirements if the alternate method is used and/or if there is an inadvertent release of drilling mud or instream disturbance.

Prior to the commencement of crossing work, all required and potential contingency materials and equipment will be stockpiled and confirmed onsite. Sedimentation controls will be installed and maintained throughout installation. All HDD equipment will be inspected for proper operation prior to commencement of activities. When warranted, refuelling, servicing and washing of equipment will be conducted a minimum of 100 m from water crossings or special measures will be used for servicing and refuelling of set-up equipment within 100 m of a watercourse/wetland/lake (see Section 8.1).

The Lead Environmental Inspector(s) and the Environmental Inspector(s) will ensure that the Contractor or surveyor has clearly marked the complete drill path, on both sides of the watercourse/wetland/lake to assist in the delineation of the area upstream and downstream of the crossing to be monitored for potential inadvertent releases. Drilling mud composition will be limited to bentonite mud drilling systems, fresh water and, if warranted, other inert additives. No toxic additives will be used; MSDS sheets of additives will be provided to the NEB by the Environmental Inspector(s) prior to use. A sump will be constructed at the entry and exit points with a subsoil berm installed downslope of the exit point of adequate capacity to capture potential released volumes of drilling mud. A similar sump will also be constructed at the exit point following completion of the pilot hole.

Drilling fluid pressures and drilling rates will be monitored at all times by a trained operator and inspector, for an early indication of a potential frac-out (*e.g.,* pressure spikes). If a suspected frac-out occurs, the Environmental Inspector(s) will immediately begin WQM as described in Drilling Mud Release Contingency Plan (see Appendix B) and Water Crossing Construction Monitoring Management Plan (Appendix C), and implementing emergency response measures. Data will be used to inform the Contractor, identify potential adverse effects on water quality and implement mitigation measures. Appropriate measures for containment of drilling fluid and incorporation of alternative drilling methods will be implemented if warranted. The HDD Contractor will have appropriate equipment on hand to deal with any potential incident.

Prior to the commencement of an HDD or trenchless crossing, a site-specific clean-up plan will be developed for each crossing. The plan will be prepared by the drilling Contractor in consultation with Trans Mountain inspection staff, as well as the NEB. The appropriate off right-of-way approvals will be acquired to access the potential inadvertent release area to monitor and, if warranted, for drilling mud containment and clean-up. Entry and exit sumps that contain drilling mud will be closed immediately after completion of drilling and remediated to meet applicable provincial requirements.

Monitoring

The appropriate water quality sampling equipment will be onsite during drilling operations to ensure that accurate water quality samples are taken. Onsite equipment and materials may include turbidity meter (manual and/or automated data-logging models), water sampling device, chest waders, water sample bottles, ice auger (winter), boat (during open water conditions) and coolers.

A WQM plan will be developed, with input from a QAES or QEP, for each HDD crossing. The water quality sampling program will be in place prior to drilling and will include sample locations (both upstream and downstream), frequency of sampling and sampling procedures (refer to Water Crossing Construction Monitoring Management Plan also in Appendix C). The program will be amended as conditions warrant.

WQM plans may be altered in the event of suspected frac-out. Alterations will depend on location and magnitude of frac-out. WQM data will be used to determine the potential of construction related activities to have resulted in the exceedance of CCME (2007) guidelines.

Instream portions of the drill path and surrounding area (*e.g.,* within 100 m upstream and 400 m minimum downstream) will be closely monitored for evidence of drilling mud release. The size of the area to be monitored will be determined by, among others, channel and flow conditions at the watercourse, geotechnical conditions (*i.e.,* amount of fracturing, type and depth of substrate) and drilling conditions (*i.e.,* depth of drill path, distance between watercourse and entry and exit points). Monitoring will be on a continuous basis during drilling operations and will continue for at least 8 hours after shut-down or longer as directed by the Environmental Inspector(s). Monitoring personnel will be equipped with radios to ensure appropriate communication with drilling contractor personnel. Contact between monitoring and drilling personnel will be maintained at all times.

At a minimum, monitoring stations will be established at appropriate locations and water samples will be collected for visual inspection at the noted intervals if pressurized drilling fluids or water are used. Multiple monitoring stations and transects will be established within the watercourse at each crossing location. The placement of stations and transects will be unique at each crossing but will be designed to ensure effective capture of monitoring data.

Supervisory personnel will be onsite at all times during drilling, reaming and pullback operations to ensure that emergency response measures are implemented immediately and effectively. Trans Mountain will also assign inspection personnel to the site during all phases of drilling of the watercourse. Annular pressures throughout drilling will be monitored and recorded when available. The amount of fluid return to the mud tank/pit and the amount of make-up drilling fluid required in the mixing tanks during drilling of the pilot hole opening (reaming) will be monitored and recorded to provide a detailed log of all drilling activities to correlate drilling status with potential frac-out events. Sampling frequency will be increased if monitoring of drilling mud returns indicates that a release may have occurred.

The use of remote, monitoring sondes will occur at each HDD crossing to allow for safe and continuous instream monitoring for drill mud releases during the evening or during otherwise unsafe flow conditions. If the crossing occurs during frozen conditions, monitoring will occur, where safe, through holes augered through the ice. Monitors will have practical safety gear (*e.g.,* sondes, ropes, ladders, inflatable boat, flotation coveralls) for traversing ice. Ice conditions will continue to be evaluated throughout the monitoring program. If conditions do not permit the safe collection of water quality data, the NEB will be notified. If the watercourse/wetland/lake is frozen to the bottom, onsite conditions will not allow monitoring of water quality.

Should a frac-out be suspected and associated turbidity values are observed instream, water samples for TSS will be collected. Samples will be submitted for laboratory analysis so that a TSS/turbidity relationship can be developed and monitoring results can be presented in TSS values (Appendix C). Laboratory analysis will require multiple days for completion, resulting in a delay in the conversion of turbidity data collected at the crossing site. As a result, previous relationships between TSS and turbidity will be used as a reference for the determination of a suspected frac-out event.

If monitoring reveals sediment values are approaching threshold values, the Environmental Monitors will alert the Environmental Inspector(s) and work with the Contractor and Project inspection personnel to develop corrective actions. If corrective actions are not successful, construction activities will be temporarily suspended until effective solutions are identified.

Terrestrial monitoring of the drill path will also be completed regularly by the HDD contracting personnel. Terrestrial monitoring will rely on visual observations to confirm potential location of drilling fluid surfacing.

4.0 HYDROVAC CUTTING AND HANDLING DISPOSAL MANAGEMENT PLAN

Background

Hydrovac excavation will be used prior to construction of the Project, as described in Section 8.0 of the EPP. This method of excavation will be used prior to ground disturbance activities to expose hotlines and underground utilities to prevent potential line strikes. The process of hydrovac excavation uses pressurized water to safely expose underground infrastructure while a vacuum system simultaneously extracts the resulting slurry into an onboard tank. This method of excavation produces a waste liquid which is a combination of water and soil (*i.e.,* hydrovac slurry or hydrovac tailings) that must be properly contained and disposed.

Objectives

The objective of the Hydrovac Cutting and Handling Disposal Management Plan is to avoid or reduce potential adverse environmental effects due to the handling, storage or disposal of hydrovac slurry in accordance with applicable provincial and federal legislation, regulations and guidelines; Trans Mountain's policy and reclamation objectives for the Project.

Management Approach

Prior to initiating the hydrovac operation, the Hydrovac Contractor will ensure that the Lead Environmental Inspector(s) and the Environmental Inspector(s) have reviewed and approved a disposal site. If the disposal site is determined to be off-site, the maximum weight of the loaded hydrovac truck will be determined to ensure compliance with applicable road weight restrictions. The Hydrovac Contractor will also provide copies of their operating procedures and emergency response plans for approval to the Lead Environmental Inspector(s) and the Environmental Inspector(s) prior to initiation of hydrovac operations. The Hydrovac Contractor will ensure that all tanks are clean and free of contaminants prior to arriving onsite.

For water withdrawal procedures to be employed during hydrovac activities refer to Water Withdrawal and Discharge Procedures Management Plan in Appendix C.

Hydrovac Operations

Topsoil/root zone material, if present, will be salvaged prior to hydrovac use. However, for holes less than 1 m in diameter, topsoil/root zone material salvage is not necessary if the soil will be removed using a hydrovac during frozen soil conditions or where the area to be exposed will be subsequently subject to topsoil/root zone material salvage as part of right-of-way preparation activities.

Non-Contaminated Hydrovac slurry Disposal

Non-contaminated tailings will be released into the hydrovac excavation if future subsidence of the site is not a concern and the area will be fenced until the tailings are dry. Onsite disposal is the preferred method for hydrovac slurry from new disturbances as is not likely to be contaminated and is generally of mineral soil content. The disposal location will be in an area where topsoil/root zone material/salvage has occurred. If a dike is warranted to contain the hydrovac slurry, the dike material will be composed of subsoil and will be able to prevent any surface water runoff from contacting the hydrovac slurry. The Hydrovac Contractor will ensure that at no time will the hydrovac slurry be allowed to be pumped into or flow into a watercourse/wetland/lake, during hydrovac slurry disposal.

If temporary onsite storage is constructed (*e.g.,* sump or bermed area), topsoil/root zone material will be salvaged from the area to be used for storage and the storage area will be sized to be able to contain the hydrovac slurry by preventing off-site migration of the stored hydrovac slurry. If a dike is necessary for containment, it will be composed of impermeable clay. Salvaged topsoil/root zone material will be stored on one or two sides of the stripped sump/dike area to provide access for equipment and potential sump/dike expansion, where warranted.

Hydrovac slurries may be temporarily stored on the Project footprint in the hydrovac truck, in clean oilfield storage tanks, at a site designed to safely store hydrovac slurry or in a metal slop bin if other more practical storage options (*i.e.,* temporary pits) are not feasible for the site.

Wet hydrovac slurry may also be disposed of at an approved licensed treatment plant or disposal facility if necessary. Appropriate documentation will be provided to Trans Mountain to confirm the hydrovac slurry was disposed of in accordance with regulatory requirements and to the satisfaction of Trans Mountain.

Contaminated Hydrovac slurry Disposal

Trans Mountain will ensure any hydrovac slurry suspected of contamination receives special handling storage and disposal. Contaminated hydrovac slurry will not be allowed to mix with non-contaminated hydrovac slurry. If contaminants are suspected, hydrovac slurry will not be removed from the site. Instead, arrangements will be made to temporarily store the hydrovac slurry onsite until analysis is complete and appropriate disposal requirements are made. Potential indicators of contamination include soils with a sudden change to a darker or blacker appearance in colouration and/or have a hydrocarbon odour. See the Contamination Discovery Contingency Plan (see Appendix B) for additional information.

Trans Mountain will require the Hydrovac Contractor to follow the guidelines set out in the Waste Management Standard (see Appendix C) as well as to provide appropriate documentation to verify the contaminated hydrovac slurry disposal is in accordance with regulatory requirements and to the satisfaction of Trans Mountain.

Ultimately, all hydrovac holes will be backfilled with mineral soil and compacted to ensure settling of material does not pose a hazard for wildlife, livestock, or the general public. If hydrovac slurry necessitates off-site disposal, clean replacement backfill will be sourced.

5.0 NOISE MANAGEMENT PLAN

(PLACE HOLDER - To be developed prior to construction)

6.0 RARE ECOLOGICAL COMMUNITY AND RARE PLANT POPULATION MANAGEMENT PLAN

6.1 Purpose and Scope

The purpose of this Rare Ecological Community and Rare Plant Population Management Plan is to provide recommended mitigation when rare ecological communities, rare plants (vascular plant or bryophyte [moss or liverwort]) or rare lichens are discovered.

6.2 Rare Ecological Communities

- Conduct supplemental rare ecological community surveys where a need is identified.
- Protection measures and environmental management techniques for rare ecological communities will be determined following an assessment of the community, which will take into account the following site-specific conditions and community sensitivity criteria:
  - community extent and abundance in the local area;
  - the relative rarity of the community (*i.e.*, as indicated by its provincial [S] rank or BC *Wildlife Act*);
  - the growth form, primary mode of species reproduction and mode as well as magnitude of seed/spore dispersal of the component plant species;
  - construction activity timing;
  - the location of the community with respect to the disturbance;
  - the proportion of the community expected to be affected;
  - the site preferences of the community and/or its component plant species;
  - expected or known sensitivity or resilience to disturbance of the community and/or its component plant species; and
  - past mitigation success of the community or similar communities.

Assessment and mitigation for rare ecological communities will include the following steps.

- Consult with the Alberta Conservation Information Management System (ACIMS)/BC Conservation Data Centre (CDC) to verify the community's ranking and known distribution within the province, if required.
- Consult with qualified Vegetation Resource Specialists regarding preferred or recommended mitigation measures for the community.
- Stake, flag or otherwise delineate rare ecological communities to avoid accidental encroachment.
- Restrict general application of herbicide near all rare ecological communities.
- PCEM of rare ecological community occurrences may be recommended to monitor the effectiveness of mitigation efforts.

6.2.1 Mitigation Measures for Rare Ecological Communities

Mitigation measures for rare ecological communities generally fall into categories of avoidance and reducing disturbance. The recommended mitigation strategy for rare ecological community occurrences may include the following suite of mitigation measures and options, in order of preference. One or more options may be used at a site.

- Adjust workspace locations (*e.g.,* TWS, extra TWS, log decks, transmission towers) or realign the right-of-way to avoid the site.
- Narrow down or reorient the area of disturbance and protect the site using fencing or clearly mark the site using flagging and inform all users of access restrictions in the vicinity of flagged or fenced sites.
- Avoid or reduce clearing of trees or shrubs in vicinity of the site.
- Reduce grubbing of roots in shrubby communities within TWS areas, where feasible.
- Mow or walk down rather than wholly remove shrubs, where feasible.
- Leave gaps in the topsoil/root zone material piles or subsoil piles to avoid the community.
- Use protective matting and/or snow during the winter to mat over the community where it occurs and other areas where surface disturbance is not required, to protect communities from scraping and compacting.
- Conduct native seed collection for use in revegetation efforts at the site.
- Consider employing appropriate salvage, propagation and transplant techniques for component species.
- Consider delaying clearing to allow seed set and to limit drying of the soils.

Final decisions on mitigation measures will be made by Trans Mountain in consultation with a qualified Vegetation Resource Specialist and, where appropriate, other stakeholders.

6.3 Rare Plant Species

- Conduct supplemental rare plant surveys where a need is identified.
- Protection measures and environmental management techniques for rare plant sub-populations will be determined following an assessment of the occurrence, which will take into account the following site-specific conditions and species sensitivity criteria:
  - occurrence size and abundance of the species in the local area;
  - the number of known sub-populations within the occurrence;
  - the relative rarity of the species (*i.e.*, as indicated by its provincial [S] rank, *SARA*, Committee on the Status of Endangered Wildlife in Canada, the Alberta *Wildlife Act* or BC *Wildlife Act*);
  - the growth form/type of the species (*e.g.*, annual, biennial, perennial, aquatic, moss, liverwort, epiphyte, tree, and shrub);
  - construction activity timing;
  - the location of the sub-population or individual with respect to the disturbance;
  - the primary mode of species reproduction (*e.g.*, spores, seeds, rhizomes, suckering/spreading, vegetative propagules);
  - the mode and magnitude of seed/spore dispersal;
  - the proportion of the occurrence expected to be affected;
  - the habitat/substrate preferences of the species;

- the proximity of available habitat/substrate (based on similarity of habitats to the habitat of the rare species occurrence);
- expected or known sensitivity or resilience to disturbance of the species;
- past mitigation success of the species or similar species; and
- expected or known occurrence viability/sustainability (both pre-construction and post-construction).

Assessment and mitigation for rare plant occurrences will include the following steps.

- Consult with ACIMS/BC CDC to verify the species' ranking and known distribution within the province, if required.
- Consult with qualified Vegetation Resource Specialists regarding preferred or recommended mitigation measures for the species.
- Stake, flag or otherwise delineate rare plant sub-populations prior to construction to avoid accidental encroachment.
- Restrict general application of herbicide near all rare plant sub-populations.
- PCEM of rare plant occurrences may be recommended to monitor the effectiveness of mitigation efforts.

6.3.1 Mitigation Measures for Rare Plant Occurrences

Mitigation measures for rare plant occurrences generally fall into categories of avoidance, reducing disturbance and alternative reclamation techniques.

- Where the Project encounters rare species ranked S1 or S1S2, or species that are protected under provincial or federal legislation/regulations, complete avoidance is preferred. The following mitigation measures may be utilized to avoid the sub-population(s):
  - Adjust workspace locations (*e.g.*, TWS, extra TWS, log decks, towers) or realign the right-of-way to avoid the site.

In the event that complete avoidance is not feasible or where the Project encounters rare species ranked S2, S2S3, S1S3, S3, SNR, SH or SU, the recommended mitigation strategy may include the following options, in order of preference. One or more options may be used at a site.

- Narrow down or reorient the area of disturbance and protect the site using fencing or clearly mark the site using flagging and inform all users of access restrictions in the vicinity of flagged or fenced sites.
- Leave gaps in the topsoil/root zone material piles or subsoil piles to avoid the site.
- Use protective matting and/or snow during the winter (mark the area in case snow melts) to mat over the sub-population where it occurs on the Project area, and other areas where topsoil/root zone material removal is not required, to protect vegetation from scraping and compacting.
- Propagate rare plants via vegetative or reproductive means (*e.g.,* harvesting of seed, salvaging and transplanting or collecting of cuttings) and transplant at suitable receiving sites.

Additional site-specific mitigations for non-vascular plants, where complete avoidance is not feasible, or where the Project encounters rare non-vascular plants ranked S2, S2S3, S1S3, S3, SNR, SH or SU, may include the following options.

- Relocation of substrates (*e.g.,* decayed logs, portions of logs, individual branches, bark disk transplants, soil crusts).

- Relocation of portions of the plants population (*e.g.,* lichen pendants, moss peds, and liverwort thalii).
- Inoculation using vegetative fragments.
- Where transplanting is utilized, the location (*e.g.,* aspect and vertical position) and habitat (*e.g.,* substrate, light and humidity conditions) of the receiving sites will emulate conditions at the transplant source location, to the extent feasible.

Final decisions regarding mitigation measures will be made by Trans Mountain in consultation with botanical experts and, where appropriate, other stakeholders.

7.0 RECLAMATION MANAGEMENT PLAN

Construction reclamation activities are measures conducted as part of the main construction program. The primary goal of reclamation is to reduce adverse effects of pipeline construction and return the affected lands to a stable, non-erosive condition that will promote the re-establishment of land productivity. This process involves measures such as: topsoil and root zone material salvage; subsoil conditioning and grade and drainage re-establishment; topsoil and root zone material replacement; installation and maintenance of temporary and permanent erosion and sediment control measures; and revegetation. This reclamation plan includes construction reclamation measures that will be implemented prior to, during and following pipeline installation in order to assist in successfully reclaiming land.

Construction affected lands will be stabilized and revegetated in a manner that will in time achieve land productivity along the right-of-way that is equivalent to the adjacent land use, ensuring the ability of the land to support various land uses. Successfully achieving this goal typically includes implementing the construction reclamation measures as follows:

- topsoil/root zone material salvage, subsoil conditioning and grade and drainage feature re-establishment;
- topsoil/root zone material replacement;
- installation and maintenance of temporary and permanent erosion and sediment control measures;
- establishment of vegetative cover to stabilize surface soils and to re-establish an early successional trajectory (where a primarily native plant community existed prior to construction) will facilitate the development of plant communities that are compatible with those maintained during the operational phase of the Project (requirements of maintenance and access) and temporary workspace areas that are allowed to re-establish the surrounding vegetation and land uses; and/or
- establishment of access controls and reinstallation of existing fencing.

7.1 Scope of the Reclamation Plan

This reclamation plan has been developed to provide details of the reclamation measures that will be used to mitigate construction disturbed lands along the TMEP construction right-of-way. The following activities represent standard and special reclamation measures that are to be implemented during pipeline construction as outlined in the EPP. Resource features such as rare plants, watercourse bed/banks and riparian areas, wetlands and wildlife habitat enhancement features are also described below. Implementation of some of the measures included in the reclamation plan may commence prior to the construction phase, where deemed appropriate. A PCEM Program will be developed as per regulatory requirements.

7.2 Construction Reclamation

The goal of the construction reclamation measures is to re-establish site stability to all disturbed lands. The drawings (provided in Appendix R) identify the construction reclamation measures to be implemented prior to, during and following construction in order to ensure that land productivity is returned to affected lands. The drawings included within this plan outline instructions for the mitigation and reclamation of valued environmental resources and will be used by Contractors and the Environmental and Construction Inspectors as specifications and instructions for environmental protection and reclamation.

7.3 Construction Reclamation Measures

The following activities represent measures designed to mitigate potential environmental effects and facilitate reclamation during pipeline construction. These construction reclamation measures have been chosen to address the environmental resources expected to be encountered within the construction right-of-way.

7.3.1 Clearing and Disposal

Background Information

Woody vegetation clearing/brushing and disposal measures are implemented to prepare the construction right-of-way for pipeline installation activities. Where merchantable timber is present along the existing right-of-way, it will be salvaged and managed as per the Timber Salvage Management Plan (see Appendix C). All non-merchantable woody vegetation, including tree and shrub stumps and roots not required for rollback or the establishment of access control, will be burned (if appropriate) or disposed of as per municipal/regional requirements. Grubbing of tree and shrub roots and stumps will be minimized and only mulching of un-grubbed tree stumps will be allowed on the construction right-of-way (5 cm depth surface woody debris will not be exceeded). The objectives of these mitigation measures are to restrict the construction footprint to approved workspace, limit the disturbance to adjacent vegetation (*i.e.,* merchantable timber and native vegetation) and reduce the effects of construction on vegetation re-establishment, to the extent practical.

7.3.2 Reclamation Strategy

Measures to address the extent of vegetation clearing and management of woody debris (mulch production and slash salvage) on the disturbance footprint (construction right-of-way) and to support vegetation re-establishment, have been developed for use during construction. These include:

- clear woody vegetation only to the extent warranted to reduce the loss of forest values and minimize the potential for terrain instability and erosion;
- monitor the amount of mulch (wood chips) produced during mulching of un-grubbed tree stumps where minimum disturbance construction techniques are used on the construction right-of-way (grubbing and topsoil salvage over the trench only) so as to maintain soil nutrients at levels (*i.e.,* maintain a suitable Carbon:Nitrogen ratio) that can support vegetation re-establishment following construction activities;
- salvage sufficient woody slash and non-merchantable timber for soil erosion control in areas where disturbed erodible soils are identified and for habitat re-establishment at watercourse riparian areas to provide microsites to aid in the establishment of woody plants; and
- minimize grubbing of plant roots and stumps at non-graded areas, to the extent feasible, to promote re-sprouting of cleared/brushed deciduous vegetation and germination of the undisturbed soil seed bank to optimize the potential for the natural regeneration of vegetation and reduce the potential for terrain instability or soil erosion by wind or water at these sites.

7.3.3 Topsoil/Root Zone Material Salvage, Grading and Replacement

7.3.3.1 Background Information

Protection of topsoil/root zone material, minimizing grading and addressing vegetation re-establishment of graded areas is a key component of the reclamation plan. Soil handling measures to protect and reclaim agricultural lands (see the Agriculture Management Plan in Appendix C), grasslands and forested/wooded areas is the objective of the following measures.

7.3.3.2 Reclamation Strategy

Reclamation procedures will be implemented during construction to salvage, store and replace topsoil/root zone material in a manner that prevents soil structure degradation and soil erosion. Measures to facilitate topsoil/root zone material salvage, grading (including removal of excess trench spoil in urban construction areas) and revegetation have been outlined as follows.

- Topsoil/root zone material will be salvaged to preserve plant propagules (*i.e.,* root pieces, seed and spores) to assist natural regeneration on non-agricultural lands and to preserve soil productivity on agricultural lands.

- Store topsoil/root zone material in a manner that: does not alter soil structure or soil chemistry; provides protection from soil erosion by wind and water; and avoids mixing of stored surface soils with stored subsoil/trench spoil material or woody debris (*i.e.,* woody slash or mulch).

- Recontour subsoil, compact trench spoil sufficiently to avoid future subsidence, relieve compaction in work areas and do not over work replaced topsoil/root zone material.

- At watercourse riparian areas, re-establish bank and approach slope contours, relieve compaction, where required, replace root zone material in a manner that leaves the surface in a rough condition (*i.e.,* textured) to reduce surface water runoff and distribute salvaged (or supplemental) woody slash to provide microsites for plant establishment.

7.3.4 Soil Erosion Control

Some areas of the construction right-of-way may be susceptible to wind and/or water erosion (see Drawings [Brush Wind Barriers] and [Coir/Straw Log Installation] and [Cross Ditches and Diversion Berms] and [Erosion Control – Rollback in Riparian Areas] and [Erosion Control Matting/Blanket] provide in Appendix R). Where erosion potential is identified (*i.e.,* exposed moderately to highly erodible soils) install temporary and/or permanent erosion control prior to re-establishment of vegetation. Erosion control measures may be one or a combination of the following:

- erosion matting;
- cover crop;
- wind fencing;
- tackifier and mulch;
- brush wind barrier;
- staked logs; and/or
- woody debris.

7.3.5 Watercourse Crossings and Riparian Areas

7.3.5.1 Background Information

The objective of watercourse streambed and bank, and riparian area reclamation is to stabilize the disturbed channel and riparian areas and to reclaim fish habitat and the morphology and integrity of the watercourse to the condition of the adjacent land.

7.3.5.2 Reclamation Strategy

Measures outlined below are designed to ensure the stabilization of the banks and approach slopes of watercourses and revegetation within riparian areas immediately following construction and to re-establish important fish habitat at these watercourses. General channel reclamation measures that may be implemented include the following.

- Prior to instream work, identify any instream site-specific features at the crossing and record their location (*e.g.,* root wad, large woody debris, and large boulders) to allow for feature re-establishment following substrate replacement.

- During instream work (open cut or isolation method), salvage the upper coarse-textured substrate material from the channel and banks, and stockpile separately from lower substrate (see Drawing [Watercourse Crossing – Open Cut Method For Dry/Frozen Watercourses] provided in Appendix R).

- At the completion of instream work, return the watercourse bed and banks to their pre-construction configuration and alignment.

- Cap disturbed area of the channel and banks with salvaged substrate (wash gravel substrate prior to returning to streambed).

- Extend replacement of cobbles and boulders to the ordinary high water level, if adequate material is available.

- Replace any site-specific features within the streambed or banks that are important for fishes or other aquatic organisms (*i.e.,* as initially salvaged or as part of Compensation directed by the Environmental Inspector(s).

Additional measures that may be implemented to address bank stability and riparian reclamation include:

- log crib structures (see Drawing [Streambank Protection – Cribwalls] provided in Appendix R);

- biodegradable coir geotextile soil wraps with brush layers;

- dormant brush layer in cross cut slope (see Drawing [Typical Bank Overhang] provided in Appendix R);

- rip-rap erosion protection (see Drawing [Streambank Protection – Cobble or Riprap Armouring] provided in Appendix R);

- sediment fences (see Drawing [Sediment Fence] provided in Appendix R); sediment stop logs (see Drawing [Coir/Straw Log Installation] provided in Appendix R);

- sediment stop logs (see Drawing [Coir/Straw Log Installation] provided in Appendix R);

- erosion control berms (see Drawing [Cross Ditches and Diversion Berms] provided in Appendix R);

- erosion control blanket or coir matting (see Drawing [Erosion Control Matting] provided in Appendix R);

- coniferous tree revetments (see Drawing [Streambank Protection – Typical Coniferous Tree Revetment] provided in Appendix R);

- woody slash placement in the riparian area to promote woody vegetation establishment where appropriate (see Drawing [Rollback] provided in Appendix R);

- subsoil/surface soil texturing (micro-berms and swales) within the riparian area to create micro-sites that protect riparian vegetation from desiccating winds at exposed sites; and

- seed an annual/biannual grass cereal (*e.g.,* fall rye, oats, etc.) or short-lived perennial grass (*e.g.,* slender/awned wheatgrass or Canada wild rye) cover crop species where woody vegetation establishment is the revegetation goal or a native grass seed mix where a grass plant community is the revegetation goal. The cover crop species will be chosen to germinate and establish quickly to stabilize soils and minimize competition to naturally regenerating and installed woody plant material install dormant stakes/brush during bank reconstruction or woody transplants within the riparian area, where warranted (see Drawings [Typical Bank Overhang] and [Streambank Protection – Typical Hedge/Brush Layering] provided in Appendix R).

7.3.6 Wetlands

7.3.6.1 Background Information

Wetlands are sensitive ecosystems, however, if mitigation measures are planned and implemented effectively, wetlands demonstrate a unique resiliency to quickly re-establish wetland function and resume an ecological trajectory similar to that observed prior to construction.

7.3.6.2 Reclamation Strategy

Disturbances to wetlands crossed by the construction right-of-way will be reduced. Mitigation measures that may be used to reduce effects to wetlands are as follows.

- Transfer identified rare plants off right-of-way prior to construction (see Section 2.1.6).
- Narrow down the disturbance when crossing a wetland (see Drawing [Wetland Crossing – General/Non Frozen and Frozen] provided in Appendix R).
- Carefully salvage, separate and store organic and mineral trench subsoil (see Drawing [Wetland Crossing – General/Non Frozen and Frozen] provided in Appendix R).
- Replace trench spoil in the same order as it was excavated, avoiding admixing of soils and uneven contour.
- Where required, re-establish wetland water connectivity across the right-of-way by constructing channels through the trench crown.
- Compensation would only be considered where additional mitigation to re-establish habitat and/or function was considered to not be an appropriate course of action, and following consultation with appropriate regulatory authorities.

7.3.7 Rare Plants

7.3.7.1 Background Information

Protection of rare vascular and non-vascular plants and plant communities is important for the maintenance of ecological integrity. Prior to construction, a survey will be conducted to identify if any species that require special consideration before, during and after construction are present along the construction right-of-way. Mitigation measures have been developed for use during decommissioning to accomplish effective protection of the rare plants and/or plant communities, if they are discovered within the disturbed footprint.

7.3.7.2 Reclamation Strategy

Measures to address rare plant issues will be implemented prior to, during and following construction. These may include the following.

- Fence off the area where the rare plant community is located so it can be avoided (see Drawing [Narrow Down Fencing] provided in Appendix R).
- Placing protective structures or snow and ice work pads over the plants of concern where site-specific conditions, plant species characteristics and timing of construction allow for effective protection (see Drawing [Rare Plant Ramp Protection] provided in Appendix R).
- Placing a span bridge or ramp over the plants of concern where site-specific conditions allow for effective protection from construction traffic where construction activities will interact with rare plants (see Drawing [Temporary Bridge/Rare Plants] provided in Appendix R).
- Where the route traverses a rare plant or rare plant community and avoidance or protection is not an option, it is recommended that plant seeds and/or the entire plant are collected prior to construction, transplanted to suitable habitat off right-of-way and monitored 1 year following construction (see Drawing [Rooted Stock Selection and Installation] provided in Appendix R).
- Within the vicinity of all of the subpopulations, strip the upper 15 cm of topsoil separately (where feasible) from the remaining A horizon, then redistribute on top of the replaced topsoil following final clean-up.
- Recontour the landscape to pre-construction conditions.

7.3.8 Wildlife

7.3.8.1 Background Information

The protection of wildlife and the re-establishment of wildlife habitat are important elements in Project reclamation. Measures to re-establish effective wildlife movement corridors and maintain biodiversity include preserving existing vegetation and using native plant species during reclamation.

7.3.8.2 Reclamation Strategy

Disturbances to wildlife habitat will be mitigated through the implementation of various measures as follows.

- Grub stumps and roots of deciduous vegetation following clearing activities only at locations where grading is required (to encourage re-sprouting following construction), mulch stumps to create a smooth work surface.
- Reclamation activities requiring the use of medium to large equipment will be scheduled, to the extent feasible, to adhere to wildlife timing constraints.
- Reseeding disturbed areas following construction with native vegetation conducive to the development of wildlife habitat and food.
- Utilize native vegetation that has a reduced attractiveness to wildlife (*e.g.,* forage) in areas where the construction right-of-way is in close proximity to railway or roadway rights-of-way to avoid attracting ungulates and carnivores, and reduce their exposure to collisions.

7.3.9 General Right-of-Way Revegetation

7.3.9.1 Background Information

Several methods are proposed/planned for the general revegetation of the right-of-way (*e.g.,* native grass seed mixes and localized shrub transplants, rooted stock plants, etc.). The implementation and success of these methods is based on vegetation types, soil moisture regimes, soil chemistry, salvage and planting season and exposure to wind and sun.

7.3.9.2 Reclamation Strategy

Within construction disturbances, a number of special measures will be implemented depending on site-specific conditions. These measures could include a combination of the following:

- salvaging and storing dormant native vegetation and rare plants prior to construction for transplant on to the right-of-way following construction;
- seeding with a native grass seed mixes (see Detail [Seed Mixes] provided in Appendix R); and
- placing erosion control blanket or coir matting (see Drawing [Erosion Control Matting] provided in Appendix R), woody slash or log diversions (see Drawing [Rollback] provided in Appendix R) along the right-of-way on erodible soils or wind exposed sites to provide micro-habitat and support plant establishment (see Drawings [Brush Wind Barrier] and [Staked Logs for Erosion Control] provided in Appendix R).

Natural regeneration of native plant species (with the addition of a short-lived cover crop) will be considered for implementation in areas that are well-suited to this reclamation measure. Construction disturbances in riparian areas (*i.e.,* watercourses, wetlands and lakes) and in TWS areas where minimum disturbance techniques were used and grubbing of vegetation was avoided are suitable areas for the implementation of this measure.

7.3.10 Salvage, Storage and Installation of Native Plant Material and Plants, Tree/Shrub Transplants and Native Seed Procurement

7.3.10.1 Background Information

Disturbances to vegetation will be mitigated through the use of natural regeneration processes and/or implementation of vegetation installation measures. Prior to clearing/brushing activities, dormant native woody plant material (brush and stakes) and plants may be salvaged and stored. Alternatively, dormant native woody plant material and plants may be collected immediately prior to their installation. Native grass seed will be obtained from a commercial seed retailer.

7.3.10.2 Reclamation Strategy

The primary objective of salvaged, transplant or purchased native plants or plant material and/or facilitating the natural regeneration of native plants (woody, forb and grass species) on construction disturbances is to re-establish equivalent land productivity. Reclamation measures that may be implemented include the following.

- Salvage, store and install dormant native woody plant material and plants in a manner that maximizes the establishment potential of the plant material and plants following installation.
- Within the vicinity of the construction right-of-way, collect dormant woody plant material (deciduous stakes/brush) and select suitably sized transplants (small conifer/deciduous trees/shrubs) from a suitable donor site following approval from the applicable land manager.
- A grass cover crop and/or native grass seed mix has been developed for use at riparian areas to support the establishment of installed and naturally regenerating native woody plant material and plants and to provide erosion protection in the short-term.
- Implement plant protection measures (*e.g.,* soil mounds and berms, wind fencing and rollback) that work to minimize environmental stresses (*i.e.,* wind exposure, low soil moisture stress [desiccation]), to the extent feasible.
- Monitor plant establishment.

7.3.11 Problem Soils Reclamation

7.3.11.1 Background Information

The topography and types of soils encountered along the construction right-of-way may provide special challenges for reclamation. Soil related reclamation issues occur due to high susceptibility to wind and water erosion, low soil moisture and soil chemical and physical properties.

7.3.11.2 Reclamation Strategy

The following mitigation measures will be implemented to deal with reclamation on problem soils, where warranted.

- Silt and sand textured soils are more susceptible to wind and water erosion after disturbance by construction due to a general lack of cohesiveness and low water holding capacity. During construction, it may be necessary to apply tackifier to topsoil/root zone material storage windrows, pack with a goosefoot packer or cover with burlap, especially in open wind prone areas.
- To re-establish vegetation on dry sandy soils, native, locally adapted drought tolerant plant species will be seeded along with a native or non-native short-lived cover crop. Prior to the seeding activity, the seedbed will be lightly compacted (*i.e.,* track packed or other method) to improve moisture holding capacity in the surface seedbed layer and localized woody slash placement may be installed to control wind erosion and promote germination and seedling establishment.

Short and long-term measures with be implemented as required to reduce the risk of soil erosion by water or wind (see Section 8.6.3 of the Pipeline EPP).

7.3.12 Weed and Problem Species Control

Management of problem species is essential for the successful reclamation of disturbed areas. The Project will use an integrated management approach that could include mechanical and chemical methods to control Noxious weeds and reduce the spread of problem vegetation (see the WVMP in Appendix C). The mechanical or chemical treatment methods used will vary with life-form and mode of reproduction of the species targeted and the location and extent of the infestation. Mechanical treatments include hand pulling and mowing. Promotion of active revegetation of native plant communities through native grass, forb or woody plant installations represents the effective use of a cultural method (see Drawing [Weed Control] provided in Appendix R). Chemical treatments include either selective herbicides (*i.e.,* target specific plant species) or non-selective herbicides (*i.e.,* target all vegetation).

7.3.13 Municipal Parks and Green Spaces

(To be completed prior to construction in order to capture the full range of potential disturbances).

7.3.14 Temporary Construction Access and Existing Operations Access Routes

Construction access routes used during decommissioning construction are of two types: existing roads and trails (operational access and other); or access specifically built for temporary use during construction. Following completion of construction, select access routes will be deactivated and reclaimed. Reclamation measures will include:

- regrading subsoil to match surrounding contours and drainage patterns;
- alleviating compacted subsoil, where warranted;
- replacing salvaged topsoil/root zone material and woody debris and seed with the appropriate native grass seed mix to establish a native cover suitable for site conditions and land use, and compatible with weed management and wildlife management objectives; and
- block access using large boulders, fencing or install rollback for access control (see Drawing [Rollback] provided in Appendix R) across the access road to the edge of the forest.

8.0 SOCIO-ECONOMIC MANAGEMENT PLAN

8.1 Introduction

The SEMP summarizes the proposed mitigation and enhancement measures that have been designed to manage potential social, economic and health-related issues and economic opportunities associated with the Project.

The SEMP focuses on mitigation and enhancement measures that are not covered by the EPPs or other management plans developed for the Project and should be read in parallel with the various Project EPPs (Pipeline EPP, Facilities EPP and Westridge Marine Terminal EPP, Volumes 6B to 6D) and other management plans for a complete understanding of how Project-related issues will be managed. Generally, the EPPs focus on measures aimed at protecting the biophysical and natural environment. Certain measures in the EPPs and other management plans also serve to assist in the management of socio-economic issues, in particular those measures and management plans related (but not limited) to:

- traffic and access control management;
- waste management;
- noise, air emissions, dust control, lighting, odour and visual buffering;
- temporary construction camps;
- water quality and quantity;
- vegetation;
- timber;
- agricultural land;
- fish and fish habitat;
- watercourse crossings; and
- wildlife.

The SEMP focuses on additional policies, programs and initiatives developed to address socio-economic issues that could emerge in relation to the Project, which Trans Mountain and its Contractors will implement. These measures will contribute to the enhancement of the Project benefits and work opportunities and minimize potentially adverse socio-economic effects.

The SEMP summarizes mitigation measures pertinent to the following socio-economic elements outlined in the NEB *Filing Manual*: social and cultural well-being; human occupancy and resource use; infrastructure and services; navigation and navigation safety; employment and economy; and human health. Mitigation measures pertaining to the elements of traditional land and resource use and heritage resources are outlined in the various Project EPPs in Volumes 6B to 6D.

8.2 Purpose

The purpose of the SEMP is to summarize socio-economic mitigation and enhancement measures and communicate to Project personnel and Contractors, in a clear and concise format, Trans Mountain's policies, programs and measures to be implemented during pre-construction, construction and operation of the Project to avoid or reduce potential adverse socio-economic effects and to maximize Project-related economic and community opportunities or benefits.

Specifically, the SEMP:

- identifies socio-economic mitigation and enhancement measures to be implemented during Project pre-construction, construction and operations;
- provides guidance on whether the socio-economic mitigation/enhancement implementation is in the scope of Trans Mountain, Contractors or both, and whether external agencies may be involved; and
- serves as reference information for the Trans Mountain personnel to support decision making and ongoing issues management.

8.3 Socio-Economic Management Plan Approach and Organization

The SEMP is based on:

- key policies of KMC, Kinder Morgan and Trans Mountain, including the: EHS Policy; Aboriginal Training policy; Employment policy; and Procurement policy;
- the ESA, specifically Volume 5B;
- feedback obtained through Project-related stakeholder and Aboriginal engagement and consultation;
- commitments made in the ESA to regulatory authorities, stakeholders and the public;
- industry standards and management practices related to socio-economic and health effect management; and
- professional experience in the assessment of other infrastructure and energy-related developments.

The SEMP has been prepared to address socio-economic issues for all components of the Project in an integrated manner (*e.g.*, pipeline, pump stations, tanks, temporary facilities and the Westridge Marine Terminal), since the communities and regions in which the Project occurs will experience Project-related activities and effects in a combined manner. It is less meaningful from a community perspective to discuss socio-economic issues management of each Project component on an individual basis. Measures should be applied to all Project components in an integrated manner.

For each mitigation or enhancement measure, both the timing (during what phase of the Project the measure should be implemented) and the accountable parties (parties who are responsible or involved in implementing the mitigation or enhancement measure) are noted. Time periods include pre-construction, construction and operations to align with the EPPs. Accountable parties may include Trans Mountain, Contractors or external authorities/agencies. External authorities/agencies can be any party outside of Trans Mountain or its Contractors who would play a role in, or need to be engaged during, the implementation of a particular measure. Examples of these authorities/agencies include: health authorities; emergency services (*e.g.*, fire, police); and training organizations.

The involvement of external authorities/agencies is key in some instances as, by their nature, socio-economic issues are dynamic and affected by many factors. Whether related to employment, business opportunities, services or social effects on communities, how socio-economic issues play out during the Project will be determined by a nuanced balance of Project actions, government policies and programs, individual choices and broader economic forces. The Project, therefore, does not have sole ownership or complete control over the management of all issues. Issues management will require shared responsibility and collaboration between the Project and the various orders of governments, service organizations and other informal and/or non-elected groups that may be active in decision-making and service implementation at the community level.

The Project will continue to engage with the appropriate government/regulatory, service and training authorities/agencies as Project planning continues to determine the delineation of roles and responsibilities leading up to and during Project execution. This is particularly relevant for socio-economic issues, as the economic and social context of the Project regions will continue to evolve and change as Project planning advances.

8.3.1 Roles and Responsibilities

8.3.1.1 Trans Mountain Pipeline ULC Responsibilities

Within a shared responsibility framework, Trans Mountain will be responsible for establishing the overall socio-economic programs for the Project and for directing its Contractors in the implementation of the socio-economic measures. In the SEMP, the word “Contractors” refers to General Contractors and/or their subcontractors.

Specifically, Trans Mountain will:

- establish Project-specific socio-economic initiatives for implementation during development, construction and operation of the Project;
- conduct ongoing engagement with interested parties;
- implement socio-economic measures that are applicable to Trans Mountain’s direct Project activities;
- provide information to General Contractors about Contractor socio-economic requirements within bid documents, contract terms and conditions, by provision of the SEMP to the General Contractors;
- provide information in a timely manner to governments, educators and service organizations to facilitate their plans, programs and service delivery and solicit input and feedback from them to facilitate refinement of plans, initiatives and measures;
- review and approve Contractor-specific measures;
- direct and monitor Contractors in their implementation of the socio-economic management measures; and
- monitor quantitative and qualitative results of the implementation of the socio-economic measures and revise measures, as required.

8.3.1.2 Contractor Responsibilities

Trans Mountain will directly contract several General Contractors and subcontractors who will supply goods and services for the construction of the Project. Those General Contractors that provide services in Alberta, BC or other parts of Canada will be responsible for implementing Project-specific socio-economic measures and reporting specific information. Responsibilities will be adjusted appropriately for Contractors supplying goods from outside Canada.

Specifically, the General Contractors will:

- understand and support the Project socio-economic management measures;
- define how that Contractor will implement the employment programs and practices as requested by Trans Mountain;
- implement their Contractor-specific plans after approval of the plan by Trans Mountain;
- provide information about employment policies and practices and requirements to subcontractors through bid documents and contract terms, and collect results from subcontractors; and
- collect and report results from the implementation of employment and recruitment policies and practices as required by Trans Mountain.

8.3.1.3 Subcontractor Responsibilities

The General Contractors will engage numerous subcontractors to complete parts of the General Contractors’ scope of work. Those subcontractors that provide goods or services in the Project area will also be required to meet and implement the applicable Project socio-economic management measures.

The subcontractors will be responsible for:

- understanding the Project socio-economic management measures;
- implementing the socio-economic measures relevant to their scope of work; and
- reporting relevant information as required by Trans Mountain or the General Contractors.

8.3.2 Socio-Economic Management Plan Organization

Specific mitigation and enhancement measures are organized by socio-economic theme. These themes are:

- procurement;
- employment and training;
- traffic;
- worker accommodation;
- worker health;
- human occupancy and resource use;
- sensory disturbance;
- emergency management planning;
- other regional infrastructure and services;
- navigation and navigation safety; and
- community way-of-life.

Given the interconnection between many socio-economic issues, certain mitigation and enhancement measures may apply to the management of issues related to multiple themes. For example, mitigation measures related to camp conditions found in the worker accommodation theme also play a role in worker support and retention related to the employment and training theme. Measures related to worker transportation found in the traffic theme also play a role in worker health. For the purposes of clarity, however, each mitigation measure is listed only once. Please refer to the discussion of potential Project effects in Volume 5B for discussion of key mitigation or enhancement measures that apply to each potential socio-economic effect or issue; there, mitigation and enhancement measures will be repeated for any potential effect where they are relevant.

8.3.3 Implementation

As noted, the implementation of socio-economic mitigation measures may be the responsibility of Trans Mountain, its General Contractors and subcontractors or a combination. For each mitigation theme, the following is noted:

- which Project phase the mitigation is relevant to (*e.g.*, development, construction, operations); and
- which party or parties are accountable or hold the responsibility for implementing the measure.

8.4 Socio-Economic mitigation and Enhancement Measures

8.4.1 Procurement

In order to enhance the procurement and contracting opportunities related to the Project, Trans Mountain and its Contractors will take active steps to maximize the use of Aboriginal, regional, provincial and Canadian businesses during the construction and operation of the Project. This subsection describes the procurement-related mitigation and enhancement measures that will be implemented as a result of the Project. Discussion of potential Project effects related to employment and economy, including procurement, are found in Section 7.2.7 of Volume 5B.

PROCUREMENT MITIGATION AND ENHANCEMENT MEASURES

Activity/Concern		Potential Mitigation or Enhancement Measures	Timing	Accountability
Procurement Policies	1.	Adhere to all principles and guidelines outlined in the Trans Mountain Expansion Project's General Procurement Policy.	Pre-construction; construction; operations	Trans Mountain; Contractors
	2.	Adhere to all principles and guidelines outlined in the Trans Mountain Expansion Project Aboriginal Procurement Policy.	Pre-construction; construction; operations	Trans Mountain; Contractors
Publicizing Procurement Opportunities	3.	Provide information about procurement opportunities to potential Aboriginal, regional, provincial and Canadian suppliers using various communication means.	Pre-construction; construction	Trans Mountain
	4.	Maintain an online procurement registry where interested parties can register their capabilities and express interest in providing goods or services to the Project.	Pre-construction; construction	Trans Mountain
	5.	Hold meetings with Project General Contractors to review all procurement policies and expectations, including those related to Aboriginal, regional, provincial and Canadian content.	Pre-construction; construction	Trans Mountain
Tracking and Reporting of Procurement	6.	Require Project General Contractors to describe plans to identify, track and report Aboriginal, regional, provincial and Canadian content in their bid proposals.	Pre-construction; Construction	Trans Mountain; Contractors
	7.	Require Project General Contractors to identify, track and report Aboriginal, regional, provincial and Canadian content in their regular reporting to Trans Mountain.	Pre-construction; Construction	Trans Mountain; Contractors
	8.	Track Aboriginal, regional, provincial and Canadian contracts awarded.	Pre-construction; Construction	Trans Mountain
Regional and Aboriginal Procurement Enhancement	9.	Continue to engage with Aboriginal communities regarding regional Aboriginal businesses/Contractors, including available business services and capacity.	Pre-construction; Construction	Trans Mountain; Contractors

PROCUREMENT MITIGATION AND ENHANCEMENT MEASURES

Activity/Concern	Potential Mitigation or Enhancement Measures	Timing	Accountability
Regional and Aboriginal Procurement Enhancement (cont'd)	10. Develop and implement a process to share information at the regional level in a timely manner about general Project procurement needs and required qualifications, so businesses can prepare.	Pre-construction; Construction	Trans Mountain; Contractors
	11. Work with Contractors to give first consideration to qualified regional suppliers of goods and services, where practical and in conformance with procurement policies.	Pre-construction; Construction	Trans Mountain; Contractors
	12. Establish and implement a process for the use of qualified regional Aboriginal Contractors for operations phase maintenance contracts.	Operations	Trans Mountain
Regional Business Opportunities	13. As part of ongoing communications in advance of construction, provide updated information at the community level on anticipated Project workforce, detailed construction schedule and Worker Accommodation Strategy so that local businesses can plan accordingly.	Pre-construction; Construction	Trans Mountain

8.4.2 Employment and Training

In order to enhance the employment and training opportunities related to the Project, Trans Mountain and its Contractors will take active steps to maximize the use of Aboriginal, regional, and provincial labour during the construction and operation of the Project. This subsection describes the employment related mitigation and enhancement measures that will be implemented as a result of the Project. Discussion of potential Project effects related to employment and economy, including training and capacity development, are found in Section 7.2.7 of Volume 5B.

Many of the mitigation measures focuses on actions that Trans Mountain will take to provide timely and relevant information about construction and operations employment opportunities to potential workers, local and regional employment and economic development organizations, regulatory authorities, educational institutions and other groups with an interest in Project training and employment. The purpose is to provide timely information in sufficient detail to facilitate planning and preparation by interested individuals and groups.

Many of the procurement-related measures in Section 4.1 will also support the enhancement of employment opportunities, as businesses successful in winning Project-related service contracts may also expand employment opportunities to meet direct Project needs.

EMPLOYMENT AND TRAINING MITIGATION AND ENHANCEMENT MEASURES

Activity/Concern	Potential Mitigation or Enhancement Measures	Timing	Accountability
Regional Employment	1. Develop and implement a program to enhance awareness of pipeline and facilities construction and operations jobs and career opportunities in cooperation with business, industry, community and education and training organizations.	Pre-construction; Construction; Operations	Trans Mountain
	2. Create an online employment communications tool where potential workers who are interested in employment can register to receive regular updates on employment opportunities.	Pre-construction; Construction	Trans Mountain
	3. Include regional employment clauses in all Project contracts, outlining expectations and requirements to report on regional hiring.	Pre-construction; Construction	Trans Mountain; Contractors
Aboriginal Employment	4. Maximize the hiring of on-reserve and off-reserve Aboriginal community members.	Pre-construction; Construction	Trans Mountain; Contractors
	5. Evaluate Contractors' recruitment and selection processes to ensure opportunities will be available to Aboriginal workers.	Pre-construction; Construction	Trans Mountain; Contractors
	6. Continue to communicate with Aboriginal communities to discuss issues and interests related to employment opportunities.	Pre-construction; Construction	Trans Mountain

EMPLOYMENT AND TRAINING MITIGATION AND ENHANCEMENT MEASURES

Activity/Concern	Potential Mitigation or Enhancement Measures	Timing	Accountability
Build Awareness of Work Opportunities	7. Develop and implement a communications plan to share information about types of work opportunities related to the Project; coordinate efforts with government and educational organizations.	Pre-construction; Construction	Trans Mountain
	8. Develop and provide typical job descriptions, including skills and qualifications required to support employment opportunities.	Pre-construction; Construction	Trans Mountain
	9. Develop and provide a list of skills typically required during pre-construction, construction and operations.	Pre-construction; Construction	Trans Mountain
	10. Communicate employment opportunities to interested parties and authorities/ agencies in a timely manner.	Pre-construction; Construction	Trans Mountain; Contractors
	11. Ensure Contractors communicate upcoming employment opportunities directly to Project area employment offices, women's organizations and Aboriginal communities and organizations.	Pre-construction; Construction	Trans Mountain; Contractors
Hiring Practices	12. Give first consideration for employment opportunities to qualified regional and Aboriginal residents with appropriate skills and qualifications, where possible.	Pre-construction; Construction	Trans Mountain; Contractors
	13. Include hiring practices and reporting requirements in tender and contract documents.	Pre-construction; Construction	Trans Mountain; Contractors
	14. Require that General Contractors report to Trans Mountain their steps taken to attempt to hire within the Project area and nationally and report the number of hires from Project area Aboriginal residents and other regional residents.	Pre-construction; Construction	Trans Mountain; Contractors
Worker Support to Enhance Retention	15. To support worker retention, develop a Code of Conduct for employees and contracted workers that provides respectful workplace behaviour expectations.	Pre-construction; Construction	Trans Mountain; Contractors
	16. Provide orientation to all workers including expectations of respectful workplace behaviour, as outlined in the Code of Conduct.	Pre-construction; Construction	Contractors

EMPLOYMENT AND TRAINING MITIGATION AND ENHANCEMENT MEASURES

Activity/Concern	Potential Mitigation or Enhancement Measures	Timing	Accountability
Worker Support to Enhance Retention (cont'd)	17. Require Contractors to provide Aboriginal and community awareness training for all workers in supervisory positions (*i.e.,* foremen level and higher).	Pre-construction; Construction	Trans Mountain; Contractors
	18. Develop a mentorship program for Aboriginal workers to encourage work site integration and retention.	Pre-construction; Construction	Trans Mountain
	19. Provide Aboriginal/Community Liaison workers to liaise with appropriate resources and with Contractors.	Construction	Trans Mountain
Training	20. Initiate an Aboriginal Employment and Training Program to support increased access to Aboriginal employment opportunities on the Project.	Pre-construction; Construction	Trans Mountain
	21. Continue to collaborate with regional training providers to identify ongoing opportunities for Trans Mountain to facilitate, support or participate in delivery of training for Aboriginal communities.	Pre-construction; Construction	Trans Mountain
	22. Provide information in a timely manner to educators and governments about the types of Project-related jobs that will be available, and the required skills and qualifications, to assist training providers in developing and implementing appropriate training.	Pre-construction; Construction	Trans Mountain
	23. Work with Contractors and labour organizations to encourage Project Contractors to provide training and apprenticeship opportunities related to the work they perform, including opportunities for on-the-job training on the Project.	Pre-construction; Construction	Trans Mountain

8.4.3 Traffic

In order to reduce the possibility of traffic-related injuries and reduce the burden on existing road users and lessen affects to road infrastructure, Trans Mountain and its Contractors will take steps to actively manage road usage and disturbance to local users.

This subsection discusses mitigation measures that are relevant for effects associated with public safety and road infrastructure. Discussion of the potential effects associated with traffic-related injuries can be found in Section 7.2.8 of Volume 5B.

TRAFFIC MITIGATION MEASURES

Activity/Concern		Potential Mitigation Measures	Timing	Accountability
Traffic Estimates	1.	Develop estimates of Project-related traffic volumes associated with all Project components, related to both the movement of workers and the movement of equipment and materials.	Pre-construction	Trans Mountain
	2.	Continue to consult with the BC Ministry of Transportation, the Alberta Ministry of Transportation and relevant municipalities regarding traffic volumes anticipated and traffic management protocols.	Pre-construction; Construction	Trans Mountain; External Authorities/ Agencies
Traffic Management	3.	Develop a Traffic and Access Control Management Plan.	Pre-construction	Trans Mountain
	4.	Develop Traffic Control Plans for site-specific sections of roads affected by the Project, and obtain approval for them from applicable provincial and municipal regulatory authorities as required.	Construction	Contractors
	5.	Develop a communication plan for activities that affect normal traffic flow, such as road closures, detours, etc.	Construction	Contractors
Worker Transportation	6.	Where possible, provide daily shuttle bus service from designated staging areas to work sites in order to reduce the volume of construction traffic on the road.	Construction	Trans Mountain; Contractors
	7.	Actively encourage carpooling for times when shuttles/buses is not practical or available.	Construction	Trans Mountain; Contractors
Traffic Routing and Movement	8.	Follow acceptable heavy truck routes and approved access routes.	Construction	Contractors
	9.	Determine if bridge restriction and oversize load permits from municipalities are necessary.	Pre-construction	Trans Mountain; Contractors
	10.	Communicate with local police and emergency services personnel to keep these organizations informed of traffic schedules and enlist their services as needed.	Pre-construction; Construction	Contractors

TRAFFIC MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Driving Behaviour	11. Develop mandatory minimum driving standards for Contractors that include but are not limited to: submission of driver's abstract for any person driving a Project vehicle; the use of seat belts; the prohibition of drug and alcohol use while operating motor vehicles; no cell phone use; and driving to road conditions at all times while not exceeding posted speed limits. Driving standards will apply equally to Project employees and to Contractors.	Pre-construction	Trans Mountain
	12. Develop and implement a driver safety awareness program as part of employee orientation.	Pre-construction; construction	Contractors
Vehicle Monitoring	13. Monitor all travel-related incidents involving Trans Mountain personnel or Contractors; review this information regularly and take action to respond to incidents and to reduce risk.	Construction	Trans Mountain; Contractors
	14. Follow up all complaints raised by local organizations or residents related to driving behaviour or safety, and work with local organizations to address these concerns where practical.	Construction	Trans Mountain

8.4.4 Worker Accommodation

Trans Mountain and its Contractors will take active steps to minimize pressures on local housing markets, while balancing the potential positive economic effects related to use of local rental/hotel accommodations by workers. Trans Mountain and its Contractors will also take active steps to ensure that any work camps related to the Project are designed and managed to support well-being of workers residing there and to reduce social effects on construction hub communities.

This subsection describes the mitigation measures that will be implemented as a result of the Project related to housing of direct Project workers. Discussion of potential Project effects related to infrastructure and services, including housing, are found in Section 7.2.5 of Volume 5B. A discussion of potential Project effects related to community health, including worker wellness, is found in Section 7.2.8 of Volume 5B.

WORKER ACCOMMODATION MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Worker Accommodation Strategy	1. Continue to refine Project workforce estimates, construction schedule and construction hub locations, in order to plan for direct Project accommodation needs.	Pre-construction; Construction	Trans Mountain
	2. Monitor temporary, short-term and rental housing and accommodation availability in potential construction hub communities.	Pre-construction	Trans Mountain
	3. Develop and implement a Worker Accommodation Strategy in collaboration with Contractors and local municipalities, which considers a range of worker housing options, including: • temporary construction camps in select locations (*e.g.*, Edson, Blue River and Clearwater/Vavenby); • pre-booking hotel and motel space; and • working with regional organizations to identify anticipated extended-stay recreational vehicle spaces.	Pre-construction; Construction	Trans Mountain; Contractors
Camp Conditions	4. Ensure construction camps meet all provincial health and safety requirements.	Pre-construction; Construction	Contractors
	5. Include information about camp potable water and sewage needs projections in Project information that is shared on a regular basis with local municipalities.	Construction	Trans Mountain; Contractors
Camp Amenities	6. Provide access to health services at all construction camps.	Construction	Trans Mountain; Contractors
	7. Provide recreational amenities in camps (*e.g.*, leisure/fitness areas).	Construction	Trans Mountain; Contractors
	8. Ensure camp residents have access to information about worker assistance and social services support systems.	Construction	Contractors

WORKER ACCOMMODATION MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Camp Security	9. Ensure camp operators provide security services at all construction camps.	Construction	Contractors
	10. Establish a point of contact in each camp for the local police, fire and ambulance detachments to contact in the event of incidents, investigations, etc.	Pre-construction; Construction	Trans Mountain; Contractors

8.4.5 Worker Health

While enhancing the economic prosperity for communities and businesses, Trans Mountain and its Contractors will take active steps to maintain a healthy workforce as well as minimize negative health implications for communities related to the presence of temporary workers.

This subsection describes the mitigation measures that will be implemented as a result of the Project related to worker health and other community/worker interactions not managed by other measures. Discussion of potential Project effects related to social and community well-being and community health are found in Sections 7.2.3 and 7.2.8, respectively, of Volume 5B.

WORKER HEALTH MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Workplace Hygiene Facilities and Procedures	1. Place hand-washing stations in communal areas of work camps, including cafeterias, washrooms and recreation areas.	Construction; Operations	Trans Mountain; Contractors
	2. Make hand sanitizer dispensers available in common areas, including any eating areas, where hand-washing stations are not feasible.	Construction; Operations	Trans Mountain; Contractors
	3. Ensure adequate strategies are put in place for cleaning up and/or disinfecting areas of potential human contamination at work sites. Where regulations and standards exist for other areas, such as food handling, these must be followed.	Pre-construction	Trans Mountain; Contractors
Policies on Infectious Workers	4. Prohibit workers from coming to or remaining in camp or at worksites while they show symptoms of highly contagious diseases.	Construction; Operations	Contractors
	5. Arrange for private transportation of workers exhibiting symptoms of highly contagious disease.	Construction; Operations	Contractors
	6. Report outbreaks of notifiable infectious disease in camps to local health authorities.	Construction	Contractor; External Authorities/ Agencies
Worker Mental Health	7. Provide opportunities at Project accommodations for employees to connect electronically and/or by phone with family and friends.	Construction	Trans Mountain; Contractors

8.4.6 Human Occupancy and Resource Use

Trans Mountain and its Contractors will take active steps to minimize and manage the potential effects related to disruption of and disturbance to areas of human land and resource.

This subsection describes the mitigation measures that will be implemented as a result of the Project to minimize Project-related effects related to human occupancy and resource use indicators, including parks and protected areas, residential use, agricultural use, outfitting, non-tradition hunting, trapping and fishing. Discussion of potential Project effects related to human occupancy and resource use are found in Section 7.2.4 of Volume 5B.

HUMAN OCCUPANCY AND RESOURCE USE MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Disturbance of Natural or Built Features With a Human Use Area	1. Reduce disturbance of valued natural features with a non-traditional human use (*e.g.*, recreational trails, recreational use areas, key use areas within parks and protected areas) during final route selection to the extent practical.	Pre-construction	Trans Mountain
	2. Avoid disturbance of built features during final route selection, to the extent practical.	Pre-construction	Trans Mountain
	3. Narrow the construction right-of-way at key locations to avoid valued built or natural features, to the extent practical.	Pre-construction	Trans Mountain
	4. Reduce the amount of land disturbed by using previously disturbed areas for stockpiles, staging areas and camps where possible.	Pre-construction	Trans Mountain
	5. Avoid disturbance to ornamental trees, windbreaks and shelterbelts on landowner property, to the extent practical.	Construction	Contractors
Notification of Construction and Physical Works	6. Provide provincial and federal regulatory authorities; Aboriginal communities; affected landowners, occupants and Crown tenure holders and recreational organizations with final routing information, including maps, as well as construction schedule information.	Pre-construction	Trans Mountain
	7. Install signs in parks and protected areas and known recreational use areas in the vicinity notifying users of construction activities and timing.	Construction	Contractors
	8. Install construction notification signs at road crossings, navigable watercourse crossings and rail crossings, as needed.	Construction	Contractors
	9. Ensure closure signage is placed on the affected established trails or trailheads.	Construction	Contractor

HUMAN OCCUPANCY AND RESOURCE USE MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Notification of Construction and Physical Works (cont'd)	10. Develop and implement a communication plan for sharing information about key Project construction milestones and information with the general public in affected areas.	Pre-construction; Construction	Trans Mountain; Contractors
	11. Contact appropriate regulatory authorities (*e.g.*, AESRD, BC Ministry of Forests, Lands and Natural Resource Operations, Alberta Tourism, Parks, and Recreation, BC Parks, Parks Canada, etc.) and municipal tourism offices prior to construction activities and provide maps and schedules of the proposed construction activities to enable them relay information about possible trail and recreational use area closures.	Pre-construction	Trans Mountain
	12. Ensure any changes in planned timing or location of construction activities is communicated to the public, appropriate municipal and regional regulatory authorities, Aboriginal communities, landowners, occupants, Crown tenure holders and formal recreation organizations in affected areas.	Pre-construction; Construction	Trans Mountain; Contractors
Access	13. Maintain access to established recreation features, through the clearing, construction and reclamation period, where practical.	Construction	Contractors
	14. Deactivate and reclaim temporary access routes and sites required to construct the Project once Project construction is complete.	Construction	Contractors
	15. Place signage on access roads in the vicinity of the construction activities to ensure users are aware that construction activities are taking place.	Construction	Contractors
	16. Bore under paved and high use roads where practical.	Construction	Contractors
	17. Where minor roads are crossed that may affect established community use/access routes, complete open cut crossing within one day, to the extent practical.	Construction	Contractors
	18. For construction in urban areas that affects traffic routes, establish alternate access routes for commercial or residential areas where applicable and practical.	Construction	Contractors
	19. Coordinate pipeline construction activity to ensure access to traditional subsistence hunting and fishing areas.	Pre-construction; Construction	Trans Mountain; Contractors

HUMAN OCCUPANCY AND RESOURCE USE MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Managed Forest Areas	20. Notify and consult with all affected timber tenure licensees or other permit holders prior to construction.	Pre-construction	Contractors
	21. Work with BC Ministry of Forests, Lands and Natural Resources to identify appropriate measures to manage effects on Old Growth Management Areas.	Pre-construction	Trans Mountain
Disruption of Areas Used For Business or Livelihood	22. Contact the following prior to clearing and construction activities, providing maps and schedule information to enable them to select alternate areas for their activities: • trappers of affected registered fur management areas and traplines • guide-outfitters in relevant wildlife management units; and • commercial recreation tenure holders.	Pre-construction	Trans Mountain
	23. Provide compensation, considering various forms, to affected trappers according to established industry and provincial protocols if reduced fur harvest and lost revenue is proven.	Pre-construction	Trans Mountain
	24. Notify all affected mineral, aggregate and oil and gas tenure/disposition holders before construction to coordinate planned activities and secure agreements, as necessary.	Pre-construction	Trans Mountain
	25. Provide compensation, considering various forms, to private land and property owners according to established industry protocols where losses or damages are proven.	Pre-construction	Trans Mountain
	26. Include any site-specific mitigation identified through consultation with affected parties or as included in easement agreements in the final Construction Line List for use by Contractors.	Pre-construction	Trans Mountain

8.4.7 Sensory Disturbance

In order to minimize changes to ambient conditions caused by Project-related sensory disturbances, Trans Mountain and its Contractors will take active steps to limit their production of noise, dust, odours and night lighting.

This subsection describes the sensory disturbance-related mitigation measures that will be implemented as a result of the Project. A discussion of potential Project-related effects on noise is provided in Section 7.2.6 and air emissions (*e.g.,* dust, odours) in Section 7.2.4 of Volume 5A.

SENSORY DISTURBANCE MITIGATION MEASURES

Activity/Concern		Potential Mitigation Measures	Timing	Accountability
Nuisance Sensory Disturbance	1.	Employ all measures in the EPPs related to management of noise, air emissions, dust, odours, lighting, and litter/waste.	See EPPs (Volume 6B to 6D)	See EPPs (Volume 6B to 6D)
	2.	Notify potentially affected residents of any major construction activities that will occur at night.	Construction	Contractors
Visual Screening	3.	Employ all mitigation measures in the EPPs related to visual screening during construction and operations.	See EPPs (Volume 6B to 6D)	See EPPs (Volume 6B to 6D)
	4.	Replace ornamental trees and other vegetation disturbed during construction or site-specific maintenance on residential and commercial properties, as per landowner agreements.	Construction; Operations	Trans Mountain; Contractors
	5.	During reclamation, use seeds that ensure vegetation regrowth blends with adjacent vegetation.	Construction; Operations	Contractors

8.4.8 Emergency Management Planning

In order to minimize disturbance to local emergency management and response systems along the Project route and protect the availability of emergency medical systems to local residents during construction, Trans Mountain and its Contractors will take active steps to supply their own emergency management systems. In addition, Trans Mountain and its Contractors will communicate and work with local service providers to coordinate response planning in the event resources external from the Project are required during an emergency.

Effects on emergency management planning are not anticipated for operations, as Trans Mountain's current emergency response regime will not change or need to change in the context of the expanded operating system. Trans Mountain will continue to use the Incident Command System which is designed to adapt to changing operational circumstances. Trans Mountain anticipates it will increase the amount of its own Project-specific emergency response equipment (*e.g.*, skimmers, booms, absorbent, upgrades of fire water systems at expanded terminals), or downgrade for deactivated facilities, to reflect the expanded operating system.

This subsection describes the emergency management and response planning-related mitigation measures that will be implemented as a result of the Project. Potential Project effects related to emergency response are discussed in Section 7.2.5 and Section 7.2.8 in Volume 5B.

The requirement for an ERP will be initiated within the TMEP HSMP as discussed in Volume 4C. Specifically, the TMEP HSMP will require a Project ERP to be completed by Trans Mountain. The Project ERP, based on applicable occupational health and safety legislation, minimum Trans Mountain standards, and industry best practices, will outline the specific requirements Contractors' site-specific ERPs must meet. Some of the key components of the site-specific ERPs that will assist in mitigating potential Project effects on regional emergency and medical services are noted below.

EMERGENCY MANAGEMENT MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Emergency Response	1. Prepare a Project ERP that covers the Project construction phase.	Pre-construction	Trans Mountain
	2. Develop site-specific ERPs.	Construction	Contractors
	3. Consult with emergency response agencies and municipal emergency planners regarding ERPs, as required, to ensure understanding of potential Project-related service needs.	Pre-construction; Construction;	Trans Mountain; Contractors
	4. Provide key Project contact numbers, pipeline route maps, the construction schedule and emergency response program information to local and regional police services, fire departments and medical/health services.	Pre-construction; Construction;	Trans Mountain; Contractors
Onsite Medical Assistance	5. Supply medical personnel and equipment to work sites, including camps, meeting applicable occupational health and safety regulations, as a minimum, including the use of Emergency Medical personnel, Emergency Transport Vehicles, and First Aid rooms	Construction	Contractors
	6. Establish contracts for the use of air evacuation in the event of serious injury in more remote locations.	Construction	Contractors

EMERGENCY MANAGEMENT MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Onsite Medical Assistance (cont'd)	7. Provide worker medical information, as allowable under privacy legislation, in the event of a personal injury emergency.	Construction	Contractors
	8. Provide chemical information in the form of Material Safety Data sheets in the event of an exposure.	Construction	Contractors
	9. Ensure fire protection and fire response is available, meeting applicable regulations.	Construction	Contractors
	10. Ensure spill prevention and spill response equipment is available meeting applicable regulations.	Construction	Contractors
Public Safety	11. Provide appropriate levels of security at camps and worksites. This will reduce the potential for external events to affect Project personnel, at the same time reducing diversion of emergency services from regional residents.	Construction	Contractors

8.4.9 Other Regional Infrastructure and Services

Trans Mountain and its Contractors will take active steps to minimize pressures put on local health care services, social services and waste and water services.

This subsection describes the mitigation measures that will be implemented as a result of the Project related to regional infrastructure and services, specifically health care and waste and water. Discussion of potential Project effects related to infrastructure and services are found in Section 7.2.5 of Volume 5B for waste and water, and Section 7.2.8 of Volume 5B for health care service provision.

REGIONAL INFRASTRUCTURE AND SERVICES MITIGATION MEASURES

Activity/Concern	Potential Mitigation Measures	Timing	Accountability
Interaction with Local Health, Emergency Medical, and Social Services	1. Communicate with local health authorities, emergency medical service authorities, social service authorities on the timing of the Project, duration of stay in the local community, expected number of people coming into the area and onsite health care plans.	Construction	Trans Mountain; Contractors
Interaction with Waste and Water Facility Operations	2. Communicate with operators of pre-approved waste facilities to determine options for Project-related waste disposal.	Pre-construction; Construction	Trans Mountain
	3. Include information about camp potable water and sewage needs projections in Project information shared with local municipalities.	Pre-construction; Construction	Trans Mountain
	4. Withdraw water required for the Project from approved sources as per permit and approval conditions; return water to appropriate watersheds in accordance with permit conditions.	Pre-construction; Construction	Trans Mountain; Contractors
Linear Infrastructure Crossings	5. Continue discussions with municipalities and regional regulatory authorities regarding restrictions related to the presence of the proposed pipeline in relation to municipal sub-surface infrastructure and future infrastructure planning.	Pre-construction, Construction, Operations	Trans Mountain; Contractors

8.4.10 Navigation and Navigation Safety

In order to enhance/avoid safety risks pertaining to the Project's interface with navigable waters, Trans Mountain and its Contractors will take active steps to reduce effects on navigable waterways and ensure the safety and use continuation of waterway users.

This subsection describes the navigation-related mitigation measures that will be implemented as a result of the Project. Potential Project-related effects on navigation and navigation safety are discussed in Section 7.2.6 of Volume 5B.

NAVIGATION AND NAVIGATION SAFETY MITIGATION MEASURES

Activity/Concern		Potential Mitigation Measures	Timing	Accountability
Notification	1.	Communicate with marine and local fishing industry organizations, Aboriginal groups, marine recreation organizations and other affected stakeholders to provide Project information related to Project activities affecting marine use areas.	Pre-construction; construction	Trans Mountain; Contractors
Facilitate Ongoing Navigation	2.	Allow navigation on non-marine waters through the construction site where practical, assisting if necessary (*e.g.,* have the ability to transport watercourse users around construction activity to a downstream watercourse re-entry point).	Construction	Contractors
	3.	Restore natural contours of bed of watercourse to promote navigability.	Construction	Contractors
	4.	Stabilize disturbed shoreline to prevent erosion.	Construction	Contractors
	5.	Keep channel clear upon completion of construction.	Construction	Contractors
Navigation Safety	6.	Where water is present in watercourses at the time of construction, refer to all EPP measures pertaining to navigable waters, water crossings, and navigation safety.	See EPPs (Volume 6B to 6D)	See EPPs (Volume 6B to 6D)

8.4.11 Community Way-of-Life

This subsection presents a suite of mitigation measures that are unique but possibly related to other potential effects not previously mentioned. Strategies in this subsection intend to address effects related to Aboriginal communities, community relations, interactions between workers and community members, and consequences of worker non-compliance with the many mitigation measures proposed in this document as well as the EPPs.

A discussion of potential Project effects related to Aboriginal communities is found in Sections 7.2.2, 7.2.3, 7.2.4, and 7.2.8 of Volume 5B. Discussion of potential effects related to community relations and interactions between workers and community members are found in Sections 7.2.3 and 7.2.8 of Volume 5B.

COMMUNITY WAY-OF-LIFE MITIGATION MEASURES

Activity/Concern		Potential Mitigation Measures	Timing	Accountability
Ongoing Engagement and Communication	1.	Continue communication and engagement with stakeholders as the Project progresses.	Pre-construction; Construction; Operations	Trans Mountain
Issues Tracking	2.	Develop and implement an issues tracking process to monitor and respond to Project-related socio-economic issues and opportunities that emerge during construction and reclamation.	Pre-construction; Construction	Trans Mountain; Contractors; External Authorities/ Agencies
Project-Community Interaction	3.	Develop a Code of Conduct for employees and Contractors that provides guidance and policies on appropriate and inappropriate worker behaviour and community interactions.	Pre-construction	Trans Mountain
	4.	Establish a process by which community members can raise complaints or concerns related to Project activities or workers. Ensure this process includes protocols for timely follow-up by Trans Mountain and/or its Contractors and transparent issue resolution, and communicate this process to communities.	Construction; Operations	Trans Mountain
	5.	Endeavour to align construction schedules around statutory holidays and key community events, to the extent practical.	Construction	Trans Mountain; Contractors
	6.	Adhere to a policy of no tolerance of use or being under the influence of illicit drugs or alcohol during work hours.	Construction; Operations	Trans Mountain; Contractors
Consequence of Worker Non-Compliance	7.	Establish and enforce a policy whereby workers who disregard the mitigation measures outlined above will be subjected to appropriate disciplinary measures including, if appropriate, removal from the work site and/or dismissal.	Construction; Operations	Trans Mountain; Contractor

Towards the end of the construction phase, Trans Mountain will engage with municipal officials and other key stakeholders in construction hub communities to elicit feedback on Project-related community experiences during the construction period. Based on this, as well as issues-tracking feedback received throughout construction, Trans Mountain will develop a lessons learned document to share with affected communities, and for its own use and its Contractors' future use.

9.0 TIMBER SALVAGE MANAGEMENT PLAN

(PLACE HOLDER - To be developed prior to construction)

10.0 TRAFFIC AND ACCESS CONTROL MANAGEMENT PLAN

The Traffic and Access Control Management Plan addresses the management of pipeline construction traffic and access along the construction right-of-way and temporary access routes (see also Volume 4C). This plan also addresses the activities during pre-construction, construction (pipe installation) and construction clean-up and reclamation phases of the Project and provides guidelines for vehicular use on the construction right-of-way and associated access roads, as well as blocking and/or controlling access to previously inaccessible portions of the right-of-way following construction and throughout the operation phase of the Project. The intent of the mitigation is to reduce disturbances caused by access, construction equipment and vehicle traffic, during and following pipeline construction and, in particular, on lands with sensitive wildlife areas, riparian areas and in areas of high soil erosion hazard. All vehicle and equipment operators will adhere to the contingency measures for thawed conditions outlined in the Wet/Thawed Soils Contingency Plan (see Appendix B).

The Traffic and Access Control Management Plan is a supplement to, and not a replacement for, the Traffic Control Plan to be prepared by the Prime Contractor.

The objectives of the Traffic and Access Control Management Plan will be accomplished by minimizing the development of access routes, controlling public access along the construction right-of-way, selecting appropriate access routes that cause the least disturbance to high quality, sensitive wildlife habitat, managing traffic on these routes and determining appropriate construction reclamation. Trans Mountain will work with applicable resource managers, traditional land and resource users, as well as other affected stakeholders (*e.g.,* non-traditional trappers, etc.) to define locations where access control is necessary, and what type(s) of access control will be implemented.

Access will be managed, where required, along the Project where new temporary and permanent access is created for the construction and operation of the pipeline. To mitigate environmental effects associated with increased access, which could further lead to increased concentrations of hunting and fishing activities at previously unattainable locations, increased predation of wildlife, disturb reclamation efforts on sensitive terrain, and other anthropogenic disturbances, Trans Mountain will manage access along portions of its right-of-way where new access is/was created by implementing one or more of the mitigation measures to manage access during the pre-construction, construction and post-construction phases.

10.1 Pre-Construction

Access roads will be developed prior to clearing of the construction right-of-way.

The applicable regulatory authority will be notified of all access road upgrading requirements and Trans Mountain will accommodate continued public access during pipeline construction whenever feasible.

The Project will implement and adhere to the following guidelines and mitigation measures.

- Once approval for the Project has been granted, determine all necessary permits that are necessary prior to the initiation of pre-construction work.

- Trans Mountain will work with applicable regulatory authorities, traditional land and resource users and other potentially affected stakeholders when completing the final design for managing access along the construction right-of-way. Final access management measures to be implemented at any given location along the right-of-way will be determined during the detailed design phase of the Project prior to construction. The applicable measure(s) to be implemented during construction will be mapped on the Construction Access Plan to be developed by the Contractor and issued prior to construction.

- For existing access routes, Trans Mountain will implement access management in a similar fashion as current pipeline operators, where Trans Mountain parallels existing pipeline rights-of-way.

- All motorized vehicles, including ATVs, will be confined to the construction right-of-way and approved access roads, shoo-flies or trails except where specifically authorized by the landowner and occupant. This restriction also applies to all biophysical inventory and land surveying activities.

- Travel through areas of high sensitivity (*e.g.,* native grassland) will be primarily on foot, however, ATVs may be used for increased efficiency if minimal terrain effect is anticipated. Vehicle travel through native grassland and riparian areas will be restricted to one pass along the construction right-of-way where practical.

- Prior to the commencement of construction activities, site-specific features of concern (*e.g.,* rare plant communities or heritage resource sites) identified during biophysical surveys will be flagged sufficiently (if approved by landowner and occupant) so that subsequent traffic can avoid these areas.

- All pre-construction vehicle traffic will use existing vehicle crossings (*e.g.,* existing bridge) to cross flowing watercourses. Fording of flowing streams by vehicles will not be permitted.

- Pre-construction vehicle traffic will be suspended if excessively wet soil conditions and the potential for topsoil/subsoil mixing due to rutting exists. Traffic will be confined to well-sodded, well-drained or frozen lands during excessively wet soil conditions.

- Pre-construction access through wetlands and riparian areas will be primarily by ARGO for increased efficiency and minimal effects on terrain.

10.2 Construction

During construction, the Project will implement and adhere to the following guidelines and mitigation measures.

- All Project personnel and other visitors to the construction right-of-way will receive a pre-job orientation which will include a discussion of the purpose and requirements of the Traffic and Access Control Management Plan. All project roads and access points to the right-of-way will be controlled using signage, gates, barricades or security personnel, where necessary, to prohibit unauthorized public use. Single lane roads and certain forestry haul roads may require radio control of traffic for safety purposes. Trans Mountain and their Contractor will develop a communication protocol prior to construction.

- Existing linear disturbances (*e.g.,* roads, pipeline rights-of-way) will be utilized as access wherever possible.

- Construction of shoo-flies will be limited within core caribou habitat.

- All vehicular traffic will be restricted to the approved and staked right-of-way, workspace and access roads. Any newly developed access must be approved by Trans Mountain.

- Fences and signs will be erected to protect features of concern as specified in the EPP. The boundaries of shoo-flies will be clearly marked with signs and/or staking and flagging.

- Construction and inspection personnel and visitors to the right-of-way and other work sites will receive instruction on locations suitable for parking vehicles and equipment.

- Trans Mountain, the Contractor and all subcontractor personnel will avoid areas that are fenced or staked and abide by any restrictions on in/out privileges that are implemented in areas requiring special protection.

- Trans Mountain, the Contractor and all subcontractor personnel will limit travel up and down the construction right-of-way during the course of the work. General touring trips on the right-of-way will be minimized.

- Special measures such as limiting of construction traffic, swamp mats or matting may be warranted in areas with poorly-drained and organic soils (see the Wet/Thawed Soils Contingency Plan in Appendix B).

- Signage will be posted at potential points of entry notifying Project personnel and the public of sensitivities with entering a Core Caribou Area.

- Construction personnel will be transported between the construction camps, construction yards and muster areas by multi-passenger vehicles to the extent practical, in order to reduce vehicle traffic between lodging, staging and work site locations.

- Two-way travel may be prohibited in areas where special restrictions are in effect (*e.g.,* narrowing of workspace to limit effect on a feature of concern).

- It may be necessary to designate turn-around areas for stringing trucks. These areas will only be used for that purpose and not used for general construction traffic.

- The speed limit on the right-of-way will be 30 km/hour and may be lower under specific conditions such as areas of high erosion hazard, low visibility, steep terrain or areas where specific wildlife or vegetation concerns have been identified (speed limits will be posted on the right-of-way and access created for the Project).

- All Project-related vehicles will follow applicable traffic, road use and safety laws.

- Speed limits will be obeyed in order to minimize the potential for collisions with caribou and for public safety.

- All personnel will avoid unnecessary wheel spin.

- Surface grading will be minimized on native vegetation (*i.e.,* rough micro-topography tolerated) unless a safety concern is identified.

- Equipment travel, particularly that of heavy and/or tracked equipment, will make use of the trench and travel lane areas for travel and passing whenever practical following topsoil/root zone material salvage and prior to trenching.

- Vehicles will be limited to travel on the access roads and right-of-way for which they are designed. Most vehicles are able to turn around within the width of the construction right-of-way. Stringing trucks require extra turning radius. Consequently, approaches to the construction right-of-way or existing public roads will be at least 15 m wide when used for stringing trucks. Where turnarounds are required on the right-of-way, extra space will be required, typically 30 m x 30 m to the travel side of the right-of-way. Previously disturbed areas will be used for this purpose, if feasible. Stringing trucks will be limited to access roads developed for their use, and other vehicles will not park in turnarounds developed for string truck use. Turn around areas require approval by applicable regulatory authorities.

- For existing access routes, Trans Mountain will implement access management in a similar fashion as current pipeline operators, where Trans Mountain parallels existing pipeline rights-of-way. For example, if a third-party operator has installed rollback across their right-of-way to deter access, Trans Mountain will also implement rollback over the construction right-of-way at the same location.

10.3 Construction Clean-up and Reclamation

Following the completion of pipe installation activities, all temporary construction access roads and shoo-flies will be reclaimed. Newly created access points will be blocked unless otherwise directed by Trans Mountain or the landowner/occupant or stakeholder. Reclamation efforts will be initiated and traffic will adhere to the following principles to ensure there is as little disturbance as practical.

During final clean-up and reclamation of access roads, the Project will implement and adhere to the following guidelines and mitigation measures.

- Efforts to control off-road vehicle use will be coordinated with the appropriate regulatory authority or land owner/occupant and will be conducted until the right-of-way has been satisfactorily reclaimed.

  - Foot traffic will be minimized on newly seeded areas until grass establishment has taken place. Vehicle traffic will be avoided on seeded areas until the sod is re-established.

- All temporary construction access roads and shoo-flies will be reclaimed as per the EPP. Newly created access points will be blocked unless otherwise directed by Trans Mountain or the appropriate regulatory authority. Temporary construction gates and any fences removed during construction will be replaced with permanent fences.

- Routine access to the right-of-way for operations, maintenance and monitoring activities will be by way of pre-existing roads and trails wherever feasible. Where travel along the right-of-way in the vicinity of sensitive vegetation is required (*e.g.,* during reclamation monitoring), foot travel will be used whenever feasible. ATVs/ARGOs will be used if necessary.

- Off-road vehicle use and travel by predatory wildlife will be deterred by rolling back timber and slash across the width of the right-of-way for approximately 100 m on either side of the intersection of existing access (*e.g.,* access trails, rights-of-way, seismic lines).

- Trees and/or shrubs will be planted at locations where new access is created where the pipeline crosses existing seismic lines, pipeline rights-of-way or trails.

- Trees and/or shrubs will be planted and rollback installed at locations where new access from existing access to the construction right-of-way will be constructed.

- Ditch ramps will be removed following construction where they were installed to facilitate access from existing roads to the construction right-of-way.

- The right-of-way will be re-graded to pre-construction profiles, where feasible and applicable, to deter vehicle and ATV/ARGO traffic along the right-of-way.

11.0 WASTE MANAGEMENT STANDARD

The Waste Management Standard has been prepared to provide guidelines for dealing with the generation of Project waste. This plan is submitted in accordance with the filing requirements outlined in the NEB *Filing Manual* (NEB 2013).

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

The Waste Management Standard applies to all employees, Contractors and consultants who conduct work on behalf of Trans Mountain during construction of the Project. All employees, Contractors and consultants will abide by all federal, provincial and local requirements for the storage, handling, transport, disposal and spill reporting requirements of all waste materials that are potentially hazardous to the environment.

The Environmental Inspector(s) are responsible for ensuring compliance with KMC's *Environmental Guidelines* or the most recent KMC environmental manual or environmental management plans available at the time of construction for waste management. Where a discrepancy occurs, the most stringent requirements will apply. In the event of a spill, the Spill Contingency Plan (see Appendix B) will be implemented. The Spill Contingency Plan sets forth the lines of communication and procedures to follow in order to facilitate containment and clean-up, should a spill occur.

Trans Mountain's Waste Management Standard will be provided in the Contractor's Construction Field Office for each spread.

1.0 INTRODUCTION

1.1 Scope

1.1.1 This Environmental Standard establishes the requirements that must be met while performing all work activities at Kinder Morgan Canada (KMC) in accordance with the Waste Management Program. This includes the requirements for handling, labelling, storing, and transporting wastes generated by work on or at KMC operated systems and facilities.

1.1.2 Any deviation from this Standard requires approval through the Facilities Modification Request (FMR) process.

1.2 Applicability

1.2.1 This document is applicable to all KMC employees and contractors with respect to any activity associated with waste management on the following (checked) KMC operated systems and facilities:

- ☑ Trans Mountain System
- ☑ Puget Sound System
- ☑ Jet Fuel System
- ☑ North 40 Terminal

1.3 Definitions

None

1.4 Background

1.4.1 Protection of the environment is a key priority of the public, industry, and government. One of the initiatives that KMC has implemented to accomplish this expectation is the environmentally responsible management of all waste generated by the company.

1.4.2 All types of waste, no matter how benign, can impact the environment and require responsible management to minimize and mitigate this impact. The Waste Management Program provides all employees and contractors with the tools to incorporate responsible waste management practices into their daily work routine and to

ensure that wastes are managed in accordance with applicable laws and regulations.

1.4.3 KMC operates facilities located in Canada and the United States. There are notable differences in how states and provinces regulate waste disposal. All employees involved in disposal activities must ensure that any waste intended for disposal or recycling is done so in accordance with the appropriate regulations for the province or state in which the waste is generated.

1.4.4 Both employees and contractors are responsible for preventing pollution by incorporating responsible waste management practices into work-related tasks on a daily basis. The results will lead to a cleaner environment, more efficient operations, and a safer workplace.

1.4.5 The Waste Management Program has been implemented to ensure compliance with regulatory requirements, protect human health and the environment, minimize costs and liabilities associated with managing wastes, and improve resource use and recovery in a managed and responsible manner.

1.4.6 This Standard is part of the Waste Management Program and states the requirements that must be met during all work activities.

2.0 ROLES AND RESPONSIBILITIES

2.1 Waste Program Coordinator

- Coordinates program management with third-party waste contractor
- Manages and coordinates third-party revisions to Waste Management Program
- Develops and implements waste training programs
- Participates in audits (as necessary) and corrective actions associated with waste documentation and processes
- Manages waste contractor selection for external auditing
- Acquires provincial waste generation numbers

2.2 Third-Party Waste Contractor

- Provides bin rental and pickup services
- Transports and disposes of routine and non-routine operational and project waste
- Provides technical waste support for field personnel
- Issues quarterly and annual waste tracking summaries to KMC for internal and external reporting
- Screens regulations/legislative requirements and provides updates to Waste Program Coordinator
- Reviews and updates KMC waste management documents as necessary
- Provides emergency waste services for petroleum releases i.e. onsite manifest completion, waste disposal coordination, etc.

2.3 Environment Manager

- Responsible for the overall Waste Management Program.
- Ensures the Environment Department has personnel and services in place to support the program.
- Designates a Waste Program Coordinator who will coordinate waste management activities associated with company facilities and operations.

2.4 EHS Coordinators

- Ensures applicable regulatory commitments are satisfied, including the acquisition of required permits and completion of government requested reports.
- Provides support and guidance to Operations and other departments on waste management issues.
- Assists in the acquisition of any required approvals for regional and project waste disposals.
- Responsible for record keeping and maintaining waste tracking documentation.
- Responsible for audit participation and corrective actions associated with facility audits.

2.5 Operations

- Coordinates day to day waste activities for their particular region, facility or activity.
- Ensures that only company approved waste contractors are used for generated waste transport and disposal.
- Ensures that all applicable waste training is received before conducting tasks associated with waste management.
- Responsible for completing station inspections which include Waste Storage Building Inspections.

2.6 Engineering

- Coordinates waste services for company projects.
- Ensures that only company approved waste contractors are used for generated waste transport and disposal.

2.7 Procurement Department

- Issues Master Service Agreement contracts with approved waste contractors.
- Provides support when surplus or used pipe, valves or fittings are sold or donated.

3.0 REQUIREMENTS

3.1 Waste Characterization and Classification

3.1.1 All wastes produced at KMC facilities and job sites shall be characterized and classified before long-term storage and disposal.

3.1.2  Characterization and classification shall be done by following Procedure *3.2.6.1 Classifying and Characterizing Waste*.

3.2 Waste Handling

3.2.1 All KMC employees who manage or handle waste must:

- Review and understand the applicable sections of the Waste Management Program.

- Be properly trained in the waste practices and procedures relevant to their work duties and have taken the KMC Waste Management Awareness training course.
- Ensure that all wastes are identified, handled, stored, transported, documented and disposed of or recycled in an environmentally acceptable manner and in compliance with federal, provincial/state, and municipal regulations.
- Report all spills or incidents in a timely manner according to KMC's incident reporting procedure (entry into STARS, emergency response line (ERL) notification, etc.).
- In Canada, review and understand Workplace Hazardous Materials Information System (WHMIS) and Transportation of Dangerous Goods (TDG) requirements before handling and disposing of wastes.
- In the United States, review and understand Hazardous Communication (HAZCOM), Department of Transportation (DOT) requirements for shipping dangerous goods, and Environmental Protection Agency (EPA) and state requirements for waste management.

3.3 Transportation of Wastes

3.3.1 All wastes produced at KMC facilities and job sites shall be transported in accordance with the applicable federal transportation requirements.

3.3.2 Transportation requirements are dependant on the properties of a substance, not whether it is waste or non-waste (unused); therefore, wastes must be transported with the same caution and compliance with transportation regulations as non-waste substances.

3.3.3  Transporting wastes shall be performed by following Procedure *3.2.7.3 Transporting Regulated Wastes – Documentation Guide*.

4.0 INSPECTIONS AND AUDITING

4.1 Inspections

4.1.1 All waste storage areas, including hazardous waste storage areas, shall be routinely inspected at least once every three months or as specified by the applicable regulations.

4.1.2 The inspections must document evidence of spills and leaks, corroded or damaged drums or tanks, missing labels, inadequate spill containment or weather protection, and current contents of wastes stored. A checklist shall be used for conducting routine inspections.

4.1.3  Inspections shall be carried out by following Procedure *3.2.6.2 Waste Storage and Inspections*.

4.2 Auditing

4.2.1 KMC shall undertake regular audits of waste contractors and internal operations where wastes are generated, handled, stored, transported, and disposed of or recycled.

4.2.2 Detailed information on waste auditing protocols and audit systems and schedules are developed and implemented by the Waste Program Coordinator.

4.2.3  Selecting waste contractors for waste disposal and ensuring they are approved for use by KMC shall be done by following Procedure *3.2.7.1 Selecting and Using Waste Contractors*.

5.0 QUALIFICATION AND TRAINING

5.1 KMC Employees who Manage or Handle Waste

5.1.1 All employees who handle, store, transport and dispose of waste must be qualified and have received waste management training. Waste training for KMC Technicians is a component of, and administered within, the KEEP Canada Program.

5.1.2 The type of training shall reflect the type (i.e. character and classification) of waste the employee is working with.

5.2 Contracting Companies that Transport or Dispose of Waste

5.2.1 Prior to handling, shipping, or disposing of any waste generated by KMC, contractors must review the Contractor Environmental/Safety Manual and understand the waste regulations that apply to KMC.

6.0 REFERENCES

6.1 Environmental Manual

- *3.2.6.1 Classifying and Characterizing Waste*
- *3.2.6.2 Waste Storage and Inspections*
- *3.2.7.1 Selecting and Using Waste Contractors*
- *3.2.7.3 Transporting Regulated Wastes – Documentation Guide*

6.2 Regulations

- National Energy Board, Onshore Pipeline Regulations, 1999
- Transport Canada, Transportation of Dangerous Goods Regulations
- Environment Canada, Interprovincial Movement of Hazardous Waste Regulations
- Alberta Environment and Sustainable Resource Development, Waste Control Regulation
- Alberta Environment and Sustainable Resource Development, Alberta Users Guide for Waste Managers
- Alberta Energy Resources Conservation Board (ERCB), Directive 55: Storage Requirements for the Upstream Petroleum Industry, Directive 58: Oilfield Waste Management Requirements for the Upstream Petroleum Industry, and Directive 66: Requirements and Procedures for Pipelines
- British Columbia Ministry of Environment, Hazardous Waste Regulation
- British Columbia Ministry of Environment, Hazardous Waste Legislation Guide
- Environmental Protection Agency, Resource Recovery and Conservation Act, 40 CFR §260-282
- Environmental Protection Agency, Hazardous Materials Regulations 40 CFR §273
- Department of Transportation, Pipeline and Hazardous Material Safety Administration (PHMSA) 49 CFR §171-185

- Washington State Department of Ecology, Dangerous Waste Regulations WAC 173-303
- Washington State, Chapter 70.105 RCW Hazardous Waste Management

12.0 WATER CROSSING CONSTRUCTION MONITORING MANAGEMENT PLAN

Background

The quality of water is determined by its biological, chemical and physical characteristics. Alteration of these characteristics can affect its potential value for the biotic species present and/or human need or purpose. If not mitigated, the Project's construction could negatively influence water quality primarily through sediment releases due to instream activities and project-related releases such as (among others):

- HDD activities;
- trenched watercourse crossing construction activities;
- sediment inputs in runoff from disturbed areas due to development activities (*i.e.,* clearing and grading); and
- hydrostatic test water withdrawal and discharge.

Aquatic resources can be protected when instream construction activities occur by ensuring that the TSS concentration does not exceed the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CCME 2007). The CCME guidelines indicate that a biologically important average increase in TSS concentration over a short-term period (*i.e.,* 24 hours) is 25 mg/L above the background level (CCME 2007). The guidelines also indicate that the recommended maximum average increase of TSS for sustained periods (*i.e.,* between 24 hours and 30 days) is 5 mg/L above background levels). Although regulatory authorities prefer to have TSS results, TSS analysis requires taking water samples that are sent to a lab for analysis. In contrast, turbidity readings can be taken in the field and can provide an instantaneous indication of a sediment event and its magnitude and has been an acceptable technique.

Turbidity measurements (in NTU) determine how particles in the water column reflect light and, therefore, can be used to provide an indirect measurement of TSS. The amount of light reflected for a given amount of particulates is dependent upon properties of the particles (*e.g.,* shape, colour and reflectivity). Different types of particles that can reflect light include suspended solids, tannins and phytoplankton. Thus, a correlation between turbidity and TSS is often unique for each location or situation.

For the reasons noted above, regulatory authorities such as DFO, typically allow proponents to monitor turbidity if the proponent determines the site-specific relationship between TSS and turbidity when warranted (*i.e.,* in the event of a frac-out or an exceedance of CCME guidelines). Typically, this relationship is established by collecting samples over the range of TSS concentrations that occur during a sediment event while simultaneously taking turbidity readings. After the TSS sample results are obtained from the lab, a relationship between TSS and turbidity can be determined. This relationship then allows turbidity results to be compared to exceedance criteria for TSS.

WQM typically occurs within a crossing's established zone of influence (ZOI). The ZOI is the reach of the watercourse that has the highest potential to be affected from construction activities associated with a watercourse crossing. The length of the ZOI is determined in the field based on the professional experience and judgment of the QAES (in Alberta) or QEP (in BC) who takes into account a variety of factors (*e.g.,* stream gradient, channel width, channel depth, channel morphology, flow velocity and discharge, and instream cover). The ZOI typically represents the area of the watercourse where 90% of the sediment load caused by construction activities is expected to fall out of suspension and be deposited (AENV 2000a,b).

The placement of WQM sampling transects needs to be strategic. Not only do the results from sampling at the transects help document the magnitude of sediment mobilization events and the potential effect they may have downstream, the results can also be used to help identify the location of the sediment source or, in the event of an HDD crossing, the location of drilling fluid release. During trenched construction, the source of sediment is often obvious. In these cases, the transect distribution focuses primarily on magnitude data collection. It has, therefore, been assumed that the potential ZOI at each crossing will remain unchanged regardless of whether trenchless or trenched methods are used. It should

be noted that if sampling results suggest that the expected ZOI does not extend far enough from the crossing site, the monitoring crew will adjust sampling locations accordingly.

WQM during watercourse crossing construction will be necessary at specific watercourse crossings in order to protect aquatic resources during and following construction, as well as to ensure compliance with applicable water crossing permit conditions. The methodology, frequency and duration of monitoring will vary depending upon the following considerations (among others):

- sensitivity of the aquatic resources at the crossing and within the downstream of the water crossing;
- regulatory requirements;
- pipeline and equipment crossing method;
- construction season and timing of instream construction activities; and
- flow characteristics of the watercourse at the time of crossing construction.

The duration of WQM occurring simultaneously with crossing construction may range from a few hours to one month or more and will be based on environmental and construction considerations prior to and throughout construction at each crossing. The results obtained during field studies will provide immediate feedback to evaluate the effectiveness of the watercourse crossing method and associated mitigation measures.

Objectives

The primary objective of the Water Crossing Construction Monitoring Management Plan is to ensure that the quality and quantity of watercourses crossed by the construction right-of-way are maintained and not adversely affected due to pipeline construction. The measures to be taken to achieve this objective include:

- assessment of water quality during both pre-construction and during construction conditions;
- provide information and immediate feedback to assist in protecting aquatic resources;
- identify key activities that have the potential to affect surface water quality;
- develop strategies and mitigation to reduce or avoid the potential effect as well as contingency measures to be implemented at the first indication of a potential adverse effect occurring; and
- closely monitor these activities and the effectiveness of the mitigation during construction.

Management Approach

Prior to watercourse crossing construction, information will be shared at start-up meetings where the Contractor will outline to the Trans Mountain representatives the monitoring plans, crossing construction goals and procedures, contingency plans (see Appendix B), schedules and procedures for handling high sediment loads. The Lead Environmental Inspector(s) and the Environmental Inspector(s) and other inspection staff will participate in these meetings. A construction briefing will be held for each watercourse crossing to discuss potential effects and outcomes of monitoring data on construction activities. The goal is to share information, provide prompt response at the first indication of a potential adverse effect and to ensure that each group understands their respective responsibilities in the process.

Watercourses will be monitored at sampling transects locations upstream and downstream of the watercourse crossing, and the sampling depth, sampling frequency and duration will be determined by a QEP/QAES as part of a site-specific WQM Plan or by the Environmental Inspector(s). During construction, the QEP/QAES will regularly inform the Environmental Inspector(s) of the data including the interpretation of the results. The Environmental Inspector(s) will use the information to continue or modify the construction activities, in cooperation/consultation with the Contractor. Monitoring information will be shared with the NEB and any other applicable authorities at their request or immediately if a problem is identified.

Communication between the QEP/QAES, the Environmental Inspector(s) and Contractor will be maintained throughout the implementation of the Watercourse Crossing Construction Monitoring Plan to ensure protection of aquatic resources during crossing construction by meeting or keeping within acceptable values and ranges provided by CCME (2007) guidelines and/or alternative regulatory requirements (*i.e.,* DFO authorizations).

The Environmental Inspector(s) will ensure the implementation of the monitoring plan at identified watercourse crossings with a potential for fish species of management concern to be present or high wetland values for amphibians and where events or conditions dictate the need for monitoring or at the request of the NEB. The QEP/QAES or other designated, qualified personnel will be responsible for the collection of these water quality samples.

Management plans and contingency plans are in place to guide Project activities with the potential to result in exceedance of water quality thresholds (see the Soil Erosion and Sediment Control Contingency Plan and the Drilling Mud Release Contingency Plan in Appendix B and the HDD/Trenchless Planning and Procedures Management Plan in Appendix C).

Sampling Methods

WQM may range from routine monitoring at small watercourses to more detailed sampling at major crossings. Point samples will be collected at locations upstream and downstream of watercourse crossings during routine pipeline construction monitoring. At major crossings, crossings of concern and HDD sites, multiple transects will be monitored both upstream and downstream of the crossing at a higher frequency and with the use of different sampling methods. Data gathered from upstream locations will provide information on background levels and will be compared with the results of downstream monitoring to identify potential HDD release of drilling mud.

In situ sampling results will be obtained using a portable turbidity meter for point measurements or the use of a sonde for continuous measurements, either from the bank or near shore area or from within the thalweg. During the open water season, crews will either wade instream or sample from a boat. During frozen conditions, sampling will occur through holes in ice (if present) created by an ice auger. If warranted (*e.g.,* during a suspected frac-out event) representative water samples over a range of turbidity values will be taken and sent to an analytical laboratory for analysis to form the basis of the TSS-turbidity relationship. A detailed photographic record will also be obtained for documentation purposes and reference. In addition to the turbidity measurements, pH and dissolved oxygen (DO) will be measured, where required (*i.e.,* during Beaver Dam Removal or Hydrostatic Testing) (see the Water Withdrawal and Discharge Procedures Management Plan in Appendix C) as part of the water quality assessment.

Conditions that May Warrant Water Quality Monitoring

WQM will also be recommended in the event that trenched construction activities occur within the RAP (in Alberta) or outside of the least-risk timing window (in BC) at select crossings and for all HDD crossings regardless of timing.

Trans Mountain will adopt the most current guidelines and industry-accepted practices and procedures for WQM guidelines and, at a minimum, will ensure the short-term exposure level of TSS will not exceed 25 mg/L over a 24 hour period (CCME 2007). Additional parameters (*i.e.,* pH, etc.) can be measured during winter beaver dam removals and/or hydrostatic testing procedures (see the Water Withdrawal and Discharge Procedures Management Plan in Appendix C for further details around hydrostatic testing procedures), as required under the request of the NEB or other appropriate regulatory authority, and will adhere to the appropriate guidelines outlined in the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CCME 2007).

The data acquired during water quality sampling for the Project will be presented in a format suitable for inclusion into a provincial water quality data base.

Water Quality Monitoring Rationale for Isolated Trenched Crossings

The short-term mobilization of sediment during certain steps of isolated pipeline crossings (*e.g.,* isolation installation and removal) is largely unavoidable, however, these events typically result in minimal

disturbances to fish and aquatic habitat if appropriate mitigation measures are implemented during construction. Monitoring water quality for TSS concentrations is an effective way to confirm the duration and magnitude of sediment mobilized during construction.

Trenched crossing construction will require some equipment to work instream along the right-of-way, installing and removing isolation measures, as well as during trenching and backfilling stages. If the placement of the isolation (and other mitigation measures) is effective, mobilized sediment is not expected to occur outside the isolation during trenching, backfilling or restoration stages, however, steps required to place and remove dams will likely mobilize some sediment downstream.

The duration of mobilization events resulting from isolated attempts typically vary, depending on the size of the system, type of isolation measures used, substrate at the crossing site and the success and ease of the installation and removal efforts.

Monitoring activities can occur during all stages of a trenched crossing, however, if a successful isolation is achieved (*i.e.,* no leakage occurs) and the management of grey water from the isolated area is effective, monitoring during trenching, pipe installation and backfilling stages may not be necessary. It is expected that the Environmental Inspector(s) will determine whether monitoring will be limited to installation and removal of isolation measures or if it will occur over the entire course of the isolated crossing attempt.

Water Quality Monitoring Rationale for Flowing Open Cut Trenched Crossings -Contingency Method in the Event an Horizontal Directional Drill Fails or Proves Non-Feasible

The mobilization of sediment during flowing open cut pipeline crossings is unavoidable and may result in disturbances to fish and aquatic habitat. As a result, this construction method is the least preferred option for instream construction measures. During flowing open cut pipeline crossing construction activities, potential effects to fish include: effects to behaviour (*e.g.,* habitat selection); the abundance and/or type of food organisms; and survival and/or development of eggs; and fish mortality). Monitoring water quality for TSS concentrations is an effective way to document and assess the magnitude, duration and extent of any sediment mobilization events resulting from the instream construction activities, and to provide insight into possible effects (if any) on aquatic resources downstream from the construction right-of-way. Sequenced construction activity (*i.e.,* construction work to occur for a maximum of 12 hours per day) and the installation of turbidity curtains, where practical, are secondary measures that can be applied to flowing open cut trenched crossings to allow for sediment to suspend out during periods of no activity and to help reduce the extent of the ZOI, ultimately reducing the overall effect on aquatic fish habitat. The applicability of these types of measures will need to be assessed individually at each site where flowing open cut trenched crossings are to be attempted.

Trenched crossing construction will require some equipment to work instream along the right-of-way during trenching and backfilling stages. It is anticipated that sediment mobilized during trenching and backfilling will vary, depending on the size of the system, stream velocity, substrate at the crossing site and the success and ease of pipe installation efforts.

Water Quality Monitoring Rationale for Horizontal Directional Drill Crossings

Appropriate construction monitoring activities designed to detect a potential frac-out can vary among crossing attempts, include a WQM component (as required under DFO Operational Statement). The purpose of WQM during an HDD crossing is two-fold: 1) to enhance the potential for early warning of a frac-out event or other potential sediment mobilization event; and 2) to help document the extent of the effects and the need for additional mitigation from any sediment events caused by crossing activities. The inclusion of WQM during HDD crossings, is especially important where there is some potential for the crossing attempt to fail and/or fish habitat is present in the vicinity of the crossing.

Water Quality Monitoring for Beaver Dam Removals During Frozen Conditions

In the event beaver dam removals are required during frozen conditions, negative affects to fish and fish habitat (*i.e.,* sediment transport, water released downstream with low DO and/or pH values) from the beaver dam removals will need to be mitigated and monitored. A fish salvage will also be attempted prior to or during dam removal. Special steps may be required to ensure suitable salvage efforts during winter

construction. These steps could include the removal of ice (with heavy machinery) from the channel prior to dam removal to allow for electrofishing effort or, alternatively, the removal of the dam in a manner that will allow a crew to salvage fish via dip nets or seine nets (*i.e.,* at the breach location).

Water Quality Monitoring of Dissolved Oxygen, pH and Turbidity

It is recommended that the QAES/QEP or other designated personnel conduct water quality sampling prior to the removal of beaver dams to compare water quality parameters (*i.e.,* DO and pH) between the release water upstream of the beaver dam and receiving water downstream of the beaver dam. The QAES/QEP or other designated personnel will determine if differences in DO and pH will negatively affect the aquatic environment downstream of the beaver dam requiring removal, based on CCME (2007) guidelines or as required by DFO or other appropriate regulatory authorities. If the QAES/QEP or the Environmental Inspector(s) determines the potential exists for negative effects to the aquatic environment of the receiving waters, it is recommended that a DO and/or pH WQM Program be implemented. If DO and/or pH are similar between the release waters and receiving waters, and the QAES does not expect any negative affects to the aquatic environment downstream of the beaver dam removal, the need for DO and/or pH WQM will not be required.

Due to low flows, ponded areas and multiple dams that are often present in watercourses and drainages where beaver activity is present, the potential for mobilizing suspended sediment to downstream habitat may be reduced when beaver dam removals are occurring. The need for WQM for turbidity will be determined by the QAES and will be based on the expected quantity and duration of mobilized sediment, flow conditions and wintering fish habitat conditions present at the time of construction. For example, low flows and an absence of wintering fish habitat in receiving waters may eliminate the need for turbidity monitoring.

If WQM for DO and/or pH and turbidity is implemented at a beaver dam removal site, a water quality plan will be followed, however, the level of WQM effort should be adjusted to reflect site conditions as determined by the QAES/QEP.

Total Suspended Solids Variances

In the event of instream sedimentation due to construction, which is expected to have resulted in an exceedance of CCME (2007) guidelines or frac-out during HDD, the correlation between TSS and turbidity will be determined, as discussed above. All in situ turbidity values collected, both upstream (background) and downstream of the frac and/or sedimentation site and construction zone, will be retroactively converted to TSS values which will then be compared and monitored against TSS thresholds outlined in the CCME (2007) TSS guidelines. However, to ensure a quickened response to elevated turbidity values and/or the expected exceedance of TSS criteria, contingency plans (see Appendix B) should be employed upon initial review of the in situ turbidity values.

Once an exceedance of TSS criteria is expected, all crossing activities will be suspended or modified at the direction of the Environmental Inspector(s) or NEB, until the source of the high turbidity/TSS is identified and corrective action(s) identified and implemented. Construction may resume when corrective measures have been completed to the satisfaction of the Environmental Inspector(s) and/or the NEB, and TSS levels are below CCME guidelines. Where required, a variance report documenting the event will be made available to Trans Mountain.

Reporting

Trans Mountain will document water sample data and report the results of the assessment in a format and at times agreed upon by the NEB and other appropriate regulatory authorities. Where an event occurs as described above, additional event reporting can be provided once laboratory results and value conversions have been completed. Until that time, the QAES/QEP can report suspected exceedances based on turbidity thresholds in the CCME guidelines.

13.0 WATER WITHDRAWAL AND DISCHARGE PROCEDURES MANAGEMENT PLAN

Background

Water withdrawal and discharge can affect surface and groundwater flow as well as transport sediment into watercourses/wetlands/lakes. During Project construction, withdrawal and discharge of water may be necessary at work camps, borrow sites and for construction, reclamation and maintenance of access roads as well as hydrostatic testing of the pipeline or discharge from trucks for road/access maintenance/construction. Water withdrawal and discharge for these activities have the potential to adversely affect water quality and aquatic resources, due to disturbance to the land surface, disturbance to the bed and banks of watercourses, disruption of water flow, alteration of water temperature and flooding or erosion during disposal of waste water. The Water Withdrawal and Discharge Procedures Management Plan will provide steps to ensure that water use and discharge, related to Project activities, is properly managed. Refer to Section 9.0 of the EPP for potential mitigation measures applicable to the withdrawal and discharge of water for hydrostatic testing.

Objective

The objective of the Water Withdrawal and Discharge Procedures Management Plan is to ensure that withdrawal and discharge of water for the Project is conducted in a manner that:

- maintains water quality;
- avoids soil erosion;
- reduces or avoids adverse effects on aquatic resources and habitat, wildlife, recreational land use and downstream water users; and
- is conducted in accordance with applicable approvals and permit conditions.

Management Approach

In determining the potential water sources required for Project use and the volumes and rates of withdrawal, many key environmental factors will be considered, which include:

- fish presence, species and potential habitat near the intake site, RAP and least-risk timing windows;
- baseline source water quality parameters prior to withdrawal, including conductivity, salinity absorption and TSS (Alberta Environmental Protection 1999b);
- estimated flow rates in the watercourse at the anticipated times of withdrawal, with particular consideration to periods of low flow;
- appropriate screening on intake;
- duration, rates and total volumes of withdrawal from each respective watercourse/wetland/lake;
- characteristics of the watercourse/wetland/lake at the intake site (*e.g.*, channel width and depth, velocity, and sediment transport processes);
- location and position of the intake within the watercourse, including dimensions, alignment, depth and wetted area;
- whether the excavation of a sump is necessary (preference will be given where no sump is warranted);
- site access;
- location of the source and discharge sites to the point of use of the water;

- areas with unstable banks or approaches; and
- physical screen intake design and requirements.

Trans Mountain will prepare and provide to the NEB a summary of the details of all planned water withdrawals and discharges for the Project prior to hydrostatic testing of the pipeline. An example of a Water Withdrawal and Discharge Form is provided at the end of this plan.

Water Withdrawal

During water withdrawal, the Contractor, under the supervision of the Environmental Inspector(s), will set intakes in the watercourses/wetlands/lakes in such a way as to avoid sedimentation, maintain adequate flow rates (no more than a 10% withdrawal rate [CAPP 1996]) and restrict fish impingement on screen intakes, in compliance with regulatory requirements and conditions of the TDL (in Alberta) or a Section 8 Short-Term Water Withdrawal *Water Act* Approval or Basin Section 8 Approval from the BC OGC in BC. In the event that primary test water sources do not contain adequate flow rates to support the water withdrawal without affecting downstream uses and resources, the withdrawal rate will be reduced or alternative water sources will be used.

Fuel driven pumps and generators associated with the withdrawal of water will be isolated by an impermeable lined dike or depression to prevent spills of fuels or lubricants from contaminating soils or watercourses/wetlands/lakes. Pump and related water withdrawal equipment will be placed above the ordinary high water level of the source watercourse/wetland/lake to avoid being inundated in the event of high water levels during the period of use.

In watercourses/wetlands/lakes that support sensitive species, Trans Mountain will avoid withdrawal of water during the RAPs (in Alberta) and outside of the least-risk timing windows (in BC), unless specific approval is obtained in advance from the appropriate regulatory authority.

The QAES/QEP will collect baseline water quality parameters prior to withdrawal and monitor water withdrawal rates and suspend activity, when warranted, if low flow rates or other thresholds are encountered. The screen around the intake will be fabricated to provide an adequate surface area of fine-mesh screen to reduce the approach velocity in order to prevent impingement or entrainment of small fish, in accordance with DFO screening requirements (DFO 1995). The QAES/QEP will regularly inspect the water intake screen for entrained fish.

Water Discharge

There will be no transfer of water from one river sub-basin to another. All water used for hydrostatic testing will be discharged close to the source drainage basin to prevent the inadvertent transfer of aquatic organisms or plant species from one watershed or drainage basin to another, as identified on approval conditions. Where test water is clean enough for release to the environment, however, if it cannot be released to the original basin, the selection of the discharge site and rate of discharge will ensure that the released water does not directly flow into any adjacent surface waters. In the event that it is impractical to release test water onto a terrestrial site or into a watercourse/wetland/lake, located within the source drainage basin, seek approval from the appropriate federal regulatory authorities (*e.g.,* DFO, NEB) prior to discharge. Screens will be maintained and adequately cleaned between water sources. Where test water is not clean enough for release to the environment, alternate options for disposal will be considered (*i.e.,* reuse for testing elsewhere or pre-approved off-site disposal and treatment locations).

All waters to be released directly or indirectly into a watercourse/wetland/lake will be tested prior to and during release. The need and type of testing of water to be released onto land or water will be in accordance with approval/permit/notification conditions as well as the testing requirement information provided on the water withdrawal/discharge planning sheets (see example at the end of this plan). Water used in a hydrostatic test will be tested for total suspended solids, benzene, ethylbenzene, toluene, zylene, free chlorine residual, pH, dissolved Iron, oil/grease sheen and additives if released into receiving water and total purgeable hydrocarbons, total extractable hydrocarbons and a Microtox (EC_{50}) test, if released onto land, as per the *Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines* (Government of Alberta 1999b) in Alberta and released if determined to be non-harmful. Prior to the discharge of hydrostatic test water to land in BC,

appropriate testing and treatment measures will be implemented in accordance with Section 7(2)(e) and Section 7(3) of the *Oil and Gas Waste Regulation*, BC Reg. 254/2005 of the BC *Environmental Management Act* (Province of BC 2010), guidelines outlined in CAPP (1996) and CCME (2007) water quality requirements. Note that waters containing freeze depressants will either be reused on subsequent tests or returned to the supplier.

Preferred discharge locations for dewatering will be located on stable terrain areas (rather than directly into a watercourse/wetland/lake), where feasible, to allow the discharged water to be filtered through vegetation and soils prior to returning to a watercourse/wetland/lake. Preferred locations for dewatering include bar ditches, if feasible, and non-arable lands. Sediment reduction methods will be implemented on the bed, banks and approaches to the water source or discharge site, if warranted, to protect downstream fish, fish habitat and water users from increased sedimentation or reduced water quality. Discharge locations will be monitored to ensure that no erosion, flooding or icing occurs. During discharge procedures from trucks for road/access construction and maintenance, ensure discharged water is maintained within the major drainage basin and dispersed as per the conditions located within the applicable approval/licence.

Water energy will be limited with the use of a dissipater and protective rock rip-rap, sheeting, tarpaulins or other equivalent materials to reduce or avoid the potential for erosion of soils during water discharge activities. The rate of discharge will also be reduced if downstream or terrestrial flooding appears to be imminent, particularly when discharge occurs during frozen conditions.

Example Water Withdrawal and Discharge Form

The following provides an example of the information that will be included on the Water Withdrawal and Discharge Forms. Information related to the fish species presence, habitat utilization, channel morphology, stream flow, and reclamation requirements are provided in the Water Crossing Summary Tables in Appendix J.

SOURCE WATER OVERVIEW

Source Water: **Name:** _____ _____ **UTM of Withdrawal Site:** Northing: _____ Easting: _____ **Nearest RK:** _____

Intended Water Use: _____

Volume to be Withdrawn (m^3) _____

Rate of Withdrawal (L/s): _____

Timing of Withdrawal(s): _____ _____

Socio-economic/Environmental Issue(s): _____

Instream Period of Least Risk: _____ to _____

Erosion Control Measure(s): _____

Spill Containment/Contingency Measures: _____

DISCHARGE SITE OVERVIEW

Receiving Land or Water: Land: ____ Water: _____ Land Area: _____ ha Water Name: _____ **UTM of Discharge Site:** Northing: _____ Easting: _____ **Nearest RK:** _____

Water Use: _____

Volume to be Discharged (m^3) _____

Rate of Discharge (L/s): _____

Timing of Discharge(s): _____ _____

Socio-economic/Environmental Issue(s): _____

Instream Period of Least Risk: _____ to _____

Erosion Control Measure(s): _____

Spill Containment/Contingency Measures: _____

SUMMARY OF MONITORING MEASURES

Monitoring Requirements as per Regulatory Approvals: _____

Planned Monitoring Program (including parameter[s] to be monitored, sampling intervals and sampling location[s]): _____

Key EPP References

Water Crossing Summary Tables in Appendix I in the EPP

Hydrostatic Testing - Section 8.5 in this EPP.

Access Roads - Section 9.0 in the EPP

Temporary Construction Camps - Section 10.0 in the EPP

Borrow Sites - Section 11.0 in the EPP

14.0 WEED AND VEGETATION MANAGEMENT PLAN

This WVMP has been prepared to meet the requirements for NEB filing as part of the Project application and to address Trans Mountain's short and long-term problem vegetation monitoring and management procedures, decision criteria, as well as accountability and responsibility for the construction and operational phases of the Project.

This WVMP has been prepared to comply with all guidelines outlined in KMC's Integrated Vegetation Management (IVM) Plan (KMC 2011) as well as weed and pesticide legislation for the provinces of Alberta and BC. This WVMP addresses designated weeds listed in the Alberta and BC *Weed Control Act* as well as the BC *Forest and Range Practices Act* (Attachment C1). Within Alberta, all growing plants designated as Prohibited Noxious and their reproductive mechanisms must be destroyed or rendered non-viable. Plants designated as Noxious must be controlled (inhibit growth and spread) or destroyed. In BC, Provincial Noxious plants are those that must be controlled in all regions and Regional Noxious plants are those that must be controlled in the region(s) for which they are listed. Furthermore, plants listed as invasive under the BC *Forest and Range Practices Act* must be managed to prevent their introduction or spread. Problem woody vegetation identified in the IVM Plan will also be addressed in this report (Attachment C1).

Vegetation species of concern specific to municipalities and/or regional districts can be obtained from appropriate municipal regulatory authority representatives and invasive plant councils (Table C.14-1). Trans Mountain will contact each municipality and/or regional invasive plant council at a later date closer to construction to determine additional species of concern and any specific mitigation recommended for the applicable areas.

TABLE C.14-1

MUNICIPALITY/REGIONAL DISTRICT INVASIVE PLANT COUNCILS

Area	Municipality/Regional District	Invasive Plant Council	Approximate Reference KP
Alberta	Parkland County	N/A	45 to 135
	Yellowhead County	N/A	135 to 339
BC	Fraser – Fort George	Northwest Invasive Plant Council	490 to 549
	Thompson-Nicola	Southern Interior Weed Management Committee	549 to 992
	Fraser Valley	Fraser Valley Invasive Plant Council	992 to 1138
	Greater Vancouver	Invasive Plant Council of Metro Vancouver	1138 to 1180

The WVMP will be part of Trans Mountain's general Operations Plan for the Project in Alberta and BC. The overall goal of the WVMP is to manage the spread of problem vegetation for above ground pipeline identification and sight line maintenance, and to provide access to pipelines for maintenance.

Trans Mountain will utilize an IVM approach to carry out problem vegetation (*i.e.,* weeds, grasses, sedges, forbs, vines, ferns, brush and trees [deciduous and coniferous]) management practices for this plan and to meet the overall objectives of IVM for all Trans Mountain pipelines and facilities. IVM is an adaptive management process involving the use of various methods in a cost-effective and responsible manner to reduce the use of herbicides, promote healthy ecosystems, provide measurable results and facilitate better management of problem vegetation. The WVMP will address non-chemical, cultural and chemical techniques for problem vegetation management along the construction right-of-way through recommendations of vegetation management procedures, which include:

- timing considerations;
- select methods and equipment; and
- specific vegetation management procedures based on the following six key considerations:
  - prevention;

- identification;
- monitoring;
- treatment thresholds;
- vegetation management options; and
- post-treatment evaluation.

The use of herbicides for problem vegetation management along the construction right-of-way within the province of Alberta will be conducted in accordance with the *Environmental Code of Practice for Pesticides* as part of the Alberta *Environmental Protection and Enhancement Act*. The use of herbicides for problem vegetation management along the construction right-of-way in BC will be conducted in accordance with the *Integrated Pest Management Regulation* of BC as part of the BC *Integrated Pest Management Act*.

The WVMP consists of vegetation management measures to be implemented in the short-term, during the pre-construction, construction and PCEM phases of Project construction and the long-term, during the regular operation and maintenance phase of the Project. The vegetation management measures to be implemented during both short-term and long-term periods are described further in Section 14.1.1 and 14.1.2.

Weed information will be provided following the completion of the Weed Survey for the Project that is scheduled prior to construction.

14.1 Plan Objectives

The objective of the WVMP is to manage problem vegetation (as identified in the IVM Plan) that could otherwise affect the safe and efficient operation of the Project as well as adversely affect regulatory and environmental requirements. Specifically, the intent of the WVMP is to prevent, reduce and manage the potential spread of provincially and regionally designated weed species along the construction right-of-way as a result of construction activities and during operations to a level equivalent to that observed on adjacent lands with similar land use and to manage problem vegetation to a level that is in accordance with regulatory requirements (Table C.14-3). Trans Mountain will comply with all relevant regulatory requirements and the IVM Plan to meet the objectives of the WVMP as follows.

- Allow above ground pipeline identification and sight line maintenance as require by the *NEB Act* and *NEB OPR*.
- Allow access to pipelines for maintenance, pressure and leak testing by managing problem vegetation, including the growth/spread of provincially and regionally designated weeds on the construction right-of-way.
- Comply with provisions of the BC *Wildfire Regulation* with respect to maintaining sites located within 300 m of forested lands or grassland areas in a manner that prevents fire from spreading.
- Ensure compliance with KMC vegetation management policies, Environment, Health and Safety policy, environmental standards and or any updated manuals and with NEB requirements and guidance.
- Ensure compliance with federal and provincial problem vegetation management legislative requirements (*i.e., Weed Control Act*).
- Respect any agreement made with the public, adjacent landowners and Aboriginal communities affected by problem vegetation management (*i.e.,* chemical suppression).
- Ensure safe working conditions and protect public health and safety, environmental resources and ecologically sensitive areas.

- Maintain construction right-of-way integrity and security as well as landscape aesthetics.
- Reducing problem vegetation infestations to a level at or below the level observed in immediately adjacent lands with equivalent or similar land use and land management.
- Incorporate the most effective and efficient vegetation management treatments as determined through use of IVM principles.
- Minimizing the need for vegetation management treatments through the use of IVM principles.

14.1.1 Short-Term Objectives

In recognition of the time required for native woody vegetation (shrubs, and deciduous and coniferous species trees) to re-establish on disturbed areas following construction, problem vegetation (designated and non-designated weeds [forbs]) as identified in provincial legislation and the IVM Plan will be addressed under short-term objectives.

Measures implemented in the short-term (during the construction phases of the Project) will include the following.

- Conduct a pre-construction weed survey and record problem vegetation (designated weeds) infestations on and immediately adjacent to the construction right-of-way.
- Implement problem vegetation (designated weeds) treatments during the pre-construction phase, where warranted.
- Monitor problem vegetation (all weeds) during the construction phase (primarily topsoil/root zone material storage piles) and implement treatments, where warranted.
- Monitor problem vegetation (designated weeds) along the construction right-of-way during the PCEM phase and implement treatments, where warranted.
- Recommend effective mitigation measures based on species, densities, land use, land management, location and aerial extent for the pre-construction, construction and PCEM phases of the Project.
- Manage problem vegetation below established threshold levels required for the safe and efficient construction of the Project.
- Ensure compliance with all pertinent government regulations, KMC policies and environmental standards and guidelines or any other updated manuals.
- Continue ongoing consultation with the public, adjacent landowners and Aboriginal communities to coordinate effective problem vegetation management strategies.
- Monitor and evaluate the success of problem vegetation management strategies during the PCEM Program.
- Utilize the most effective and efficient problem vegetation management techniques/strategies beyond the short term.

A Trans Mountain Vegetation Management Contractor trained and experienced in identifying problem vegetation and familiar with provincially and regionally designated weeds in Alberta and BC will conduct on-ground monitoring to record the species and density of problem vegetation.

Problem vegetation density distribution in Alberta will be ranked according to the AESRD codes (Government of Alberta 2009) and while in BC, the Ministry of Forests codes (Luttmerding *et al.* 1990) will be used to provide descriptions that encompass density and distribution as well as provide a visual schematic and verbal description of each code. The AESRD and BC Ministry of Forests problem vegetation distribution codes are provided in Attachment C2 of this report.

Identified problem vegetation, which requires immediate management, will be reported with recommendations for problem vegetation management to the Environmental Manager. Depending on the species, land use, densities, aerial extent and through consultation with the public, adjacent landowners and Aboriginal communities, options will be considered by the Environmental Manager for problem vegetation management along the construction right-of-way. The effectiveness of problem vegetation management measures implemented during the pre-construction and construction phases, will be outlined in the as-built report, Environmental Issues List for the Project (to be included and updated in all PCEM reports) and will be evaluated by a Reclamation Specialist during initial and subsequent PCEM of vegetation and soil conditions. Monitoring will be completed by inspecting all locations previously noted within the Environmental Issues List as having problem vegetation and where treatments were implemented, to report on the degree of success of the reclamation in these areas including the identification of problem vegetation species and their densities. A PCEM report will be prepared and the Environmental Issues List updated. Where PCEM identifies that further management measures are required to manage problem vegetation, Trans Mountain will take appropriate action in a timely manner. Problem vegetation management activities will be conducted as often as the Environmental Manager determines is warranted, based on the effectiveness of the treatment strategies, until the problem vegetation species have been reduced to below threshold levels.

14.1.2 Long-Term Objectives

Trans Mountain is committed to regular review of all applicable problem vegetation reports (*i.e.,* Pre-Construction Weed Survey Report, final year PCEM report, Environmental Issues List and Post-Treatment Monitoring Report) for the construction right-of-way. As part of this commitment, measures implemented in the long-term will be implemented (*i.e.,* ongoing management of problem vegetation) to meet objectives outlined in the WVMP and the IVM Plan during regular operation and maintenance activities for the Project. Areas of the construction right-of-way where ongoing operation and maintenance is not required will be managed to revert to a natural vegetative state, where feasible. To meet Trans Mountain's long-term problem vegetation management goals, applicable short-term goals and measures discussed in Section 13.1.1 will be used along with the following measures.

- Reducing or preventing the spread of problem vegetation along the construction right-of-way through ongoing monitoring and vegetation management, where warranted.
- Addressing regulatory notices or complaints.
- Reducing problem vegetation infestations to a level at or below the level observed in immediately adjacent lands with equivalent or similar land use and land management.
- Considering proactive and preventative problem vegetation management designed to reduce the use of herbicides when planning and constructing new pipelines and/or when conducting operations and maintenance activities.
- Continue ongoing consultation with the public, adjacent landowners and Aboriginal representatives to actively evaluate and use new problem vegetation management techniques and practices to improve the WVMP.
- Actively using and evaluating new problem vegetation management techniques and practices to improve vegetation management programs by designing and managing more effective herbicide applications, testing alternatives to herbicides and using them where appropriate.
- Searching for products and application methods that have lower environmental effects.

14.2 Environment, Health and Safety Policy and Environmental Standards

The WVMP will be carried out in accordance with KMC's EHS (KMC 2012a) as well as KMC's Environmental Standards for Pesticides or any updated manuals/management programs in use by KMC at the time of construction.

14.3 Legislative Requirements for Vegetation Management

The management of problem vegetation must be in compliance with federal and provincial legislation/regulations as outlined in Table C.14-2. Specific regulatory requirements (*i.e.,* setback distances for herbicide application near watercourses/wetlands/lakes) that Trans Mountain must adhere to are provided in the IVM Plan as well as Sections 6.0 and 7.0 of EPP.

TABLE C.14-2

SUMMARY OF WEED AND VEGETATION MANAGEMENT LEGISLATION

Area	Regulatory Authority	Legislation	Regulations
Provincial (Alberta)	AARD	*Weed Control Act*	*Weed Regulation*
	AESRD	Alberta *Environmental Protection and Enhancement Act*	*Pesticide Sales, Handling, Use and Application Regulations*
			Pesticide (Ministerial) Regulation
			Environmental *Code of Practice for Pesticides*
			Code of Practice for Watercourse Crossings
			Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body
		Public Lands Act	*Public Lands Act Regulation*
		Forest and Prairie Protection Act	*Forest and Prairie Protection Regulation*
		Alberta *Fisheries Act*	--
		Alberta *Wildlife Act*	--
	Ministry of Agriculture and Rural Development	*APA*	--
Provincial (BC)	BC Ministry of Agriculture	*Weed Control Act*	*Weed Control Regulations*
	BC MOE	*Integrated Pest Management Act*	*Integrated Pest Management Regulation*
	Ministry of Forests, Lands and Natural Resource Operations	*Environmental Management Act* (Bill 57-2003)	--
		Wildfire Act	--
	Ministry of Forests, Lands and Natural Resource Operations	*Water Act*	--
		Forest and Range Practices Act	*Invasive Plants Regulation*
		Wildlife Act	--
	BC OGC	*Oil and Gas Activities Act*	--
Federal	Pest Management Regulatory Agency (Health Canada)	*Pest Control Products Act*	--
	Environment Canada	*Canadian Environmental Protection Act*	--
		Canada Water Act	--
		Species at Risk Act	--
	Canada Wildlife Services	*Migratory Birds Convention Act*	--
	DFO	*Fisheries Act*	*Operational Statement for the Maintenance of Riparian Vegetation in Existing Rights-of-Way*
	Canadian Food Inspection Agency	*Plant Protection Act*	--
	Transport Canada	*Transportation of Dangerous Goods Act*	*Transportation of Dangerous Goods Regulations*
	NEB	*Pipeline Act*	--
	NEB	*NEB Act*	*National Energy Board Onshore Pipeline Regulations* (*NEB OPR*)

14.4 Consultation

Trans Mountain will consult with the public, adjacent landowners and Aboriginal communities affected by the Project regarding problem vegetation management and methods of treatment.

Consultation with be ongoing up until construction and will be provided at that time.

14.5 Prevention

Preventative measures aimed at stopping the introduction, initial growth and spread of problem vegetation is an important component of the WVMP. These measures, where applicable, have been and

will be incorporated into new pipeline design prior to construction and site maintenance activities as well as any other construction activities along the construction right-of-way.

A summary of the preventative measures for problem vegetation management that Trans Mountain will employ are provided below and supplement detailed preventative measures outlined in the IVM Plan.

Along the construction right-of-way employ the measures outlined below.

- Ensure that maintenance equipment is free of problem vegetation seeds or debris.
- Restrict vehicle travel through problem vegetation infested areas.
- Seed appropriate native or non-native grass mixes and fertilize, where warranted, to revegetate disturbed areas.
- Strategically plant native shrub/tree species, where warranted, depending on the site-specific objectives.
- Remove problem vegetation when adjacent to or crossing a wetland or watercourse (*i.e.,* river) and replace it with compatible, low-growing plant species that will out-compete problem vegetation.
- Manage all problem vegetation along the construction right-of-way during all pipeline construction phases (*i.e.,* pre-construction, construction, PCEM) and the operational phase.
- Encourage alternative, compatible vegetation management techniques such as planting low-growing shrubs, livestock grazing or other types of approved vegetation management practices.

14.6 Identification

Vegetation Specialists will record the location and the aerial extent of weed infestations along the construction right-of-way, during their normal inspection/patrols, maintenance and monitoring activities. Trans Mountain defines a Vegetation Specialist as a person who has a demonstrated ability and experience in identifying problem vegetation species. The Vegetation Specialist will be:

- local Trans Mountain field personnel who have special training or experience in problem vegetation identification;
- Regional Environmental Managers who have training or experience in problem vegetation identification; and/or
- Consultants who specialize in problem vegetation identification.

The Vegetation Specialist will be familiar with legislated problem vegetation in Alberta and BC as well as problem vegetation identified in the KMC's IVM Plan. In addition, the Vegetation Specialist will be trained to identify problem vegetation at important growth stages (*i.e.,* trained to recognize when the problem vegetation cover is near or above the treatment threshold levels within a certain area). The Project will provide vegetation identification guides will be issued to aid operators in their identification of problem vegetation. Where Trans Mountain staff is not trained to identify problem vegetation, a Vegetation Resource Specialist specializing in problem vegetation identification and management will be retained to identify problem vegetation. Problem vegetation management along the Project right-of-way will target vegetation designated by relevant legislation (*i.e.,* Prohibited Noxious and Noxious plants in Alberta and provincially and regionally Noxious and Invasive plants in BC) as well as problem vegetation listed in the IVM Plan.

The legislated problem vegetation in Alberta and BC as well as woody problem vegetation of concern to Trans Mountain projects are provided in Attachment C1. Provincial rankings are in accordance with the Alberta and the BC *Weed Control Regulation* as well as the BC *Invasive Plants Regulation*.

14.7 Monitoring

As a component of Trans Mountain's construction right-of-way patrols, problem vegetation will be monitored during aerial patrol flights and/or ground inspections (aerial patrol flights will occur during the PCEM phase of construction and relevant information will be provided to the Project Environmental Manager). Monitoring will be conducted as per the IVM Plan in conjunction with other scheduled aerial inspection activities for regular maintenance and operations activities. Where potential concerns are identified during the aerial pipeline patrol, on-ground monitoring will be conducted to record the species and density of problem vegetation as soon as practical following the aerial patrol flight. Aerial patrol flights will begin once the pipeline is activated (includes the period of the PCEM during the construction phase) and any relevant information will be provided to the Environmental Manager and PCEM Program Manager. Once the Project reaches the operational phase, a QAES/QEP will conduct pre-treatment site monitoring in late spring of each year to determine the necessity for and the type of problem vegetation management required.

During regular maintenance and operations activities, incidental ground inspections for problem vegetation along the construction right-of-way may be conducted to determine the extent (percent cover, composition, distribution, location of infestations, etc.) of problem vegetation (*i.e.,* presence of mature brush and trees, and weeds). Areas of new infestations, recommended treatment sites and adjacent landowner concerns will also be identified and documented during monitoring. To assist monitoring efforts, the baseline data collected during the pre-construction weed survey and the results of the PCEM Program (Environmental Issues Lists) will assist in establishing thresholds and determining if objectives of the WVMP are being met.

14.8 Treatment Thresholds

Setting treatment thresholds (based on federal and provincial legislation/regulations and/or requirements as well as accepted industry standards) includes prioritizing treatments when problem vegetation management becomes necessary in order to minimize the risk of problem vegetation exceeding the thresholds specified in the IVM Plan.

The treatment threshold objectives for problem vegetation species for the Project are as follows.

- Problem vegetation must be maintained at levels, by density and distribution, equivalent to or less than levels on observed adjacent lands with equivalent or similar land use and land management.

- Problem vegetation must be managed in compliance with provincial legislation and jurisdictional requirements (*i.e.,* the Alberta *Weed Control Act*, the BC *Weed Control Act* and the BC *Forest and Range Practices Act*).

- Problem vegetation specific to Trans Mountain projects, as outlined in the IVM Plan, will be managed along the construction right-of-way, where warranted.

- At a minimum, a 3 m zone on either side of the pipeline, measured from its centre line, must be maintained where the vegetation does not exceed 1 m in height.

- Maintain the height of vegetation on the remainder of the construction right-of-way to a height that minimizes the possibility of pipeline markers and warning signs being obscured by low-growing branches or a canopy effect created by larger trees.

- In areas where the tolerance for problem vegetation is low (*i.e.,* under or adjacent to piping, diesel fuel or propane tanks, electrical control building, etc.), vegetation will be managed as per the IVM Plan for defined areas along the construction right-of-way.

The priority for managing sites (treatment priority) where the established threshold has been reached can be determined by the level of risk and is further described in the IVM Plan. Criteria for the site risk levels are summarized in Table C.14-3.

TABLE C.14-3

SITE RISK LEVELS AND TREATMENT

Risk Level	Purpose or Intent	Treatment	Construction	Operations
1 High Risk	To stop the spread of problem vegetation (*i.e.,* Prohibited Noxious and Noxious) weeds currently threatening non-infested or highly susceptible sites including agricultural land, forestry cutblocks and tree farms and/or if the site is adjacent to transportation corridors such as roads or waterways.	• Problem vegetation management will involve IVM principles that may combine two or more of the following vegetation management treatments: non-chemical; cultural/biological; and chemical. • Problem vegetation management will be based on one or more of the following: pre-construction weed survey and PCEM Program (Environmental Issues List) findings; the invasiveness of the problem vegetation; problem vegetation densities on adjacent land (off right-of-way); and adjacent land use.	• Initial treatments, monitoring and follow-up treatments will be completed as soon as possible. • A pre-construction weed survey will be completed and problem vegetation treatments will occur during the pre-construction phase, where warranted. • During the construction phase, problem vegetation on topsoil/root zone material storage piles will be controlled and/or destroyed. • During the PCEM phase, problem vegetation identified will be controlled and/or destroyed.	• Initial treatments, monitoring and follow-up treatments will be completed as soon as possible. • Problem vegetation management will have a strong focus on annual monitoring data (and construction phase reporting [*i.e.,* pre-construction weed survey report and PCEM Program – Environmental Issues List]) that identifies problem vegetation. The spread of Prohibited Noxious and Noxious weeds and woody problem vegetation will be stopped. In addition, woody problem vegetation will be managed when it is determined that the woody problem vegetation poses a risk to the access, maintenance and regular operations of the pipeline.
2 Moderate Risk	To stop the increase of problem vegetation on sites in less susceptible areas. This includes sites adjacent to lands such as forested lands that have a well-established vegetation cover and are, therefore, less susceptible to problem vegetation introduction.	• All records of problem vegetation management will be tracked in the Problem Vegetation Management and Monitoring Database. • Prohibited Noxious weeds in Alberta must be destroyed while Noxious weeds must be controlled. Noxious and Invasive weeds within BC must be controlled and managed, respectfully.	• Initial treatments, monitoring and follow-up treatments will be completed as soon as conditions are optimal and once problem vegetation management at high risk sites is complete. • A pre-construction weed survey will be completed and problem vegetation treatments will occur during the pre-construction phase, where warranted. • During the construction phase, problem vegetation on topsoil/root zone material storage piles will be controlled and/or destroyed. • During the PCEM phase, problem vegetation identified will be controlled and/or destroyed.	• Initial treatments, monitoring and follow-up treatments will be completed as soon as conditions are optimal and once problem vegetation management at high risk sites is complete. • Problem vegetation management will have a strong focus on annual monitoring data (and construction phase reporting [*i.e.,* pre-construction weed survey report and PCEM Program – Environmental Issues List]) that identifies problem vegetation. The increase of problem vegetation species in less susceptible areas will be stopped. In addition, woody problem vegetation will be managed when it is determined that the woody problem vegetation poses a risk to the access, maintenance and regular operations of the pipeline.
3 Low Risk	To stop the increase and/or contain problem vegetation on sites in and adjacent to industrial lands.		• Initial treatments, monitoring and follow-up treatments will be completed as soon as conditions are optimal and once problem vegetation management at high and moderate risk sites is complete. • A pre-construction weed survey will be completed and problem vegetation treatments will occur during the pre-construction phase, where warranted. • During the construction phase, problem vegetation on topsoil/root zone material storage piles will be controlled and/or destroyed. • During the PCEM phase, problem vegetation identified will be controlled and/or destroyed.	• Initial treatments, monitoring and follow-up treatments will be completed as soon as conditions are optimal and once problem vegetation management at high and moderate risk sites is complete. • Problem vegetation management will have a strong focus on annual monitoring data (and construction phase reporting [*i.e.,* pre-construction weed survey report and PCEM Program – Environmental Issues List]) that identifies problem vegetation. The increase of problem vegetation species will be stopped and/or contained where problem vegetation poses a risk on sites and adjacent to industrial lands. In addition, woody problem vegetation will be managed when it is determined that the woody problem vegetation poses a risk to the access, maintenance and regular operations of the pipeline.

14.9 Vegetation Management Options

Trans Mountain will implement an IVM approach for the treatment of problem vegetation utilizing different techniques for the area(s) of concern. The Pre-Treatment Monitoring Form completed for the infested area(s) will provide information required to develop a course of action. Depending on the type of problem vegetation and how it will be managed (*i.e.,* destroyed, controlled or managed), various non-chemical (*i.e.,* mechanical and manual), cultural (*i.e.,* seeding) and chemical (*i.e.,* herbicide) vegetation management options will be considered for problem vegetation management along the construction right-of-way. An integrated approach combining non-chemical, cultural and chemical treatment options is generally most effective when tailored to the plant species and conditions at each site. The selection of a particular treatment option or technique will be determined and evaluated based on the following:

- urgency of the required treatment (*i.e.,* Prohibited Noxious weeds, a legislative requirement for access to an area or concerns for pipeline safety or security);
- species (technique may differ if more than one undesirable species is being targeted);
- timing (growth stage of plants);
- bare ground versus vegetated;
- location of the problem vegetation;
- density and height of problem vegetation;
- accessibility to the problem vegetation (*i.e.,* terrain, slope, and remote areas);
- safety issues to Trans Mountain staff, Contractors and the public;
- risk of fire (fuel loading on the ground);
- short and long-term effects of the method(s) being considered;
- expected efficacy of the method(s) being considered;
- benefits and limitations of each method;
- cost-effectiveness of each method;
- objectives of problem vegetation management;
- land use and land management practices being carried out on adjacent land;
- aesthetic consideration (plan holder reputation and community standing);
- environmental features such as wetlands, watercourses or lakes, riparian areas, wildlife and fish habitat;
- environmental sensitivities in surrounding areas;
- the choice of herbicide, herbicide properties and toxicity and appropriate application methods/techniques/equipment; and
- the consequences of not treating.

Potential techniques for the management of problem vegetation (additional techniques for the management of problem vegetation are provided in Sections 6.0 and 7.0 of the EPP on or adjacent to the construction right-of-way include the following:

- **Non-Chemical Vegetation Management (manual and mechanical methods) -** consists of methods that destroy or suppress species through physical disruption. Such methods include pruning, pulling, digging, disking, brushing (selective slashing) and mowing. The degree of success of various mechanical treatment methods is dependent on the life cycle of the target species.

- **Cultural (seeding and revegetation) and Biological Vegetation Management -** cultural vegetation management is the establishment of competitive and desired vegetation to prevent or slow down invasion by problem vegetation and is a key component of successful problem vegetation management. Whether seeding to native plants or pasture grasses, it is important to consult with a Reclamation Specialist. Biological problem vegetation management involves the introduction of pests and parasites specific to certain species of problem vegetation. Agents (mainly insects) reduce the vigour of the problem vegetation and suppress their competitive ability against desirable plant species.

- **Chemical Vegetation Management (herbicides) -** herbicide application is an important option for the management of problem vegetation and provides an effective and time-efficient method of managing vegetation. A wide variety of treatment methods are available (*i.e.,* broadcast spraying, foliar spot spraying and wicking treatments, etc.) to help target specific species or problem areas. Where applicable, reduce the use of herbicides by spot spraying or wicking to target individual plants or broadcast spraying localized areas. Only qualified herbicide applicator contractors with valid Pest Control Services Licenses will undertake the application of herbicides on the construction right-of-way.

Appropriate herbicides will be identified by the Vegetation Management Contractor.

An integrated approach combining non-chemical, cultural and chemical treatment options can generally be the most effective when tailored to the species and conditions along the construction right-of-way. Herbicides alone should only be considered where other vegetation management techniques have proven ineffective in managing problem vegetation.

14.10 Post-Treatment Evaluations

The timing and procedure for evaluating specific treatment programs will depend on the treatment method. Trans Mountain shall inspect problem vegetation management work carried out within 3 months of Vegetation Management Contractor activity using a Post-Treatment Inspection Form (Attachment C3). Each Vegetation Management Contractor's work shall be inspected to assess public and worker safety, environmental concerns, completion schedules and adherence to commitments made in the WVMP and the IVM Plan. The purpose of post-treatment evaluation is to measure the success of problem vegetation management and to evaluate the need for follow-up treatment(s).

Treatment program evaluations will be based on visual estimates as conducted by Trans Mountain employees assigned to problem vegetation management or others qualified and experienced to undertake the evaluations. A Post-Treatment Inspection Report will be completed following the evaluation.

14.11 Reporting and Accountability

Trans Mountain is committed to ensuring that the WVMP for the Project is implemented effectively, well documented and reviewed, and revised on a regular basis. Review and revision will ensure that the most effective monitoring and management practices are continually used to achieve the objectives. The tasks involved in implementing the WVMP have been broken out with each task assigned to a specific individual at Trans Mountain (see Tables C.14-4 and C.14-5).

TABLE C.14-4

WEED AND VEGETATION MANAGEMENT PLAN RESPONSIBILITIES DURING CONSTRUCTION

	Environmental Manager	Vegetation Specialist	Environmental Inspector(s)	Vegetation Management Contractor
Task 1: Ensure the pre-construction weed survey is completed prior to spring, summer and fall treatments and before the commencement of construction activities along the construction right-of-way.	A	R	C	--
Task 2: Based on the recommendations made by the Vegetation Specialist during the pre-construction weed survey, determine scope of work and proceed with any budgeting and internal approvals requiring action.	A	R	C	C
Task 3: Advise the Environmental Inspector(s) where treatment and monitoring (pre-construction and construction) is required and provide a timeline for completing the work.	A	C	R	--
Task 4: Confirm that all regulatory approvals are up-to-date and in place for vegetation management and that the WVMP includes all regulatory requirements. Ensure all provincial legislation and requirements in the WVMP are followed during vegetation management activities.	A/R	C	C	C
Task 5: Hire and supervise the Vegetation Management Contractor.	A	--	R/C	C
Task 6: Conduct vegetation management activities and monitoring.	C	--	I/A	R
Task 7: Review herbicide application records and ensure vegetation management has been carried out according to site priorities and timelines.	A	C	R	C
Task 8: Provide the Post-Treatment Inspection and Monitoring Forms (completed by the Environmental Inspector(s) or Vegetation Specialist) to the Environmental Manager.	I	R	A	--
Task 9: Ensure that all records of vegetation management are included in the Construction Monitoring database and included in the as-built report for the Project.	A	I	R	--

Notes:
A = Accountable - The individual or group who is ultimately answerable, includes yes/no and power of veto. Only one "A" can be assigned to each task.
R = Responsible - The individual(s) or group(s) who actually arranges and contracts the task. The degree of responsibility is defined by the accountable person. An "R" can be shared.
C = Consulted - The individual(s) or group(s) to be consulted prior to a final decision or action being taken. Two-way communication.
I = Informed - The individual(s) or group(s) to be consulted prior to a final decision or action being taken. Two-way communication.

TABLE C.14-5

WEED AND VEGETATION MANAGEMENT PLAN RESPONSIBILITIES DURING OPERATIONS

	Environmental Manager	Environmental Specialist	Vegetation Specialist	Operations Supervisor	Vegetation Management Contractor
Task 1: Ensure annual and warranty vegetation monitoring and recommendations are completed prior to mid-June at all operational right-of-way locations.	A	R	C	C	--
Task 2: Based on the vegetation monitoring recommendations made by the Vegetation Specialist, determine vegetation management priorities and proceed with any budgeting and internal approvals requiring action.	I	A/R	C	C	C
Task 3: Advise the Operations Supervisor where treatment and monitoring is required and provide a timeline for completing the work.	I	A/R	C	C	--
Task 4: Confirm that all regulatory approvals are up-to-date and in place for vegetation management and that the WVMP includes all regulatory requirements. Ensure all provincial legislation and requirements in the WVMP are followed during vegetation management activities.	A/R	R/C	C	C	C

TABLE C.14-5 Cont'd

	Environmental Manager	Environmental Specialist	Vegetation Specialist	Operations Supervisor	Vegetation Management Contractor
Task 5: Hire and supervise the Vegetation Management Contractor to implement requirements of the annual vegetation survey as well as any warranty work that is required.	I	A/R	--	R/C	C
Task 6: Conduct vegetation management and monitoring activity.	I	A	R	I	R
Task 7: Review herbicide application records and ensure vegetation management has been carried out according to site priorities and timelines.	I	A/R	C	C	C
Task 8: Provide Pre and Post-Treatment Inspection and Monitoring Forms to the Operations Supervisor and the Environmental Specialist.	I	A	R	I	--
Task 9: Maintain a database of Pre and Post-Treatment Inspection and Monitoring Forms for all operational right-of-way locations.	A/R	R/C	--	--	--
Task 10: Review the WVMP on a 5 year basis and make changes as warranted, with recommendations from a Vegetation Specialist or Operations Supervisor.	A	R/C	C	C	--

Notes:
A = Accountable - The individual or group who is ultimately answerable, includes yes/no and power of veto. Only one "A" can be assigned to each task.
R = Responsible - The individual(s) or group(s) who actually arranges and contracts the task. The degree of responsibility is defined by the accountable person. An "R" can be shared.
C = Consulted - The individual(s) or group(s) to be consulted prior to a final decision or action being taken. Two-way communication.
I = Informed - The individual(s) or group(s) to be consulted prior to a final decision or action being taken. Two-way communication.

14.12 Problem Vegetation Management: Non-Woody Species

The following headings provide a breakdown of each of the steps required for effective non-woody problem vegetation management. This section is intended for guidance to Vegetation Specialists and/or for those conducting inspection or evaluation of non-woody problem vegetation management methods.

14.12.1 Identification

Non-Woody Problem Vegetation

- Identify types of non-woody problem vegetation and record their location along the construction right-of-way during the pre-construction weed survey, annual inspection/patrols and maintenance and monitoring activities. The Vegetation Specialist will monitor for non-woody problem vegetation. Refer to Attachment C1 for a list of plants of concern that will be the target of non-woody problem vegetation management.

- Pre-treatment and post-treatment evaluations will be conducted in order to determine the efficacy of non-woody problem vegetation management methods.

14.12.2 Prevention

Preventing the Spread of Non-Woody Problem Vegetation

- Ensure that all equipment arriving onsite is clean of soil and vegetative debris prior to entering the work site. If equipment is in an unacceptable condition, clean with a shovel or sweep, high-pressure water or steam to remove remnant soil and vegetation debris prior to the equipment entering the work site.

- If necessary, clean equipment prior to leaving the work site, to reduce the risk of carrying non-woody vegetation, soil or vegetative debris to another location.

- Ensure all material brought to site (*i.e.,* gravel, soil, seed, etc.) is free of non-woody problem vegetation, to the extent feasible.

14.12.3 Monitoring

Regular Inspections

- Conduct regular inspections to visually examine the construction right-of-way during maintenance and/or during routine operation activities and document the species, location, density and distribution of non-woody problem vegetation present.

Documentation

- Document vegetation presence (including desirable vegetation), population density and distribution on an annual basis. Record the following:
  - evaluation of any previous non-woody problem vegetation management; and
  - non-woody problem vegetation species, location, density and distribution (or other appropriate method).

- Maintain records of non-woody problem vegetation management in the Problem Vegetation Management and Monitoring Database.

14.12.4 Treatment Threshold

Determine Whether Treatment Threshold Has Been Reached

- Compare the density and distribution of each non-woody problem vegetation species present onsite to the density and distribution of the same species off-site, the reported pre-construction and PCEM phases weed survey densities and/or to listed thresholds in KMC's IVM Plan, to determine whether the treatment threshold has been reached. Record the information required for the treatment decision (whether treatments are necessary, the best timing of treatments and the best treatment option[s]).

- Consult with the local land or regulatory authority, as required, prior to making a treatment decision.

14.12.5 Management Decision

- Initiate the non-woody problem vegetation management decision process and action when the treatment threshold for a defined area along the construction right-of-way has been exceeded.

14.12.6 Treatment Options

Treatment Options

- Where practical, choose treatments that will have the least environmental effect while providing adequate problem vegetation management.

Monitoring Form

- Complete a Pre-Treatment Monitoring Form prior to a non-woody problem vegetation management decision being made. List the strategies that will be used to protect the various environmental features that are listed including the establishment of appropriate size buffer zones around the established Pesticide Free Zones (PFZs), as identified in KMC's IVM Plan, that take into account such factors as the type of equipment being used, the potential for drift, the soil type and the slope of the ground.

14.12.7 Non-Chemical Vegetation Management Options

- Where practical, consider non-chemical vegetation management options as the primary methods to manage non-woody problem vegetation.

Mowing

- Mow non-woody problem vegetation, primarily grasses or other herbaceous species, where warranted. Mow non-woody problem vegetation using equipment such as commercial lawnmowers, garden tractors or industrial tractors.

String Trimmers

- Cut non-woody problem vegetation at the ground surface to remove herbaceous vegetation growing within landscaped areas and along fence lines.

- Combine the use of string trimmers with a pre-mowing herbicide application, where necessary. Allow an appropriate time between herbicide treatment and mowing to allow herbicide to be absorbed by the plants.

Hand Pulling

- Conduct hand pulling for certain (*i.e.,* weed species that do not reproduce vegetatively via root pieces) established non-woody problem vegetation that can be easily uprooted.

14.12.8 Cultural and Biological Vegetation Management Options

Cultural and Biological Vegetation Management

- Use natural treatments which promote the establishment of local, competitive vegetation, including grasses, to provide long-term management of non-woody problem vegetation, where feasible.

- If a native grass seed mix or a cover crop is to be used to help manage the spread and growth of non-woody problem vegetation, ensure a seed Certificate of Analysis is obtained for each native seed species prior to purchase in order to ensure that the highest seed grade available is obtained and that no undesirable species seed is present in the seed lot prior to seed purchase. Where an agronomic seed mix or cover crop is to be used to help manage the spread and growth of non-woody problem vegetation, ensure only seed species with a grade of Canada No. 1 are used and a seed Certificate of Analysis is obtained for each species prior to purchase.

- The release of biological management agents for non-woody problem vegetation management will be strictly monitored and adhere to all applicable legislation.

14.12.9 Chemical Vegetation Management Options

Chemical Vegetation Management

- Use herbicides where necessary to establish a stable plant community. Herbicides may be required to target specific plant species and complexes along the construction right-of-way, primarily grasses and herbaceous broad-leaf plants growing on gravel areas. The use of herbicides may be required for the following:

  - non-woody problem vegetation management in areas where non-chemical methods are not feasible or practical; and

  - management of non-woody problem vegetation where manual and mechanical treatment methods are not effective or practical.

- Only herbicides approved by Trans Mountain may be used.

Herbicide Application Contracts

- Initiate and monitor contracts for non-woody problem vegetation management that involve herbicide applications. Be knowledgeable of the application equipment, methods or techniques that may be used by Contractors, including the benefits and limitations of each method, and the rationale/selection criteria that will be used in selecting a particular method or technique for non-woody problem vegetation management. All Contractors are to be aware of Trans Mountain's safety requirements for the Project.

- Treatment area boundaries and environmentally sensitive areas will be marked/flagged and mapped. This information will be provided to the Vegetation Management Contractor. Marking/flagging will remain for at least 14 days following herbicide application.

Herbicide Labels

- Ensure familiarity with the properties, uses and label directions, precautions and limitations for each of the herbicide products applied.

- Consider the choice of herbicide, herbicide properties and toxicity, and appropriate application methods/techniques/equipment.

- Apply herbicides in accordance with manufacturer's instructions.

Proximity of Treatment Area to Water Sources (Wells)

- Do not apply herbicides for non-woody problem vegetation management within 30 m of a well or water intake (domestic, agricultural, commercial and industrial) unless completely satisfied that a smaller No Treatment Zone (NTZ) or PFZ will ensure that no herbicide enters the water supply, intake or well.

Watercourses, Lakes and Classified Wetlands

- Prior to herbicide application, confirm the location and classification of watercourse/wetland/lake (*i.e.,* fish-bearing/nonfish-bearing) and flag or mark any PFZs or NTZs.

- Do not apply herbicides within the NTZs or PFZ of lakes and watercourses, both fish-bearing and nonfish-bearing, and classified wetlands, measured horizontally from the high watermark. Check the appropriate legislation and regulations for NTZ and PFZ for specific herbicides.

Wildlife and Wildlife Habitat

- Be aware of and maintain appropriate protective buffer zones around inhabited raptor, heron and wood warbler nests, wildlife trees and mineral licks during non-woody problem vegetation management activities. Assess the size of these buffer zones on a site-by-site basis.

- Avoid treatment of low-growing plants that may be beneficial for wildlife habitat and browsing where practical.

- Field check each treatment site prior to undertaking non-woody problem vegetation management to confirm treatment area boundaries, the locations of any required PFZs, NTZs, sites for posting required treatment notices and the presence of other environmental conditions that would preclude the use of herbicides.

Applicator Qualifications

- Conduct or supervise all applications of herbicides by a person who holds a Pesticide Applicator Certificate in the Industrial Vegetation Category. Record the name and certificate numbers of the applicators who will supervise/undertake herbicide applications.

Equipment Maintenance and Calibration

- Application Contractors will ensure that all equipment is calibrated prior to the work on the Project. Equipment will be calibrated in accordance to the manufacturer's directions. Equipment will also be calibrated if:
  - there is a change in application personnel;
  - any maintenance or equipment changes occur; and
  - there is a change to the formula or herbicide concentration.

Supervision

- The Certified Pesticide Applicator must:
  - be in continuous attendance at the site;
  - have available proof of certification with them at each treatment site;
  - within BC, supervise no more than four uncertified assistants at one time (BC Integrated Pest Management Regulation);
  - within Alberta, supervise no more than six uncertified assistants at one time as per the *Environmental Code of Practice for Pesticides* (Government of Alberta 2010);

- maintain continuous contact, auditory and/or visual, with the uncertified assistants;
- be within 500 m of persons being supervised; and
- must meet Trans Mountain's safety requirements and be prepared to provide proof of completion of safety courses.

Treatment Notices

- Treatment notices must be posted or given to affected parties before each herbicide use in BC, and must not be removed for at least 14 days after the use or as defined by appropriate regulatory authority (BC *Integrated Pest Management Regulation*). Each treatment notice must be posted so that it is clearly visible and legible from each approach to access the treatment area, and must contain the following information:
  - the trade name or active ingredient of the herbicide that will be used;
  - the date and time of the herbicide use;
  - the confirmation number of the KMC IVM Plan;
  - a description of the treatment area;
  - precautions to be taken to prevent harm to people entering the treatment area; and
  - how to contact the plan holder or that person's agent to obtain information about the herbicide or herbicide use.

Mixing of Herbicides

- Ensure that the following procedures are adhered to when mixing herbicides:
  - conduct herbicide mixing in a safe and appropriate manner;
  - ensure the presence of personal washing stations (*i.e.,* eye was station) is present in the mixing area;
  - ensure that appropriate personal protective equipment will be worn at all times by all personnel to reduce the risk of unwanted exposure to herbicides;
  - where feasible, mixing stations will be located within the treatment areas; and
  - no mixing of herbicides will occur within 15 m of a sensitive area (*i.e.,* riparian area, wetland, watercourse, lake or NTZ).

Regulatory Requirements

- Ensure that all use requirements specified in the manufacturer's instructions and any corresponding environmental protection laws, are adhered to during herbicide application. Ensure that all use requirements specified in the Alberta *Environmental Protection and Enhancement Act* as well as the BC Integrated Pest Management Regulation are adhered to during herbicide applications.
- Any unused herbicide waste produced from rinsing containers (*i.e.,* rinsate) will be disposed of onsite, where feasible, in a manner that adheres to the requirements outlined in the BC *Environmental Management Act*, the *BC Hazardous Waste Regulation* and the Alberta *Pesticide Sale, Handling, Use and Application Regulations*.
- All herbicide containers will be triple rinsed/pressure rinsed and disposed of in accordance with the manufacturer's instructions or as outlined in the IVM Plan and the provincial guidelines detailed in the BC MOE document, Handbook for Pesticide Applicators and Dispensers (BC Ministry of Water, Land and Air Protection 2005).

- Contact local authorities regarding any new bylaws/permitting for the construction area. Ensure that all local area sanitation or monitoring requirements are adhered to during all construction and operational phases.

- Adhere to Workplace Hazardous Materials Information System (Health Canada 2010) and Transportation of Dangerous Goods standards for pesticide containment, transport, storage and spill response.

- Store, handle and transport herbicides in a container in which they were originally packaged and with the label originally affixed by the herbicide manufacturer, or in a labelled container designed for containing herbicides. The labelling on the replacement container must include the herbicide trade name, the name and concentration of each active ingredient in the herbicide and the product registration number under the federal Pest Control Products Act. The containment standards do not apply to tanks being used for mixing herbicides or for holding herbicides during use.

- Ensure that herbicides are transported or caused to be transported in a secure manner that prevents:

  - the escape, discharge or unauthorized removal of the herbicides from the transport vehicle; and

  - the contamination of food or drink intended for animal or human consumption, household furnishings, toiletries, clothing, bedding or similar items that are transported with the herbicides.

- If temporary herbicide storage in vehicle(s) is required, the storage area in the vehicle must:

  - adhere to all storage requirements outlined in the *Integrated Pest Management Act and Regulation*, the *Pesticide Sales, Handling, Use and Application Regulation* and the WorkSafe BC document Standard Practices for Pesticide Applicators (WorkSafe BC 2009);

  - be separate from, and not used for storage of, food intended for human or animal consumption;

  - be ventilated so that herbicide vapours are vented to the outside;

  - have on each door providing access to the vehicle herbicide storage area, a sign that is clearly visible to a person approaching the door with the words, written in block letters: “WARNING: CHEMICAL STORAGE - AUTHORIZED PERSONS ONLY”;

  - be locked when unattended;

  - be accessible only to authorized personnel;

  - be locked when unattended; and

  - notify the local fire department of the presence of herbicides on the premises.

Spill Response

- Follow the Spill Contingency Plan (see Appendix B) for responding to herbicide spills.

- Ensure spill treatment equipment is present or near storage (including mobile storage), mixing and loading sites. Equipment shall include: personal protective equipment; absorbent material; neutralizing material; a long handled broom; shovel; and a waste receiving container with lid.

- Keep a copy of the Spill Contingency Plan (see Appendix B) at or near each work site; ensure all personnel working on the Project are familiar with its contents.

Weather Monitoring

- Ensure that:
  - measurements are made to record weather conditions prior to and periodically during herbicide applications;
  - wind speed and direction, precipitation, temperature and sky conditions (clear, overcast, cloudy, partly cloudy) are recorded for foliar and soil herbicide applications;
  - temperature, precipitation, frost and dew conditions are recorded for wick/wipe-on applications; and
  - persons applying herbicides are responsible for checking each product label for guidelines for applying herbicides during various weather conditions.
- Stop herbicide applications if any of the following occur:
  - the maximum/minimum temperature stated on the herbicide label is exceeded;
  - the wind speed and/or direction cause the foliar or soil application of herbicide to drift and/or miss the target vegetation;
  - ground wind velocity is greater than 8 km/hour;
  - it begins to rain steadily, increasing the chances of excessive runoff and leaching; or
  - there is ice or frost on the foliage.

14.13 Problem Vegetation Management: Woody Species

Trans Mountain actively encourages the establishment of suitable low-growing natural vegetation in its reclamation seed mixes and in its ongoing application of problem vegetation management practices. Tall-growing woody vegetation may be encouraged in environmentally sensitive areas such as caribou habitat and around watercourses, wetlands and lakes to accomplish other environmental objectives.

Woody problem vegetation management will be conducted along the construction right-of-way to ensure: protection of public safety and environmental integrity; access for maintenance and inspection; and for the regular operation of the Project as outlined in the IVM Plan.

Woody problem vegetation management will be conducted due to the presence of the following conditions or issues:

- woody problem vegetation restricting aerial surveillance and/or visibility of the Project easement;
- woody problem vegetation restricting the visibility of pipeline markers and warning signs;
- where woody problem vegetation effects the safety and operations of the pipeline;
- where woody problem vegetation increases the fire hazard potential;
- where woody problem vegetation effects site security by providing easier access over security fencing;
- where woody problem vegetation causes the deposition of organic debris or seed (seed rain) into stations that increases vegetation growth;
- where woody problem vegetation has reached threshold limits as outlined in the IVM Plan; and
- where woody problem vegetation restricts construction right-of-way access for maintenance, emergency response and/or construction right-of-way patrols.

14.13.1 Treatment Thresholds

The decision to initiate treatment for woody problem vegetation management is based solely on the presence of target vegetation that has the potential to disrupt the normal operation, maintenance and safety of the pipeline system. Treatment decisions will also consider public safety, pipeline security, accessibility, species growth rates and social, economic and environmental considerations.

Management strategies will be achieved through the development and implementation of woody problem vegetation treatment procedures that address site-specific and regional considerations including appropriate regulatory authority legislation and regulations, consultation with the public, adjacent landowner and Aboriginal representatives as well as land use and site conditions along the construction right-of-way. To ensure effective implementation of woody problem vegetation treatment procedures, it is necessary to understand:

- types of treatments that are available for woody problem vegetation management;
- how woody problem vegetation management treatments may vary along the construction right-of-way;
- timing constraints for woody problem vegetation management treatments; and
- methods for implementing woody problem vegetation treatment procedures.

14.13.2 Woody Problem Vegetation Management Methods

Woody problem vegetation management activities include non-chemical, cultural and biological and chemical methods. Non-chemical methods typically include clearing of the vegetation using hand-held

tools or heavy machinery. Cultural methods encourage regeneration of desirable vegetation species including natural regeneration or seeding of the Project right-of-way to competitive native grass species. Biological management involves introducing pests or parasites to target specific woody problem vegetation. Chemical management of woody problem vegetation may apply to both native and non-native woody species and included both spot treatments and less discriminate broadcast application of herbicides. Utilization of several or potentially all methods of problem vegetation management are likely in the scope during operations; effective implementation of these methods will consider the location and relevant timing constraints in addition to the risk for fire, unauthorized encroachments as well as public, adjacent landowner and Aboriginal community commitments and operational requirements, if warranted.

14.13.3 Management Method Variations

Woody problem vegetation management practices will vary across the construction right-of-way according to site-specific conditions. Since woody problem vegetation is likely to inhibit access along the construction right-of-way, trees and tall shrubs are removed from the majority of the operational right-of-way except for specific locations with sensitive environmental conditions (*e.g.,* riparian areas). Low shrubs are allowed to regenerate in a controlled manner such that the construction right-of-way can still be identified and that access is not inhibited. Regeneration of woody species along the centre line is discouraged and managed by mechanical and/or chemical methods.

14.13.4 Timing

Woody problem vegetation management activities may be disruptive for wildlife, biological or physical processes as well as other activities associated with the intended land use for areas traversed by the construction right-of-way. Where practical, woody problem vegetation management will be minimized along the construction right-of-way. Adherence to specific timing constraints is necessary for compliance with environmental regulations and legislation, effective utilization of woody problem vegetation management procedures as well as providing respect to operating agreements with the public, adjacent landowners or Aboriginal communities.

Timing constraints will vary according to the affected land use, the woody problem vegetation management procedures to be applied and the environmental components that may be affected.

On private lands, woody problem vegetation management procedures will be scheduled in consultation with the landowner, land users and/or tenants to avoid conflict with activities associated with industrial and recreational land uses.

In wetlands, watercourses and forested lands with known critical wildlife habitat and species of concern (*e.g.,* caribou and rare plants), Trans Mountain will determine through consultation with the public, adjacent landowners, regulatory authorities and Aboriginal communities, the appropriate woody problem vegetation management activities necessary to ensure compliance within environmental regulations and legislation.

Depending on the goals of woody problem vegetation management, certain plant species may respond most effectively to vegetation management practices at particular stages in their yearly growth cycle. Therefore, to ensure successful results from vegetation management practices, timing for these activities will be scheduled to occur during periods when they are anticipated to be most effective, if practical.

14.13.5 Selecting Methods and Equipment

Similar to planning the timing of woody problem vegetation management activities, selection of methods and equipment may require consideration for compliance with environmental regulations and legislation, environmentally sensitive features and providing respect to operating agreements with the public, adjacent landowners and Aboriginal communities. Appropriate methods will:

- achieve objectives;
- not create safety issues or inhibit access along the construction right-of-way;

- reduce known environmental effects where possible without creating additional environmental effects; and

- achieve compliance with requirements of legislation as well as regulatory, public, adjacent landowner and Aboriginal communities agreements.

When assessing options for woody problem vegetation management, it is necessary to consider the respective advantages and disadvantages of each method. Furthermore, additional factors may influence which methods are selected, including:

- site characteristics including the species to be managed, sensitivity considerations and intended land use;

- expected response time from the point of treatment and the implications for both short-term and long-term operations; and

- logistical considerations and necessary resources including costs, equipment and crew.

Due to the broad landform and plant community variations encountered on the construction right-of-way, the above-listed factors may vary along the length of the construction right-of-way and, therefore, consideration will be made to how this variation may affect which methods are selected where warranted.

14.13.6 Identification

Woody Problem Vegetation

- Identify types of woody problem vegetation and record their location and height, along the construction right-of-way during monthly inspection/patrols, maintenance and monitoring activities. The Vegetation Specialist will monitor for woody problem vegetation. Refer to Attachment C1 for a list of plants of concern that will be the target of woody problem vegetation management.

- Ensure that locations where management procedures are to be applied are properly communicated to personnel and that locations requiring special consideration are properly identified using stakes or flagging.

- Utilize maps, aerial photographs and/or Global Positioning Systems to communicate locations of special consideration, especially where woody problem vegetation management procedures are to vary during the scope of work or where the location of site-specific treatments is difficult to identify.

14.13.7 Monitoring

Regular Inspection

- Conduct regular inspections to visually examine the construction right-of-way during maintenance and/or during routine operation activities and document the density, location and type of woody problem vegetation present.

Documentation

- On an annual basis, document vegetation presence (including desirable vegetation), population density and distribution. Monitor woody problem vegetation responses to management treatments throughout the Project. Maintain records of woody problem vegetation management in the Problem Vegetation Management and Monitoring Database. Adjust procedures as necessary to achieve objectives of the WVMP.

14.13.8 Treatment Threshold

Determination

- With available size, density and distribution information of woody problem vegetation and by referencing accepted threshold levels, determine whether the treatment threshold has been reached.

Record the information required for the treatment decision (whether treatments are necessary, the best timing of treatments and the best treatment option[s]).

- Consult with the local land authority, as required, prior to making a treatment decision.

Management Decision

- Initiate the woody problem vegetation management decision process and action when the treatment threshold for a defined area along the construction right-of-way has been exceeded.

14.13.9 Treatment Options

Treatment Options

- Choose treatments that will have the least environmental effect while providing adequate management.

Monitoring Form

- Complete a Pre-Treatment Monitoring Form prior to a woody problem vegetation management decision being made. List the strategies that will be used to protect the various environmental features that are listed including the establishment of appropriate size buffer zones around the established PFZs that take into account such factors as the type of equipment being used, the potential for drift, the soil type, the slope of the ground and the potential for soil disturbance.

14.13.10 Non-Chemical Management Options

Non-chemical Vegetation Management Options

- Where practical, consider non-chemical management options (*i.e.,* hand pulling or tree and stump removal) as the primary methods to manage woody problem.

- Brushing activities will not occur during any regulated restricted period (*i.e.,* wildlife movement restrictions), unless otherwise approved by the applicable regulatory authority representative.

Mowing/Brushing/Girdling/Pruning

- Utilize commercial lawnmowers, industrial tractors, brush mowers, hydro-axes, mulchers and/or hand-held trimmers when.

- regional herbicide application is not feasible either for aesthetic, health, safety or environmental reasons.

- herbicide application is localized and does not address large-scale woody problem vegetation management goals.

- objectives for woody problem vegetation management do not require short-term outcomes, allowing for natural succession.

Felling/Hand Clearing

- At watercourses and wetland crossings during the operational phase, woody problem vegetation removal will be minimized to the amount necessary for equipment and vehicle passage and pipeline integrity considerations. This woody vegetation buffer will extend across the entire construction right-of-way and extend up the right-of-way from the watercourse or wetland within the functional riparian area, or less if it affects operations.

- Fell trees away from watercourses, wetlands and lakes and from limits of the construction right-of-way to reduce damage to streambeds, banks and adjacent trees. Hand clear, if necessary, to minimize disturbance. Remove any trees, debris and soil inadvertently deposited within the ordinary high water level in a manner that minimizes disturbance of the streambed and banks. Do not stand or yard trees across watercourses.

- Fell all damaged or leaning trees immediately and remove any trees that fall off the construction right-of-way.

- Maintain low woody vegetation or vegetated ground mat within the vegetated buffer zone of watercourses, wetland and lakes to the extent practical.

Geotextile

- Use porous, polypropylene geotextile fabric below mulches, crushed rock and/or gravel to prevent the root growth of woody problem vegetation.

14.13.11 Chemical Vegetation Management Options

See Section 14.12.9 of this WVMP.

15.0 WILDLIFE CONFLICT MANAGEMENT PLAN

Background

Wildlife conflicts with personnel may occur during construction and operation of the Project. Potential conflict situations may arise due to vehicle collisions, attraction to garbage and debris, and human encroachment. The magnitude of the conflict will depend on the species involved and the nature of the conflict. Although efforts will be made to avoid, limit or mitigate potential effects on wildlife and wildlife habitat wherever they occur, certain locations may be particularly sensitive to the presence of Project personnel. Trans Mountain will develop resource-specific approaches to reduce and address the potential conflict between Project personnel and the wildlife species most likely to be encountered along the Project and associated facilities (see Appendix L in this EPP for resource-specific measures).

Where disturbance is unavoidable, Project staff will consult with the appropriate regulatory authorities and, as appropriate, interested and affected Aboriginal communities to identify possible options and management strategies to be implemented to reduce effects to wildlife.

Objectives

The primary objective of the Wildlife Conflict Management Plan is to provide direction to Project personnel to ensure that wildlife conflicts are reduced or avoided during the construction and operation of the Project. Measures described in this Wildlife Conflict Management Plan will assist in preventing or reducing human-wildlife conflicts associated with all phases of the Project. The goal of the Wildlife Conflict Management Plan is to provide guidelines for:

- preventing direct and indirect mortality of wildlife; and
- reducing wildlife-related safety concerns for personnel.

Specific measures to reduce potential conflicts with grizzly, black bear and rattlesnakes are presented within this management plan. For each species, measures to avoid encounters, directions on what to do in case of an encounter, and the steps to follow after an encounter are provided. Measures outlined within the Traffic and Access Control Management Plan (see Appendix C) will further reduce the effects of traffic and access on wildlife.

Measures developed to avoid or reduce effects on wildlife species of economic importance or with special conservation status as well as their habitat during construction of the Project, are provided in Appendix L in this EPP.

Management Approach

The following approach will be applied for the Project to avoid or reduce the risk and severity of wildlife conflicts.

- All Project personnel and other visitors to the right-of-way will participate in Trans Mountain's environmental awareness training program which will include a discussion of the purpose and requirements of the Wildlife Conflict Management Plan.
- Construction camps will be constructed and maintained to prevent any bears and/or other wildlife from gaining access to the site. In addition to any other measures that Trans Mountain deems necessary to accomplish this objective, all construction camps will be fenced. The potential for wildlife conflict issues at each construction camp will be assessed and, where warranted, an electric fence with cattle guard type electrified gates and a bear alarm system to deter and detect wildlife will be installed. At construction camps with limited potential for bear conflicts, a chain-link fence will be installed (with a particular focus on preventing access by wolves, coyotes and ungulates such as moose, elk and deer), with a fenced Texas gate installed at the access point.
- Appropriate fencing will be installed at other Project temporary facilities such as stockpile sites and borrow sites, if warranted, to limit the potential for wildlife conflicts and for security.

- Construction camps will be laid out with buildings well-spaced in a straight line or a semi-circle. This layout will provide a bear that enters camp area an avenue of escape and allows designated personnel the opportunity to use deterrents in a safe manner. Cooking and food storage sites will be separate, yet visible from sleeping areas and preferably downwind.

Management Approach for Reducing and Managing Conflicts with Bears

Darkness, dense vegetation, blind corners, noise, wind, precipitation, fog and other conditions may make it difficult for people to see or hear a bear. Bears, particularly when human-habituated, are tolerant of humans and the likelihood of being injured by a bear is low. However, undetected bears in a construction camp site pose a potential risk to people and equipment. Two main situations leading to human injury by grizzly bears include:

- when humans suddenly surprise a bear at close range, particularly a grizzly bear with cubs; and
- when food-conditioned bears, that are also human-habituated, aggressively approach people for food.

The following measures for avoiding a bear encounter and reducing the risk of injury to Project personnel and wildlife will be implemented.

- All Project personnel will receive education regarding bear awareness and staying safe in bear country. Without a good understanding of the principles and practices of staying safe around bears, personnel may not properly respond to interactions and may perpetuate misinformation. The following information will be made available during the Project orientation:
  - differentiating between grizzly and black bears;
  - general ecology of grizzly and black bears relevant to human safety;
  - grizzly and black bear ecology in the Project area;
  - a discussion of the processes of human-habituation and food conditioning;
  - the detrimental effects of directly or indirectly feeding wildlife, including bears;
  - how to work safely in bear country and avoid bear encounters;
  - how to avoid attracting a bear by properly managing non-natural attractants;
  - how to avoid inadvertently displacing bears from important habitats;
  - awareness that a bear encounter may occur despite all necessary precautions and guidelines on how to behave during a bear encounter;
  - locations or contacts for reporting bear observations or bear-human conflicts; and
  - further information and suggested readings.
- Camps will be designed and maintained to prevent surprise encounters with bears. Any feature on pathways and around buildings that may conceal a bear and increase the chance of a surprise encounter will be eliminated or reduced. Examples of those features are outlined below.
  - Thick vegetation, such as shrubs that may obscure visibility, will be cleared or mowed to increase sightlines.
  - Skirting will be attached to buildings to prevent bears, particularly young bears, from taking refuge under them.

  - Building exits, pathways and outside work areas will be well lit to allow people to move about the camp more safely when it is dark.

  - All camp buildings will have secure doors and windows. A window in a door, or next to it, allows people to check for bears before exiting. Larger buildings will have more than one exit.

- All potential attractants in construction camps will be stored, as noted below, so that they are inaccessible to wildlife, particularly bears.

  - All food will be stored in or near the building with cooking facilities.

  - No food or garbage will be left outside unattended. All food will be stored indoors in appropriate containers.

  - Garbage and food waste will be stored where bears cannot access the material and will not be allowed to pile up or develop strong odours. Used cooking oil and grease, and meat and fish scraps are powerful bear attractants. These materials will be collected and stored in an airtight container with a lid within a bear-proof garbage container until they can be disposed of.

  - No food will be stored in facilities when they are closed for any length of time unless the storage area is bear-proof.

  - Signage explaining proper food storage or garbage disposal will be posted at strategic locations in camp, such as dining areas, kitchens, garbage receptacles and waste disposal sites.

  - All garbage and food waste will be regularly transported to the nearest bear-proof transfer station or landfill for proper disposal (see Waste Management Standard).

  - Grey water (wastewater from sinks, showers and basins) can combine the odours of cooking grease, food particles and soap. This can be a strong wildlife attractant. Grey water will be treated so that it does not attract wildlife (see Waste Management Standard). Grey water will be treated in the same manner as sewage in an approved waste management system.

  - Accumulations of human waste (*e.g.*, sewage) can attract wildlife, including bears. Large, long-term camps will require an approved waste treatment system. Portable toilets should be regularly cleaned to reduce odours.

  - The Lead Environmental Inspector(s) and the Environmental Inspector(s) will make regular inspections of facilities and camps. The Environmental Inspector(s) will accompany NEB inspection personnel during any period inspection of facilities.

  - Project personnel and Contractors will be prohibited from hunting and fishing along the right-of-way and at other construction sites during Project construction. Crews staying in construction camps will also not be allowed to hunt or fish.

Deterring a Bear Encounter

The approach for deterring a bear encounter includes the following.

- Project personnel will be educated in methods to deter or chase away an approaching bear. Construction sites and camps will have a variety of bear deterrents on hand including noise makers.

- Any bear approaching construction camps or other Project facilities or construction sites will be deterred (hazed away) and deterred every time it returns. Bear deterrents may include bear spray, noisemakers (bear bangers, blow horns), chasing by vehicle, electric fencing and/or other deterrents approved by the Regional Wildlife Officer will be asked to assist in situations where bears become aggressive. Any deterring or hazing of bears will be conducted by a qualified Wildlife Monitor, Environmental Inspector(s) or a Wildlife Resource Specialist.

- A bear that has obtained human food or garbage may be difficult to deter. Eliminating rewards that attract a bear is critical for deterrent efforts to succeed.

- Any encounter and, if necessary, hazing, will be managed on a case-by-case basis, utilizing appropriate measures that maximize human and bear safety.

- Project personnel will report immediately to the Environmental Inspector(s) or Camp Manager any bear that has entered a construction camp, other facility site, or construction site and/or has obtained human food or garbage. The Environmental Inspector(s) or Camp Manager will immediately notify the Regional Wildlife Officer. If the bear(s) has obtained human food or garbage, the reason for such will be immediately rectified to ensure the bear(s) receives no further food rewards.

Management Approach for Reducing and Managing Conflicts with Rattlesnakes

Rattlesnakes may be encountered in areas north of Kamloops, B.C. within and near the Lac du Bois Grasslands Park. Potential encounters are generally limited to activities scheduled during periods when snakes are breeding or migrating to forage sites or hibernacula (*i.e.*, April to October).

Rattlesnakes are cryptic snakes, camouflaged in their habitat by their colouration and behaviour. Rattlesnakes are generally quiet and non-aggressive. Their first response to potential danger is to stay quiet and camouflaged. Their second response is escape. If cornered, however, rattlesnakes will rattle their tails vigorously while forming an aggressive coil with the head raised and the neck in an ‘s’ shaped curve. Striking is a last resort, usually employed if cornered or when the snake is facing immediate physical injury (*i.e.*, if stepped on).

As a result of their cryptic colouration and behaviour, rattlesnake presence goes largely undetected with the exception of direct encounters. Rattlesnake-human encounters may occur in two scenarios:

- when humans encounter a rattlesnake in its natural habitat, generally associated with rocks or vegetation; and

- when rattlesnakes use anthropogenic cover objects that may then be moved by humans, leading to an encounter.

The following measures for avoiding a rattlesnake encounter and reducing risk of injury to Project personnel and wildlife will be implemented.

All Project personnel will receive education regarding rattlesnake awareness and staying safe in snake habitat. Without a good understanding of the principles and practices of staying safe in snake habitat, personnel may not properly respond to encounters and may perpetuate misinformation. The following information will be made available during the Project orientation:

- differentiating between snake species, including rattlesnakes and gopher snakes, which imitate rattlesnake behaviour and are often misidentified;

- snake ecology in the Project area;

- understanding the behaviour of snakes relevant to human safety;

- how to work safely in snake habitat and avoid snake encounters;

- how to avoid creating anthropogenic features that may be used as cover objects and may cause snakes to remain on the work site;

- how to avoid displacing snakes from important habitats;

- awareness that a snake encounter may occur despite all necessary precautions and guidelines on how to behave during a snake encounter;

- locations or contacts for reporting snake observations or snake-human conflicts; and

- further information and suggested readings.

Work sites will be managed and maintained to prevent encounters with snakes.

- Openings on temporary structures and buildings, including stairs will be closed-in, so that snakes and other small animals are not trapped inside them.

- Keep work sites uncluttered so that snakes moving through an area will not be attracted to stay. As rattlesnakes mainly eat small mammals, discourage small mammals like mice and voles from living on site by keeping the work site tidy and garbage free.

- Avoid making anthropogenic cover objects like woodpiles, leftover construction materials, brush piles, and rock piles. If piles cannot be avoided, keep elevated so any animals underneath will be clearly visible.

- Pets will be prohibited on Project facility and construction sites.

- Snake-proof fences may be considered where encounter risk cannot be mitigated. A fine-mesh wire screen buried at least 30 cm underground, and extending 60 cm above ground will help prevent small mammals from burrowing under the fence (and providing entranceways for snakes), and help stop snakes from moving under or over the fence.

Project Personnel will take the following actions and precautions to avoid human-snake encounters:

- be familiar with snake species and behaviours;

- stay on established trails and roads;

- wear long loose pants and high boots that cover the ankles. This will help protect the legs and feet should a snake accidentally be stood on, causing it to bite;

- always be aware of hand and foot placement. Avoid reaching into piles of rocks, under logs or objects, or into shrubs where snakes may be resting or concealed; and

- use a tool to lever or lift the objects off of the ground in case a snake is concealed.

Managing a Rattlesnake Encounter

The approach for managing a rattlesnake encounter includes the following.

- Project personnel will be educated in methods to behave during a snake encounter.

- Any snakes encountered on construction sites will be relocated to a safe, suitable location within 1,000 m of where it was encountered. Any relocation of snakes will be conducted by a qualified Wildlife Monitor or a Wildlife Resource Specialist.

- Any encounter will be managed on a case-by-case basis, utilizing appropriate measures that maximize human and snake safety.

- Project personnel will report immediately to the Environmental Inspector(s) or Camp Manager any snake that has entered a facility or construction site. The Environmental Inspector(s) or Camp Manager will immediately notify the Regional Wildlife Officer.

ATTACHMENT C1

WEED SPECIES OF CONCERN

TABLE C1-1

WEED SPECIES OF CONCERN IN ALBERTA

Common Name	Scientific Name
NOXIOUS WEEDS	
black henbane	*Hyoscyamus niger*
blueweed	*Echium vulgare*
broad-leaved pepper-grass	*Lepidium latifolium*
common baby's-breath	*Gypsophila paniculata*
common mullein	*Verbascum thapsus*
common tansy	*Tanacetum vulgare*
creeping bellfower	*Campanula rapunculoides*
creeping (Canada) thistle	*Cirsium arvense*
Dalmatian toadflax	*Linaria dalmatica*
dame's rocket	*Hesperis matronalis*
downy brome	*Bromus tectorum*
field bindweed	*Convolvulus arvensis*
field scabious	*Knautia arvensis*
globe-podded hoary cress	*Cardaria pubescens*
great burdock	*Arctium lappa*
heart-podded hoary cress	*Cardaria draba*
hound's-tongue	*Cynoglossum officinale*
Japanese brome	*Bromus japonicus*
leafy spurge	*Euphorbia esula*
lens-podded hoary cress	*Cardaria chalepense*
lesser burdock	*Arctium minus*
ox-eye daisy	*Chrysanthemum leucanthemum*
perennial sow-thistle	*Sonchus arvensis*
scentless chamomile	*Matricaria perforata*
tall buttercup	*Ranunculus acris*
white cockle	*Silene pratensis*
woolly burdock	*Arctium tomentosum*
yellow clematis	*Clematis tangutica*
yellow toadflax	*Linaria vulgaris*
PROHIBITED NOXIOUS WEEDS	
autumn olive	*Elaeagnus umbellata*
bighead knapweed	*Centaurea macrocephala*
black knapweed	*Centaurea nigra*
brown knapweed	*Centaurea jacea*
Chinese tamarisk	*Tamarix chinensis*
common barberry	*Berberis vulgaris*
common buckthorn	*Rhamnus catharticus*
common crupina	*Crupina vulgaris*
common St John's-wort	*Hypericum perforatum*
diffuse knapweed	*Centaurea diffusa*
dyer's woad	*Isatis tinctoria*
Eurasian water milfoil	*Myriophyllum spicatum*
flowering rush	*Butomus umbellatus*
garlic mustard	*Alliaria petiolata*
giant hogweed	*Heracleum mantegazzianum*
giant knotweed	*Fallopia sachalinensis*
Himalayan balsam	*Impatiens glandulifera*
hoary alyssum	*Berteroa incana*
hybrid Japanese knotweed	*Fallopia bohemica*
hybrid knapweed	*Centaurea x psammogena*
Japanese knotweed	*Fallopia japonica*

TABLE C1-1 Cont'd

Common Name	Scientific Name
jointed goatgrass	*Aegilops cylindrica*
late-flowering eyebright (red bartsia)	*Odontites serotina*
marsh thistle	*Cirsium palustre*
meadow hawkweed	*Hieracium caespitosum*
meadow knapweed	*Centaurea x moncktonii*
medusahead	*Taeniatherum caput-medusae*
mouse-ear hawkweed	*Hieracium pilosella*
nodding thistle	*Carduus nutans*
orange hawkweed	*Hieracium aurantiacum*
pale yellow iris	*Iris pseudacorus*
plumeless thistle	*Carduus acanthoides*
puncturevine	*Tribulus terrestris*
purple loosestrife	*Lythrum salicaria*
rush skeletonweed	*Chondrilla juncea*
Russian knapweed	*Centaurea repens*
saltcedar	*Tamarix ramosissima*
saltlover	*Halogeton glomeratus*
smallflower tamarisk	*Tamarix parviflora*
spotted knapweed	*Centaurea maculosa*
squarrose knapweed	*Centaurea virgata* ssp. *Squarrosa*
sulphur cinquefoil	*Potentilla recta*
tansy ragwort	*Senecio jacobaea*
Tyrol knapweed	*Centaurea nigrescens*
yellow nutsedge	*Cyperus esculentus*
yellow starthistle	*Centaurea solstitialis*

Source: Alberta *Weed Control Regulation*.

Notes:
- In accordance with the Alberta *Weed Control Act*, Prohibited Noxious Weeds must be destroyed, while Noxious weeds must be controlled or destroyed.
- Consult the appropriate acts, legislation, regulations and regional district information on a regular basis for updates to species ranking.

TABLE C1-2

WEED SPECIES OF CONCERN IN BRITISH COLUMBIA

Common Name	Scientific Name	BC Ranking
anchusa	*Anchusa officinalis*	Invasive
annual sow-thistle	*Sonchus asper (L.) Hill*	Provincial Noxious
baby's breath	*Gypsophila paniculata*	Invasive
black knapweed	*Centaurea nigra*	Invasive
blueweed	*Echium vulgare L.*	Regional Noxious (Thompson-Nicola), Invasive
brown knapweed	*Centaurea jacea*	Invasive
bohemian knotweed	*Fallopia x bohemica*	Provincial Noxious
bull thistle	*Cirsium vulgare*	Invasive
bur chervil	*Anthriscus caucalis*	Provincial Noxious
burdock	*Arcticum* spp.	Regional Noxious (Fraser-Fort George, Thompson-Nicola), Invasive
common burdock	*Arctium minus*	Invasive
common crupina	*Crupina vulgaris Cass.*	Provincial Noxious
common reed	*Phragmites australis*	Provincial Noxious
common tansy	*Tanacetum vulgare L.*	Invasive
common toadflax	*Linaria vulgaris (P.) Mill.*	Provincial Noxious
creeping (Canada) thistle	*Cirsium arvense (L.) Scop.*	Provincial Noxious, Invasive
Dalmatian toadflax	*Linaria vulgaris Hill.*	Provincial Noxious, Invasive
dense-flowered cordgrass	*Spartina densiflora*	Provincial Noxious

TABLE C1-2 Cont'd

Common Name	Scientific Name	BC Ranking
diffuse knapweed	*Centaurea diffusa Lam.*	Provincial Noxious, Invasive
dodder	*Cuscuta* spp.	Provincial Noxious
English cordgrass	*Spartina anglica*	Provincial Noxious
field scabious	*Knautia arvensis*	Regional Noxious (Thompson-Nicola), Invasive
flowering rush	*Butomus umbellatus*	Provincial Noxious
garlic mustard	*Alliaria petiolata*	Provincial Noxious
giant hogweed	*Heracleum mantegazzianum*	Provincial Noxious
giant knotweed	*Fallopia sachalinensis*	Provincial Noxious, Invasive
giant mannagrass/reed sweetgrass	*Glyceria maxima*	Provincial Noxious
gorse	*Tragopogon dubius Scop.*	Provincial Noxious, Invasive
Himalayan knotweed	*Polygonum polystachyum*	Provincial Noxious
hoary alyssum	*Berteroa incana*	Invasive
hoary cress	*Cardaria* spp.	Regional Noxious (Thompson-Nicola), Invasive
hound's-tongue	*Cynoglossum officinale L.*	Provincial Noxious, Invasive
Japanese knotweed	*Fallopia japonica*	Provincial Noxious, Invasive
jointed goatgrass	*Aegilops cylindrica Host*	Provincial Noxious
leafy spurge	*Euphorbia esula L.*	Provincial Noxious, Invasive
marsh plume thistle	*Cirsium palustre (L.) Scop.*	Regional Noxious (Fraser-Fort George), Invasive
meadow hawkweed	*Hieracium pilosella*	Invasive
meadow knapweed	*Centaurea pratensis*	Invasive
milk thistle	*Silybum marianum*	Provincial Noxious
nodding thistle	*Carduus nutans L.*	Invasive
North Africa grass	*Ventenata dubia*	Provincial Noxious
orange hawkweed	*Hieracium aurantiacum L.*	Regional Noxious (Thompson-Nicola), Invasive
oxeye daisy	*Chrysanthemum leucanthemum L.*	Regional Noxious (Thompson-Nicola), Invasive
perennial pepperweed	*Lepidium latifolium*	Regional Noxious (Thompson-Nicola), Invasive
perennial sow-thistle	*Sonchus arvensis L.*	Provincial Noxious
plumeless thistle	*Carduus acanthoides*	Invasive
puncture vine	*Tribulus terrestris*	Invasive
purple loosestrife	*Lythrum salicaria L.*	Provincial Noxious, Invasive
purple nutsedge	*Cyperus rotundus L.*	Provincial Noxious
rush skeletonweed	*Chondrilla juncea L.*	Provincial Noxious, Invasive
Russian knapweed	*Centaurea repens L.*	Invasive
saltmeadow cordgrass	*Spartina patens*	Provincial Noxious
scentless chamomile	*Matricaria perforata Merat.*	Provincial Noxious, Invasive
scotch broom	*Cytisus scoparius*	Invasive
scotch thistle	*Onopordum acanthium*	Invasive
smooth cordgrass	*Spartina alterniflora*	Provincial Noxious
spotted knapweed	*Centaurea maculosa Lam.*	Provincial Noxious, Invasive
St. John's wort	*Hypericum perforatum*	Invasive
sulphur cinquefoil	*Potentilla recta*	Regional Noxious (Thompson-Nicola), Invasive
tansy ragwort	*Senecio jacobaea L.*	Provincial Noxious, Invasive
teasel	*Dipsacus fullonum*	Invasive
velvetleaf	*Abutilon theophrasti Medik.*	Provincial Noxious
wild chervil	*Anthriscus sylvestris*	Regional Noxious (Fraser Valley)
wild oats	*Avena fatua*	Provincial Noxious
yellow flag iris	*Iris pseudacorus*	Provincial Noxious, Invasive
yellow nutsedge	*Cyperus esculentus L.*	Provincial Noxious
yellow star-thistle	*Centaurea solstitialis L.*	Provincial Noxious, Invasive
yellow toadflax	*Linaria vulgaris*	Invasive

Source: BC *Weed Control Act* and *Forest and Range Practices Act – Invasive Plant Regulation*.

Notes:
- In accordance with the BC *Weed Control Act* and the *Forest and Range Practices Act*, Noxious weeds must be controlled while Invasive weeds must be managed.
- Consult the appropriate acts, legislation regulations and regional district information on a regular basis for updates to species ranking.

TABLE C1-3

PROBLEM VEGETATION OF CONCERN

Common Name	Scientific Name
Deciduous Trees	
balsam poplar	*Populus balsamifera*
big leaf maple	*Acer macrophyllum*
black cottonwood	*Populus trichocarpa*
Douglas maple	*Acer glabrum*
mountain alder	*Alnus viridis*
paper birch	*Betula papyrifera*
red alder	*Alnus rubra*
trembling aspen	*Populus tremuloides*
Coniferous Trees	
alpine larch	*Larix lyallii*
black spruce	*Picea mariana*
Douglas fir	*Pseudotsuga menziesii*
Engelmann spruce	*Picea engelmannii*
lodgepole pine	*Pinus contorta latifolia*
ponderosa pine	*Pinus ponderosa*
subalpine fir	*Abies lasiocarpa*
western hemlock	*Tsuga heterophylla*
western larch	*Larix occidentalis*
western red cedar	*Thuja plicata*
white spruce	*Picea glauca*
yellow cedar	*Thuja occidentalis*
Shrubs	
arbutus	*Arbutus sp.*
bitter cherry	*Prunus emarginata*
chokecherry	*Prunus virginiana*
Himalayan blackberry	*Rubus armeniacus*
pin cherry	*Prunus pensylvanica*
salmonberry	*Rubus spectabilis*
scotch broom	*Cytisus scoparius*
thimbleberry	*Rubus parviflorus*
Wood's rose	*Rosa woodsii*
willow	*Salix sp.*
Grasses	
bamboo	*Bambuseae sp.*

TABLE C1-4

PROBLEM VEGETATION OBSERVED ALONG THE PROPOSED PIPELINE CORRIDOR

Common Name	Scientific Name
Absinthe wormwood	*Artemisia absinthium*
Alsike clover	*Trifolium hybridum*
Annual hawk's-beard	*Crepis atribarba*
Awnless brome	*Bromus inermis*
Birds-foot tree foil	*Lotus corniculatus*
Common dandelion	*Taraxacum officinale*
Common nettle	*Urtica dioica*
Curled dock	*Rumex crispus*
Flixweed	*Descurainia Sophia*
Foxtail species	*Hordeum sp.*
Pineapple weed	*Matricaria matricarioides*
Lamb's quarters	*Chenopodium album*
Plantain	*Plantago major*
Red clover	*Trifolium pratense*
Rough cinquefoil	*Potentilla norvegica*
Smooth brome	*Bromus inermis ssp. inermis*
Sow-thistle	*Sonchus oleraceus*
Timothy	*Phleum pratense*
White and yellow sweet clover	*Melilotus spp.*

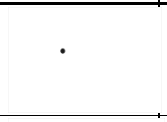
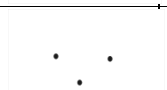
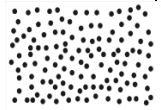
Additional weed information will be provided following the completion of the Weed Survey for the Project that is scheduled prior to construction.

ATTACHMENT C2

WEED DISTRIBUTION CODES

TABLE C2-1

BRITISH COLUMBIA MINISTRY OF FORESTS WEED DISTRIBUTION CODES

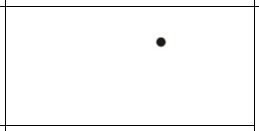
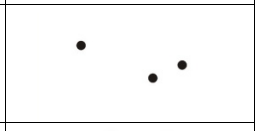
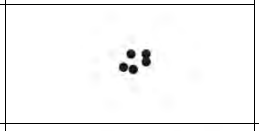
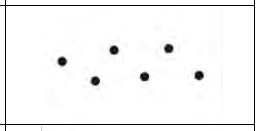
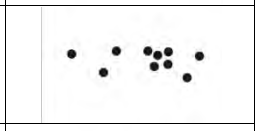
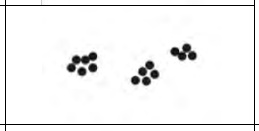
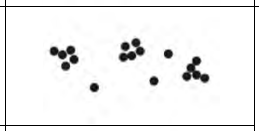
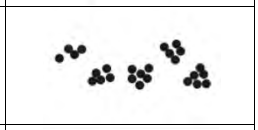
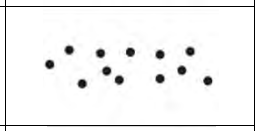
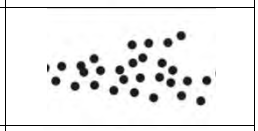
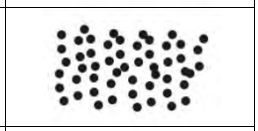
Code	Description	Guidelines for Field Assessment*			
		No. of Plants in 20 m x 20 m Area (Low Shrubs, Herbs and Mosses)	No. of Plants/ha 100 m x 100 m Area (Tall Shrubs and Trees)	Diagram	Approximate % Cover Range
1	Rare individual, a single occurrence	1	< 5		1-5
2	A few sporadically occurring individuals	2 to 5	5 to 50		1-5
3	A single patch or clump of species	1 patch (occupying an area smaller than one quadrant of the plot)	Variable (3 patches)		1-10
4	Several sporadically occurring individuals	≥ 6	> 50		5-10
5	A few patches or clumps of species	2-5 patches (each occupying an area smaller than one quadrant of the plot)	Variable (3 to 10 patches)		10-30
6	Several well-spaced patches or clumps	≥ 6 patches (each occupying less than one quadrant of the plot)	Variable (10 to many disjunct patches)		10-30
7	Continuous uniform occurrence off well-spaced individuals	Many	Many		10-30
8	Continuous occurrence of a species with a few gaps in the distribution	Many	Many (continuous matrix formed by species crowns with some openings)		30-60
9	Continuous dense occurrence of a species	Many	Many		> 60

Source: Luttmerding *et al*. 1990

Note: * The distribution code is determined over a sufficiently large area to account for normal variation in distribution pattern.

TABLE C2-2

ALBERTA ENVIRONMENT SUSTAINABLE RESOURCE DEVELOPMENT WEED DISTRIBUTION CODES

Class	Description of Abundance In Polygon	Distribution	Weeds Score
0	None		5
1	Rare		3
2	A few sporadically occurring individual plants		
3	A single patch		
4	A single patch plus a few sporadically occurring plants		1
5	Several sporadically occurring plants		
6	A single patch plus several sporadically occurring plants		
7	A few patches		
8	A few patches plus several sporadically occurring plants		0
9	Several well-spaced patches		
10	Continuous uniform occurrences of well-spaced plants		
11	Continuous occurrence of plants with a few gaps in the distribution		
12	Continuous dense occurrence of plants		
13	Continuous occurrence of plants with a distinct linear edge in the polygon		

Source: Government of Alberta 2009.
Note: * The distribution code is determined over a sufficiently large area to account for normal variation in distribution pattern.

ATTACHMENT C3

MONITORING FORMS

PRE-TREATMENT MONITORING FORM

Date: _____ Name: _____ Daily page: _____ Overall Page: _____

Location: _____ Type: ROW/Facility/Road Land Use: _____ Photos _____

Species Observed (corresponds to site sketch)		**Growth stage** (Seedling/Juvenile/Mature)	**Height** (cm)	**Density Code** (1-9 or 1-13)	**Designation** (Prohibited Noxious/Noxious/Invasive**)**
1	Onsite				
	Adjacent				
2	Onsite				
	Adjacent				
3	Onsite				
	Adjacent				
4	Onsite				
	Adjacent				
5	Onsite				
	Adjacent				
6	Onsite				
	Adjacent				
7	Onsite				
	Adjacent				
8	Onsite				
	Adjacent				
9	Onsite				
	Adjacent				
10	Onsite				
	Adjacent				

Sketch of Site - Location of Problem Vegetation

Environmental Features

Watercourse/Wetland/Lake within 30 m ☐ yes ☐ no comments: _____

Riparian area within 10 m ☐ yes ☐ no comments: _____

Site requiring protection ☐ yes ☐ no comments: _____

Wildlife habitat within 10 m ☐ yes ☐ no comments: _____

Native plants present ☐ yes ☐ no comments: _____

Grazing concerns ☐ yes ☐ no comments: _____

Accessibility (circle) good/fair/poor comments: _____

Other: _____

Pesticide Free Zone

30 m ☐ 10 m ☐ none required ☐

Comments: _____

Treatment Options

Level of Management (circle): Destroy/Control/Manage

Management Methods (circle): Non-chemical/Cultural or Biological/Chemical

Method Type (circle):

- Non-chemical – Prune/Hand pulling or digging/Disking/Brushing (selective slashing)/Hand or equipment clearing/Mowing.
- Cultural/Biological - Seeding of native or agronomic species/Introduction of pests and parasites;
- Chemical (herbicide application) – Broadcast spraying/Spot spraying/Wicking

Rationale/Comments: _____

POST-TREATMENT MONITORING FORM

Date: _____ Name: _____ Daily page: _____ Overall Page: _____

Location: _____ Type: ROW/Facility/Road Land Use: _____ Ownership: Private/Public

Treatment Info

Vegetation Management Contractor Name:

Supervisor Name:

Date of Treatment: _____ Area Treated (ha): _____ Methods:
Non-Chemical/Cultural/Biological/Chemical

Address: _____ Phone #: _____

Non-chemical Summary

Treatment Used:

Description:

Cultural/Biological Summary:

Treatment Used:

Description:

Chemical Summary:

Licensee Name: _____ Licence No.: ____

Treatment Used: _____

Description: _____

Chemical Summary

Product Name	Active Ingredient	PCP #	Target Species	App. Rate (L/ha)	Total Vol. (L)

Notes:

Environmental Protection

Required pesticide free zones were marked ☐ yes ☐ no comments: _____

Required pesticide free zones were maintained ☐ yes ☐ no comments: _____

Treatment area boundaries were marked ☐ yes ☐ no comments: _____

Treatment area boundary markings were adequate ☐ yes ☐ no comments: _____

Treatment notices posted ☐ yes ☐ no comments: _____

Watercourse/Wetland within 30 m were observed ☐ yes ☐ no comments: _____

Watercourse/wetland/lake/Riparian area within 10 m were observed ☐ yes ☐ no comments: _____

Wildlife habitat within 10 m were observed ☐ yes ☐ no comments: _____

Native plants were observed ☐ yes ☐ no comments: _____

Off site pesticide movement observed ☐ yes ☐ no comments: _____

Non-target effects observed ☐ yes ☐ no comments: _____

Other: _____

Treatment Objectives

Treatment objectives were achieved ☐ yes ☐ no

Describe how/where objectives were/were not achieved: _____

APPENDIX D

CONTACTS

TABLE D-1

EMERGENCY CONTACTS

ALBERTA		
Contact	**Location**	**Phone Number**
RCMP		911 or
	Edmonton	1-780-412-5424
	Spruce Grove	1-780-950-6500
	Stony Plain	1-780-968-7200
	Edson	1-780-723-8822
	Hinton	1-780-865-2455
	Jasper	1-780-852-4421
Alberta Health Services: Emergency Medical Services (Ambulance)	Gateway EMS Station (Edmonton)	911 or
	Yellowhead County and other Counties	1-780-342-1172
	West View Health Centre (Stony Plain)	1-780-968-3600
	Edson Healthcare Centre (Edson)	1-780-968-3600
	Hinton Healthcare Centre (Hinton)	1-780-723-3331
	Seton - Jasper Healthcare Centre (Jasper)	1-780-852-3344
Hospital/Clinic	University of Alberta Hospital (Edmonton)	1-780-407-8822
	Royal Alexandra Hospital (Edmonton)	1-780-735-4111
	West View Health Centre (Stony Plain)	1-780-968-3600
	Edson Healthcare Centre (Edson)	1-780-723-3331
	Hinton Healthcare Centre (Hinton)	1-780-865-3333
	Seton - Jasper Healthcare Centre (Jasper)	1-780-852-3344
Fire	Edmonton	911 or 311
	Spruce Grove	1-780-442-5445
	Stony Plain	1-780-963-3551
	Edson	1-780-963-3551
	Hinton	1-780-723-3178
	Jasper	1-780-865-6020
Alberta Energy Regulator (AER) 24-hour Emergency Line	St. Albert	1-780-460-3800
	Drayton Valley	1-780-542-5182
National Energy Board	Calgary	1-800-899-1265
Department of Fisheries and Oceans Canada Observe, Record and Report Hotline	Alberta and BC	1-800-465-4336
Transportation Safety Board	Quebec	1-819-997-7887
Alberta Environment and Sustainable Resource Development - 24-Hr Environmental Emergency Hotline	Edmonton	1-800-222-6514
Alberta Environment Support and Emergency Response Team (General inquiries)	AB	1-780-644-1391
WCSS Oil Spill Co-operative – 24-Hr Emergency	Alberta and BC	1-866-541-8888
Forest Fires	Alberta	310-FIRE (3473)
Trans Mountain – EHS (Edmonton)	Tim Veenstra	1-780-449-5903
Trans Mountain Operations Supervisor (Stony Plain/Edmonton)	Mike Nelson	1-780-449-5980
Trans Mountain – 24-hour Emergency Line	Alberta and BC	1-888-876-6711

BRITISH COLUMBIA		
Contact	**Location**	**Phone Number**
RCMP		911 or
	Valemount	1-250-566-4466
	Blue River	1-250-566-9800
	Clearwater	1-250- 674-2237
	Barriere	1-250-674-2237
	Kamloops	1-250-672-9918
	Merritt	1-250-828-3000
	Hope	1-250-378-4262
	Chilliwack	1-604-869-7750
	Langley	1-604-532-3200
	Surrey	1-604-599-0502
	Coquitlum	1-604-945-1550
	Burnaby	1-604-294-7922
Emergency Medical Services (Ambulance)		911 or
	Valemount	1-250-566-4703
	Blue River	1-250-673-8484
	Clearwater	1-800-663-4563
	Barriere	1-250-674-3344
	Kamloops	1-250-672-9244
	Merritt	1-250-828-4770
	Hope	1-250-378-5912
	Chilliwack	1-604-869-5112
	Abbotsford	1-604-853-0119
	Langley	1-604-952-5900
	Surrey	1-604-660-6897
	Coquitlum	1-604-660-6897
	Burnaby	1-604-872-5151
Hospital/Clinic	Valemount Health Centre (Valemount)	1-250-566-9138
	Dr Helmcken Memorial Hospital (Blue River)	1-250-674-2244
	Dr. Helmcken Memorial Hospital (Clearwater)	1-250-674-2244
	Barriere Community Health Centre (Barriere)	1-250-672-9731
	Royal Inland Hospital (Kamloops)	1-250-374-5111
	Nicola Valley Health Centre (Merritt)	1-250-378-2242
	Fraser Canyon Hospital (Hope)	1-604-860-7732
	Chilliwack General Hospital (Chilliwack)	1-604-795-4141
	Abbotsford Regional Hopsital (Abbotsford)	1-604-851-4700
	Langley Memorial Hospital (Langley)	1-604-534-4121
	Surrey Memorial Hospital (Surrey)	1-604-581-2211
	Coquitlum Eagle Ridge Hospital (Coquitlum)	1-604-461-2022
	Burnaby Hospital (Burnaby)	1-604-434-4211
Fire		911 or
	Valemount	1-250-566-9800
	Blue River	1-250-566-9800
	Clearwater	1-250-674-3733
	Barriere	1-250-674-3733
	Kamloops	1-250-672-9711
	Merritt	1-250-372-5131
	Hope	1-250-378-5626
	Chilliwack	1-604-869-5671
	Abbotsford	1-604-853-3566
	Langley	1-604-532-7500
	Surrey	1-604-543-6700
	Coquitlum	1-604-927-6400
	Burnaby	1-604-294-7190
BC Ministry of Environment 24-hour Environmental Emergency Reporting Line	BC	1-800-663-3456
BC Ministry of Agriculture	Victoria	1-250-387-5121
National Energy Board	Calgary	1-800-899-1265
Department of Fisheries and Oceans Canada Observe, Record and Report Hotline	Alberta and BC	1-800-465-4336
Transportation Safety Board	Quebec	1-819-997-7887
Ministry of Environment Spill Response	BC	1-800-663-3456

BRITISH COLUMBIA		
Contact	**Location**	**Phone Number**
Conservation Officer Service	BC	1-877-952-7277
WCSS Oil Spill Co-operative – 24-Hr Emergency	Alberta and BC	1-866-541-8888
Forest Fires	BC Forest Fires Reporting Centre	1-800-663-5555
Trans Mountain – EHS	Burnaby	1-604-268-3008
Trans Mountain – EHS	Kamloops	1-250-371-4017
Trans Mountain Environmental Lead	Calgary	1-403-514-6462
Trans Mountain Operations Supervisor	Burnaby	1-604-268-3040
Trans Mountain Operations Supervisor	Sumas	1-604-268-3080
Trans Mountain Operations Supervisor	Kamloops	1-604-268-4040
Trans Mountain Operations Supervisor	Clearwater	1-250-587-6350
Trans Mountain – 24-hour Emergency Line	Alberta and BC	1-888-876-6711

APPENDIX E

TERRAIN FEATURES (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for various terrain features and issues along the Project's proposed pipeline corridor in Alberta and BC. The terrain features encountered with corresponding site-specific mitigation measures are provided in Table E-1 to be included prior to construction.

Refer to the Environmental Alignment Sheets for further details regarding terrain features encountered and coinciding recommendations.

TABLE E-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR TERRAIN FEATURES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start (RK)	End (RK)	Legal Location	Feature	Issue	Description	Potential Mitigation

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX F

SOILS (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for soils located along the Project's proposed pipeline corridor in Alberta and BC. The soils features encountered with corresponding resource-specific mitigation measures are provided in Table F-1 for Alberta and F-2 for BC.

Refer to the Environmental Alignment Sheets for further details regarding soils features encountered and coinciding mitigation recommendations.

TABLE F-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR SOIL CHARACTERISTICS ENCOUNTERED BY THE PIPELINE CORRIDOR IN ALBERTA

Soil Symbol	Soil Name	RK Range	Topsopil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating	Water Erosion Rating	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
AGS	Angus Ridge	0.89 to 24.15	14-53	Excellent	M	S-H	No	No	None
AV	Alluvium	135.05 to 224.06	20	Fair	M	S	No	No	Salvage upper 15-20 cm of material
BMY	Bremay	157.56 to 214.73	0-25	Poor-Fair	M	S	Yes	No	No topsoil in treed areas
COA	Cooking Lake	84.56 to 120.88	0-22	Poor-Fair	M	S-H	No	No	No topsoil in treed areas
CVL	Carvel	66.98 to 84.56	10-35	Good	M-H	S-H	No	No	None
DC	Drainage Channel	138.89 to 166.18	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DEV1	Devon 1	65.96 to 246.36	0	None	S	S	Yes	No	Underlying mineral material will be encountered within trench depth; salvage upper 40 cm of peat
DEV2	Devon 2	65.37 to 245.27	0	None	S	S	Yes	No	None
DKT	Dekalta	122 to 212.51	14-25	Good	M	S	No	No	None
DL	Disturbed Land	2.25 to 247.31	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EBG	Evansburg	131.79 to 158.21	0-19	Poor-Fair	M	S	Yes	No	No topsoil in treed areas
ELP	Elk Point	118.89 to 215.15	17-22	Good	H	S	No	Yes	None
glAV	gleyed Alluvium	220.29 to 220.86	0	None	M	S	No	No	Salvage upper 15-20 cm of material
glDKT	gleyed Dekalta	128.58 to 149.97	14-25	Good	M	S	Yes	No	None
glGBL	gleyed Gabriel	210.27 to 210.86	18-20	Good	H	S	No	No	None
glMLA	gleyed Macola	127.38 to 145.94	14-23	Good	S-M	S	Yes	No	None
glRSV	gleyed Rosevear	200.07 to 237.5	0-18	Fair	M	S	Yes	No	Little or no topsoil in treed areas
glUCS	gleyed Uncas	101.88 to 101.99	20	Good	M	S	Yes	No	None
HGT	Haight	1.4 to 40.53	27-42	Good	S	S	Yes	No	Susceptible to unstable trench walls in excessively wet areas
HOD	Hoadley	172.32 to 172.58	10	Fair	H	S	No	No	None
HUB	Hubalta	120.88 to 244.92	0-24	Poor-Fair	M	S-H	No	No	None
KHS	Keephills	87.22 to 92.23	8-27	Good	M	S-M	No	No	None
KSY	Kerensky	46.66 to 216.67	22	Good	S-M	S	Yes	No	May have unstable trench walls in excessively wet areas
LT	Landscaped Topsoil	2.34 to 43.48	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MDE	Modeste	159.28 to 218.01	0-14	Poor-Fair	M	S-H	No	No	Soft sandstone slabs may be encountered throughout the material
MKY	MacKay	174.91 to 180.67	0-5	Poor-Fair	S-M	S	Yes	No	Salvage upper 15-20 cm of material (mainly peat); may have unstable trench walls in excessively wet areas
MLA	Macola	125.44 to 173.92	10-24	Good	S-M	S-M	Yes	No	None
MMO	Malmo	12.21 to 41.1	20-52	Good	S-M	S-H	Yes	No	None
MYW	Maywood	130.2 to 158.62	0-17	Poor-Fair	S-M	S-M	Yes	No	Little or no topsil in treed areas
NA	No Access	0 to 232.68	TBD	TBD	TBD	TBD	TBD	TBD	TBD
O	Open Water	13.94 to 171.51	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TABLE F-1 Cont'd

Soil Symbol	Soil Name	RK Range	Topsopil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating	Water Erosion Rating	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
ONW	Onoway	86.65 to 213.88	10-25	Good	M	S	Yes	No	Susceptible to unstable trench walls when excessively wet
PHS	Peace Hills	4.83 to 37.97	23-54	Excellent	H	S-M	No	Yes	None
POK	Ponoka	33.29 to 34.09	24	Excellent	M	S	No	No	None
PRM	Primula	72.72 to 211.92	10-20	Poor	H	S-H	No	Yes	Very coarse textured
ptKSY	peaty Kerensky	206.77 to 208.93	35-40	Good	S-M	S	Yes	No	Salvage both the peat and underlying topsoil; may have unstable trench walls in excessively wet areas
ptMKY	peaty MacKay	170.93 to 199.01	0-23	Poor-Fair	S-M	S	Yes	No	Salvage the surface peat; may have unstable trench walls in excessively wet areas
ptONW	peaty Onoway	162.31 to 195.62	10-15	Good	M	S	Yes	No	Susceptible to unstable trench walls when excessively wet; salvage both the peat and topsoil to a maximum depth of 50 cm
ptRCS	peaty Rochester	245.5 to 245.59	10-15	Good	H	S	Yes	Yes	Salvage both the peat and topsoil to a maximum depth of 40 cm
ptRVN	peaty Raven	140.95 to 236.79	10-30	Good	S	S	Yes	No	Susceptible to unstable trench walls when excessively wet; salvage both the peat and topsoil to a maximum depth of 40 cm
ptWWO	peaty Wildwood	178.64 to 235.22	0	None	S	S	Yes	No	Susceptible to unstable trench walls in excessively wet areas; salvage the surface peat
RB	Rough Broken	24.15 to 224.16	N/A	N/A	N/A	H	N/A	N/A	N/A
RCS	Rochester	5.11 to 18.41	50-60	Good	H	S	Yes	Yes	None
RI	Major River	33.39 to 223.91	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RSV	Rosevear	192.77 to 238.96	0-22	Poor-Fair	M	S	No	No	Little or no topsoil in treed areas
RVN	Raven	126.78 to 239.14	10-30	Good	S	S	Yes	No	Susceptible to unstable trench walls when excessively wet
SC	Stream Channel	4.81 to 207.32	N/A	N/A	N/A	N/A	N/A	N/A	N/A
shBMY	shallow Bremay	173.92 to 174.91	0	None	M	S	Yes	No	Soft sandstone slabs may be encountered within trench depth
shDKT	shallow Dekalta	160.54 to 160.8	20	Good	M	M	No	No	Soft sandstone slabs may be encountered within trench depth
shHUB	shallow Hubalta	173.4 to 242.97	0-13	Poor-Fair	M	S-M	No	No	Consolidated sandstone slabs may be encountered within trench depth
shRCS	shallow Rochester	212.51 to 212.77	15	Good	H	S	Yes	Yes	Surface stoniness may be increased due to underlying till
shRSV	shallow Rosevear	191.94 to 192.77	18-25	Fair	M	S	No	No	Surface stoniness may be increased due to underlying till
stCOA	stony Cooking Lake	118.29 to 118.51	0	None	M	S	No	No	Exceedingly stony till
SUC	Sundance	245.27 to 246.96	0-13	Poor-Fair	H	S-M	No	Yes	Little or no topsoil in treed areas
TB	Topsoil Berm	35.08 to 35.19	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TABLE F-1 Cont'd

Soil Symbol	Soil Name	RK Range	Topsopil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating	Water Erosion Rating	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
TBD	TBD	166.38 to 339.44	TBD	TBD	TBD	TBD	TBD	TBD	TBD
UCS	Uncas	85.59 to 120.12	13-30	Good	M	S	No	No	None
WTB	Winterburn	4.62 to 74.83	15-70	Good	M-H	S-H	No	No	None
WWO	Wildwood	158.97 to 226.54	0	None	S	S	Yes	No	Susceptible to unstable trench walls in excessively wet areas

Source: Mentiga 2013

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

1 Soils units occur intermittently between listed RK locations.

2 Erosion Hazard Ratings:

S=slight

M=moderate

H=high

TABLE F-2

RESOURCE-SPECIFIC MITIGATION MEASURES FOR SOIL CHARACTERISTICS ENCOUNTERED BY THE PIPELINE CORRIDOR IN BRITISH COLUMBIA

Soil Symbol	Soil Name	RK Range	Topsoil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating:	Water Erosion Rating:	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
ALB1	Albreta 1	496.82 to 542.08	0	None	M-H	S-H	No	Yes	Gravelly material
ALB2	Albreta 2	518.87 to 538.72	0	None	H	S	No	Yes	None
ALB2/gv	Albreta 2 overlying gravel	516.19 to 540.58	0	None	H	S-M	No	Yes	Gravel at 35-90 cm below the surface; overstrip to 25 cm
ALL	Allie	692.46 to 767.73	0-20	Fair	M	S-H	No	No	No topsoil in treed areas
AND	Andrew	865.3 to 865.56	0	None	H	S-H	No	Yes	Gravelly material
AND1	Andrew 1	861.88 to 862.34	13-16	Good	M	H	No	Yes	Gravelly material
AV	Alluvium	496.64 to 600.23	20	Fair	M	S	No	No	Salvage upper 15-20 cm of material
BFD	Banford	1083.31 to 1083.43	25	Fair	S	S	Yes	No	Salvage upper 25 cm of peat; unstable trench walls in excessively wet areas
BLP	Blackpool	600.46 to 760.06	0-20	Fair	M-H	S	No	Yes	None
BLP/gv	Blackpool overlying gravel	735.39 to 737.21	10	Fair	M	S	No	Yes	Gravel at 15-25 cm below the surface; overstrip to 15 cm
BLR	Blue River	610.19 to 758.9	15-26	Good	M	S	Yes	No	Unstable trench walls in excessively wet areas
BRY	Berry	1146.7 to 1147.8	12-31	Fair-Good	M	S-M	No	No	Very firm Bt horizon at 38-48 cm below the surface
byCHM1	bouldery Cheam 1	1052.51 to 1054.09	10-25	Good	M-H	H	No	No	Bouldery collluvial material
byKKT1	bouldery Kwikoit 1	548.23 to 558.87	0	None	M-H	S-M	No	Yes	Boulders on surface may hinder salvage operations
byMIN	bouldery Minnie	899.96 to 907.34	0	None	M-H	M-H	No	No	Little or no topsoil in treed areas
byRSM	bouldery Roserim	680.6 to 682.41	0	None	M-H	H	No	No	Boulders on surface may hinder salvage operations
bySC	Bouldery Stream Channel	592.9 to 1071.37	N/A	N/A	N/A	N/A	N/A	N/A	N/A
bySES1	bouldery Struthers 1	669.89 to 677.61	0	None	M-H	S	No	Yes	Boulders on surface may hinder salvage operations
bySPN	bouldery Stukemapten	566.95 to 567.84	0	None	M-H	M	No	No	Boulders on surface may hinder salvage soperations
CAY	Cayenne	640.93 to 761.37	0-15	Fair	M-H	S-M	No	No	Variable textured material
CGH	Cavanaugh	820.95 to 970.24	0	None	H	M-H	No	Yes	Gravelly colluvium
CHM1	Cheam 1	1054.09 to 1074.26	8-28	Good	M-H	M-H	No	No	Usually exceedingly stony
CHS	Chasm	811.85 to 966.86	0-14	Poor-Fair	M	S-H	No	No	Little or no topsoil in treed areas
CKN	Calkins	1131.82 to 1131.87	27	Good	M	S	Yes	No	Unstable trench walls in excessively wet areas
COM	Commonage	963.53 to 963.88	20	Fair	M	H	No	No	Occurs on grassy slopes
CRY	Cranberry	523.69 to 525.68	0-10	Fair	H	S	No	Yes	None
CTW	Cottonwood	493.65 to 619.41	0	None	M	S-M	No	No	None

TABLE F-2 Cont'd

Soil Symbol	Soil Name	RK Range	Topsopil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating:	Water Erosion Rating:	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
CVH	Carvolth	1083.9 to 1095.37	14-70	Good	M	S	Yes	No	Unstable trench walls in excessively wet areas
CVH1	Carvolth 1	1086.82 to 1095.06	14-40	Good	M	S	Yes	Yes	Sands at 40-90 cm below the surface; recommended for the 3-lift soil handling procedure
diCAY	disturbed Cayenne	642.57 to 669.09	0	None	M-H	S-H	No	No	Disturbed due to prior construction acitivities; salvage upper 15-20 cm of material
diKKT1	disturbed Kwikoit 1	655.51 to 656.06	14-18	Fair	M-H	M	No	Yes	Disturbed due to prior construction acitivities; salvage upper 15-20 cm of material
diRSM	disturbed Roserim	669.09 to 669.75	0	None	M-H	M-H	No	No	Disturbed due to prior construction acitivities; salvage upper 15-20 cm of material
diSES1	disturbed Struthers 1	715.15 to 716.04	0	None	M-H	S	No	Yes	Disturbed due to prior construction activities
diSWA	disturbed Snookwa	658.77 to 660.95	0-22	Fair	M-H	S-H	No	No	Disturbed due to prior construction activities
DL	Disturbed Land	498.15 to 1147.42	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DXN	Dixon	1110.48 to 1129.22	25-37	Good	M	S	Yes	Yes	Sands at 50-80 cm below the surface; recommended for the 3-lift soil handling procedure
ELK	Elk	1082.71 to 1088.33	8-35	Good	M	S	Yes	No	Unstable trench walls in excessively wet areas
EXU	Exlou	754.31 to 765.02	5-17	Fair	M	S-H	No	No	None
FAF	Fairfield	1051.34 to 1084.31	15-40	Good	M	S	No	No	None
FAF1	Fairfield 1	1048.61 to 1094.08	10-33	Good	M	S	No	Yes	Sands at 26-90 cm below the surface; some of these soils have been recommended for the 3-lift soil handling procedure
FLT	Flat Creek	812.31 to 812.7	7-15	Poor-Fair	M	S	No	No	Occurs on river terraces
FOX	Fox	489.64 to 504.2	0	None	M	M-H	No	No	Stones consist mainly of schist bedrock fragments
FRS	Frances	847.14 to 928.09	0	None	M	S	No	No	None
FTZ	Fitzwilliam	502.95 to 503.28	0	None	H	H	No	Yes	None
GHT1	Ghita 1	552.07 to 663.58	0	None	S	S	Yes	Yes	Underlying silts and sands will be encountered within trench depth; salvage upper 40 cm of material
GHT2	Ghita 2	608.7 to 666.22	0	None	S	S	Yes	No	Salvage upper 40 cm of material
glALB2	gleyed Albreta 2	522.57 to 522.82	0	None	H	S	No	Yes	None
glALL	gleyed Allie	695.56 to 695.75	14	Fair	M	S	Yes	No	Salvage upper 15 cm of material
glAV	gleyed Alluvium	619.82 to 620.28	0	None	M	S	No	-	Salvage upper 15-20 cm of material
glBLP	gleyed Blackpool	600.25 to 600.46	0	None	M	S	No	Yes	None
glCTW	gleyed Cottonwood	622.43 to 624.05	0	None	M	S	Yes	No	None

TABLE F-2 Cont'd

Soil Symbol	Soil Name	RK Range	Topsopil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating:	Water Erosion Rating:	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
glNLN	gleyed Nicholson	1137.36 to 1137.83	0-5	Poor-Fair	M	S	Yes	No	None
glTPL	gleyed Trapp Lake	871.55 to 871.88	17	Fair-Good	M	S	Yes	No	None
glVMT	gleyed Valemount	524.78 to 525.12	0	None	M	S	No	No	None
glWHC	gleyed Whatcom	1134.85 to 1137.22	27	Good	M	S	Yes	No	Very firm Bt horizon at 65 cm below the surface
GLY1	Glossey 1	825.83 to 970.85	0-14	Poor-Fair	H	S-H	No	Yes	Little or no topsoil in treed areas
GLY2	Glossey 2	865.56 to 912	0-25	Poor-Fair	H	S-H	No	Yes	Little or no topsoil in treed areas
GLY2/gv	Glossey 2 overlying gravel	967.08 to 967.56	0	None	H	S	No	Yes	Gravel at 70 cm below the surface
GPS1	Glimpse 1	885.66 to 886.31	11-12	Fair-Good	H	S	No	Yes	Gravelly below the topsoil
GPS2	Glimpse 2	886.31 to 886.56	14	Fair-Good	H	M	No	Yes	None
GVY	Glen Valley	1123.85 to 1124.52	0	None	S	S	Yes	No	Salvage upper 40 cm of peat for replacement
GWN	Gwenn	886.56 to 887.04	11-20	Good	M	S-M	No	No	Gravel at shallow depths
HPD	Hopedale	1101.63 to 1106.88	20-32	Good	M	S	Yes	Yes	Sands at 40-80 cm below the surface; recommended for the 3-lift soil handling procedure
HRS	Harrison	1084.31 to 1084.39	7	Poor-Fair	M-H	M	-	No	Little or no topsoil in treed areas; usually exceedingly stony
HRS1	Harrison 1	1071.37 to 1075.84	10-30	Good	M-H	S-H	-	No	Usually exceedingly stony
HZW	Hazelwood	1122.42 to 1128.85	15-54	Good	S-M	S	Yes	No	Unstable trench walls in excessively wet areas
ISR	Isar	1046.96 to 1147.38	0-25	Poor-Good	M-H	S	No	Yes	Often gravelly at depth and no topsoil horizon
JCK	Jackman	500.37 to 528.02	0	None	H	S-H	No	Yes	Very coarse textured material may hinder revegetation efforts
KKT1	Kwikoit 1	545.93 to 664.87	0	None	M-H	S-H	No	Yes	Gravelly material
KKT2	Kwikoit 2	544.18 to 640.93	0	None	H	S-H	No	Yes	None
KKT2/gv	Kwikoit 2 overlying gravel	550.31 to 551.96	0	None	H	M-H	No	Yes	Gravel at 35-60 cm below the surface; overstrip to 25 cm
KKT3	Kwikoit 3	625.75 to 655.31	0	None	M-H	S	No	No	None
KWY	Kenworthy	1077.47 to 1083.31	11-25	Good	M	S	No	No	None
LBM	Lundbom	847.78 to 928.47	8-22	Poor-Fair	M	S-H	No	No	None
LBM1	Lundbom 1	860.4 to 936.18	12-25	Fair-Good	M	S-M	No	No	Some of these soils have been recommended to be overstripped to the 20 cm depth
LDB	Lac du Bois	931.08 to 932.08	9-11	Fair	M	M	No	No	Salts at 22-35 cm below the surface
LHN	Lichen	700.61 to 719.83	8-23	Fair-Good	M	S-M	No	No	Often irrigated hay fields
LLW	Laidlaw	1047.55 to 1092.76	0-17	Fair	H	S-M	No	Yes	None

TABLE F-2 Cont'd

Soil Symbol	Soil Name	RK Range	Topsopil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating:	Water Erosion Rating:	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
LUC	Lucerne	492.04 to 506.95	0	None	M	M-H	No	No	Upper 10-15 cm of material is usually not as stony
LZC	Lonzo Creek	1114.8 to 1120.96	0-20	Poor-Fair	M	S-H	No	No	Till at 25-50 cm below the surface
MIN	Minnie	868.81 to 910.03	0-4	Poor-Fair	M-H	S-H	No	No	Little or no topsoil in treed areas
MNE	McNomee	558.87 to 560.4	0	None	M-H	S	No	Yes	Gravel at 20-22 cm below the surface
MQN	McQueen	822.27 to 828.99	8-21	Fair-Good	M	S-H	No	No	None
MSQ	Mosquito	651.64 to 733.56	10-22	Fair-Good	M	S	Yes	Yes	None
MSY	Mossey	826.01 to 827.13	12-18	Good	M	M-H	No	No	None
MVE	McElvee	1104.35 to 1106.19	25-32	Good	M	S	Yes	No	Unstable trench walls in excessively wet areas
NA	No Access	652.02 to 1146.7	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NVN	Niven	1104.45 to 1105.21	28-32	Good	M	S	Yes	No	Peat at 40-55 cm below the surface
O	Open Water	643.74 to 661.47	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OHG	Orthic Humic Gleysol	876.19 to 887.23	20	Good	S-M	S	Yes	No	May have unstable trench walls in excessively wet areas
ptBLR	peaty Blue River	588.94 to 656.76	0-25	Good	S	S-M	Yes	No	Salvage both the peat and underlying topsoil; unstable trench walls in excessively wet areas
ptRHG	peaty Rego Humic Gleysol	606.12 to 672.53	20-25	Fair-Good	S	S	Yes	Yes	Salvage both the peat and underlying topsoil to a maximum depth of 40 cm
ptVLN	peaty Vermillion Lakes	522.82 to 533.41	0	None	S	S	Yes	No	Salvage peat material; unstable trench walls in excessively wet areas
RB	Rough Broken	683.21 to 1147.31	N/A	N/A	N/A	H	N/A	N/A	N/A
RHG	Rego Humic Gleysol	643.98 to 644.09	10-20	Fair-Good	M	S	Yes	Yes	These soils are of very minor extent
RI	Major River	496.75 to 1047.28	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RO	Rock	492.78 to 1116.25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RSM	Roserim	664.87 to 750.72	0-18	Fair	M-H	S-H	No	No	None
RYD	Ryder	1129.22 to 1131.82	10-15	Poor-Fair	M	S-H	No	No	Till at 50-85 cm below the surface
saFLT	saline Flat Creek	815.75 to 816.49	7-10	Poor-Fair	M	S	No	No	These soils are strongly saline below the topsoil horizon
SC	Stream Channel	1051.43 to 1145.63	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCT	Scat	1140.35 to 1147.83	0-40	Poor-Good	M	S	Yes	No	Unstable trench walls in excessively wet areas
SES1	Struthers 1	666.57 to 768.52	0-20	Fair	M-H	S-H	No	Yes	Gravelly material
SES2	Struthers 2	666.22 to 767.99	0-25	Fair	H	S-H	No	Yes	None
SES2/gv	Struthers 2 overlying gravel	726.88 to 768.98	0-24	Fair	H	S	No	Yes	Gravel at 25-40 cm below the surface; overstrip to 25 cm or carry out 3-lift soil handling procedure

TABLE F-2 Cont'd

Soil Symbol	Soil Name	RK Range	Topsopil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating:	Water Erosion Rating:	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
SES3	Struthers 3	675.76 to 761.92	0-15	Fair	M	S-M	No	No	Some of these soils have gravel at 42-80 cm below the surface. Those that have gravel at depth have been recommend to be overstripped to 25 cm or the 3-lift soil handling procedure
shALL	shallow Allie	743.48 to 766.81	0	None	M	M-H	No	No	Hard rock will be encountered at 30-70 cm below the surface
shBySPN	shallow, bouldery Stukemapten	548.74 to 549.28	0	None	M-H	H	No	No	Hard rock at 40 cm
shCHM	shallow Cheam	1044.19 to 1078.32	0-5	Fair	M-H	H	No	No	Consolidated hard rock within 55 cm of surface
shCHM1	shallow Cheam 1	1064.92 to 1066.08	20-40	Good	M-H	H	No	No	Consolidated hard rock at 35-75 cm below the surface
shCHS	shallow Chasm	961.66 to 966.36	0	None	M	H	No	No	Hard rock at shallow depths
shCTW	shallow Cottonwood	647.82 to 648.62	0	None	M	S	No	No	None
shCTY	shallow Courtney	847.53 to 847.78	11	Poor-Fair	H	H	No	No	Hard rock at shallow depths
shFLT	shallow Flat Creek	812.7 to 813.62	11-14	Poor-Fair	M	S-M	No	No	Stony till within 50 cm of the surface
shJCK	shallow Jackman	513.59 to 514.1	0	None	H	S	No	Yes	Till at 75 cm below the surface
shLUC	shallow Lucerne	504.2 to 544.18	0	None	M	H	No	No	Hard rock will be encountered at 30-80 cm below the surface
shMIN	shallow Minnie	868.63 to 901.72	0	None	M-H	S-H	No	No	Hard rock at shallow depths
shRSM	shallow Roserim	684.54 to 742.84	0	None	M-H	H	No	No	Hard rock at 40 -70 cm
shSWA	shallow Snookwa	593.52 to 635.97	0	None	M-H	H	No	No	Weathered bedrock or hard rock at 28-75 cm below the surface
shTIM	shallow Timber	889.71 to 890.05	0	None	M	H	No	No	Hard rock at shallow depths
shTKW	shallow Tunkwa	870.76 to 870.84	0	None	M	H	No	No	Hard rock at shallow depths
shTLE	shallow Tullee	883.4 to 887.17	22-24	Good	M	M-H	No	No	Hard rock at shallow depths
shTNQ	shallow Tranquille	847.99 to 849.5	10-14	Poor-Fair	M	H	No	No	Hard rock at shallow depths
shTPL	shallow Trapp Lake	855.96 to 935.17	9-17	Fair-Good	M	H	No	No	Hard rock at shallow depths
SIM	Sim	1121.75 to 1122.39	34-44	Good	M	S	Yes	No	Sandy layer from 36-100 cm below the surface; recommended for the 3-lift soil handling procedure
SMS	Sumas	1086.59 to 1114.01	10-42	Good	H	S	Yes	Yes	None
SPN	Stukemapten	547.36 to 580.99	0	None	M-H	S-H	No	No	Variable textured material
SRD	Sardis	1081.65 to 1121.39	0-29	Fair-Good	H	S	No	Yes	None
SSE	Sunshine	1144.81 to 1146.55	15-30	Good	H	S	No	Yes	None
stGLY1	stony Glossey 1	819.87 to 825.83	0	None	H	S	No	Yes	Stony and gravelly material
stLUC	stony Lucerne	492.84 to 493.65	0	None	M	H	No	No	Extremely stony till
stMIN	stony Minnie	877.02 to 879.63	0	None	M-H	S-H	No	No	Little or no topsoil in treed areas
stmQN	stony McQueen	824.23 to 824.45	10	Fair-Good	M	H	No	No	None

TABLE F-2 Cont'd

Soil Symbol	Soil Name	RK Range	Topsopil Depth Range (cm)	Colour Differentiation	Wind Erosion Rating:	Water Erosion Rating:	Susceptible to Compaction and Rutting	Susceptible to Trench Instability	Comments/Mitigation
stRSM	stony Roserim	701.98 to 702.7	10-20	Fair	M-H	S	No	No	Extremely stony till
stTIM	stony Timber	875.34 to 875.98	0	None	M	M-H	No	No	Little or no topsoil in treed areas
stWOO	stony Woodley	491.38 to 516.19	0	None	M-H	S-H	No	Yes	Stony and gravelly conditions may shamper root zone salvaging
SWA	Snookwa	565.42 to 663.22	0	None	M-H	M-H	No	-	No topsoil in treed areas
TBD	TBD	970.85 to 1179.77	TBD	TBD	TBD	TBD	TBD	TBD	TBD
TIM	Timber	851.39 to 955.95	0	None	M	M-H	No	No	Little or no topsoil in treed areas
TKW	Tunkwa	866.12 to 952.97	0-10	None	M	S-H	No	No	Little or no topsoil in treed areas
TLE	Tullee	854.2 to 892.29	8-38	Good	M	S-H	No	No	None
TNQ	Tranquille	841.06 to 929.63	10-33	Poor-Fair	M	S-H	No	No	None
TPL	Trapp Lake	852.78 to 948.32	8-28	Fair-Good	M	S-H	No	No	None
TYM	Typic Mesisol	869.85 to 879.73	0	None	S	S	Yes	No	Salvage upper 40 cm of peat material
VLN	Vermillion Lakes	490.09 to 523.69	0-25	Fair-Good	M	S	Yes	No	Unstable trench walls in excessively wet areas
VMT	Valemount	506.95 to 520.36	0-15	Fair	M	S	No	No	None
WHC	Whatcom	1131.87 to 1145.87	0-35	Poor-Good	M	S-H	No	No	Very firm Bt horizon at 40-85 cm below the surface
WOO	Woodley	495.87 to 518.87	0	None	M-H	S-H	No	Yes	Upper 20-40 cm of material is usually gravel-free

Source: Mentiga 2013.

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

1 Soils units occur intermittently between listed RK locations.

2 Erosion Hazard Ratings:

S=slight

M=moderate

H=high

- No identifiable soil classification.

APPENDIX G

HYDROLOGY (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for various groundwater features and issues along the Project's proposed pipeline corridor in Alberta and BC. The hydrology features encountered with corresponding resource site-specific mitigation measures is provided in Table G-1.

Refer to the Environmental Alignment Sheets for further details on groundwater features encountered and coinciding recommendations.

TABLE G-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR HYDROLOGIC FEATURES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start RK	End RK	Legal Location (LSD/PNG)	Feature	Potential Mitigation Measures
17.9	N/A	16-26-051-24 W4M	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
39.6	N/A	12-17-052-25 W4M	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
41.6	N/A	13-20-052-25 W4M	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
50.9	N/A	09-29-052-26 W4M	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
56.9	N/A	05-35-052-27 W4M	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
89.2	N/A	09-10-053-03 W5M	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
90.2	N/A	12-10-053-03 W5M	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
329.5	N/A	15-25-050-26 W5M	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
522.0	522.6	b-013-F/083-D-14 c-003-F/083-D-14 b-003-F/083-D-14	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
529.6	531.2	d-031-C/083-D-14 a-031-C/083-D-14 d-021-C/083-D-14 a-021-C/083-D-14	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
532.5	533.0	d-001-C/083-D-14 a-001-C/083-D-14	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
545.8	545.9	d-086-G/083-D-11	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
611.8	617.4	c-053-F/083-D-03 b-053-F/083-D-03 a-054-F/083-D-03 d-044-F/083-D-03 a-044-F/083-D-03 b-044-F/083-D-03 c-034-F/083-D-03 d-035-F/083-D-03 a-035-F/083-D-03 b-035-F/083-D-03 c-025-F/083-D-03 b-025-F/083-D-03 c-015-F/083-D-03 b-015-F/083-D-03 c-005-F/083-D-03 b-005-F/083-D-03	Shallow Groundwater	Dewater trench excavations at select locations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
638.7	638.9	a-007-K/082-M-14 b-006-K/082-M-14 c-096-F/082-M-14	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
705.0	706.5	b-006-F/082-M-12 a-007-F/082-M-12 b-007-F/082-M-12 c-007-F/082-M-12 d-008-F/082-M-12	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).

TABLE G-1 Cont'd

Start RK	End RK	Legal Location (LSD/PNG)	Feature	Potential Mitigation Measures
711.5	N/A	d-023-E/082-M-12	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
713.4	N/A	d-035-E/082-M-12	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
717.5	N/A	c-068-E/082-M-12	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
846.5	847.5	d-035-L/092-I-09 a-035-L/092-I-09 d-025-L/092-I-09 c-024-L/092-I-09	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
858.3	858.5	c-025-E/092-I-09 b-025-E/092-I-09	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
869.7	870.1	a-030-C/092-I-09 d-020-C/092-I-09	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
881.6	881.7	c-092-E/092-I-08	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
956.2	N/A	b-013-L/092-H-15	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
957.8	957.9	d-094-E/092-H-15	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
963.1	963.6	b-045-E/092-H-15 c-035-E/092-H-15	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
1021.8	N/A	c-080-J/092-H-06	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
1022.9	N/A	d-061-K/092-H-06	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
1028.6	1028.7	c-024-K/092-H-06	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
1032.6	N/A	a-096-F/092-H-06	Shallow Groundwater	Dewater trench excavations to reduce artesian pressure during construction and integrate measures (*e.g.*, ditch plugs) that prevent flow within the backfilled trench material.
1040.1	N/A	d-051-E/092-H-06	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
1040.6	N/A	c-051-E/092-H-06	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
1057.6	N/A	c-008-H/092-H-05	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
1147.4	N/A	a-088-H/092-G-02	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).
1159.0	N/A	a-028-J/092-G-02	Shallow well(s)	The Hydrogeological Professional in consultation with landowners and the appropriate regulatory authorities, will determine if springs and wells used for domestic purposes located within the immediate vicinity of the construction right-of-way will be sampled for water quality and flow rate prior to the commencement of construction. Initiate pre-construction monitoring, where warranted, prior to the commencement of a specific activity during construction (e.g., blasting).

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

N/A Not applicable.

APPENDIX H

WATER QUALITY (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for various water quality features and issues along the Project's proposed pipeline corridor in Alberta and BC. The water quality features encountered with corresponding resource site-specific mitigation measures is provided in Table H-1 to be included prior to construction.

Refer to the Environmental Alignment Sheets for further details regarding water quality features encountered and coinciding mitigation recommendations.

TABLE H-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR WATER QUALITY FEATURES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start (RK)	End (RK)	Legal Location	Feature	Issue	Description	Potential Mitigation

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX I

AQUATIC RESOURCES (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for construction activities to be conducted within and adjacent to aquatic environments along the Project's proposed pipeline corridor. Aquatic features encountered with corresponding resource site-specific mitigation measures, RAPs/least-risk timing windows, vehicle and pipeline crossing methods are provided in Table I-1 for Alberta and Table I-2 for BC. Reclamation measures to be used as outlined in the Reclamation Type column in Tables I-1 and I-2, are located in Table I-3.

Refer to the Aquatics Technical Report for further details regarding aquatic features encountered and coinciding mitigation recommendations.

TABLE I-1

SITE-SPECIFIC MITIGATATION MEASURES FOR WATERCOURSES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR IN ALBERTA

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-1	4.8	Unnamed tributary to Goldbar Creek	Class C (unmapped)	SW 28-52-23 W4M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-2	5.1	Goldbar Creek	Class C	SW 28-52-23 W4M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-3	6.6	Unnamed Drainage	NCD	SW 21-52-23 W4M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-5	10.0	Fulton Creek	Class C (unmapped)	SW 9-52-23 W4M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert; Type 5 logfill/Swamp mat	Clear-span bridge; Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp Mat	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method A and B
AB-7	12.7	Mill Creek	Class C	NE 32-51-23 W4M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-8	15.7	Unnamed Drainage	NCD	NW 30-51-23 W4M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Potentially Navigable	Standard Procedures and Reclamation Method A
AB-10	20.4	Unnamed Drainage	NCD	NE and NW 27-51-24 W4M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-11	22.0	Unnamed Drainage	NCD	NE 28-51-24 W4M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-12	24.2	Blackmud Creek	Class C	NW 29-51-24 W4M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F
AB-13	28.1	Whitemud Creek	Class B	SW 25-51-25 W4M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F
AB-14	33.5	North Saskatchewan River	Class C	NW 3 to SW 3-52-25 W4M	High	September 16 to July 31	August 1 to September 15	Trenchless with water quality monitoring	Open cut with water quality monitoring outside RAP	Existing crossing	Existing crossing	Navigable	Comply with Federal and Provincial Regulations
AB-15	36.9	Unnamed tributary to North Saskatchewan River	Class C (unmapped)	SW 8-52-25 W4M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Snowfill/Ice bridge	Potentially Navigable	TBD
AB-16	40.5	Unnamed Wetland	Wetland	SW 20-52-25 W4M	Low	None	Open	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
AB-17	41.7	Unnamed Drainage	NCD	NW 20 -52-25 W4M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-18	59.4	Dog Creek	Class C (unmapped)	SE 33-52-27 W4M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Clear-span bridge; Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Potentially Navigable	Standard Procedures and Reclamation Method A and B
AB-19	62.9	Atim Creek	Class C	SE 6-53-27 W4M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-20	64.2	Unnamed tributary to Atim Creek	Class C (unmapped)	NW 6-53-27 W4M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Snowfill/Ice bridge	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-21	65.5	Unnamed tributary to Atim Creek	Class C (unmapped)	SE 12-53-28 W4M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Snowfill/Ice bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-1	4.8	Unnamed tributary to Goldbar Creek	Class C (unmapped)	SW 28-52-23 W4M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-22	69.1	Unnamed Drainage	NCD	NW 2-53-1 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-23	69.9	Unnamed tributary to Atim Creek	Class C (unmapped)	NE 3-53-1 W5M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-24	81.0	Unnamed Drainage	NCD	SE 9-53-2 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-25	82.6	Kilini Creek	Class C (unmapped)	SE 8-53-2 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A and B
AB-27	84.7	Unnamed Drainage	NCD	SW 7-53-2 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-29	85.8	Unnamed Drainage	NCD	SE 11-53-3 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-31	88.9	Unnamed Wetland	Wetland	NW 11-53-3 W5M	High	TBD	TBD	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
AB-32	89.2	Unnamed Drainage	NCD	NE 10-53-3 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-33	90.1	Unnamed tributary to Killini Creek	Class C (unmapped)	NW 10-53-3 W5M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-34	91.1	Unnamed tributary to Killini Creek	Class C (unmapped)	NE 9-53-3 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Existing crossing; Clear-span bridge; Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Potentially Navigable	Standard Procedures and Reclamation Method C
AB-35	92.6	Unnamed tributary to Killini Creek	Class C (unmapped)	NE 8-53-3 W5M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-36	94.7	Unnamed tributary to Wabamun Lake	Class C (unmapped)	SW 18-53-3 W5M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-37	95.2	Unnamed Wetland	Wetland	SW 18-53-3 W5M	High	TBD	TBD	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	TBD
AB-38	95.3	Unnamed Wetland	Wetland	SW 18-53-3 W5M	High	TBD	TBD	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	TBD
AB-39	96.8	Unnamed Drainage	NCD	SW 13-53-4 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-40	102.6	Unnamed Drainage	NCD	NW 9-53-4 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-41	104.5	Unnamed Drainage	NCD	NW 9-53-4 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-42	104.9	Unnamed Drainage	NCD	NE 17-53-4 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-43	108.2	Unnamed Drainage	NCD	NE 13-53-5 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-44	108.5	Unnamed tributary to Wabamun Lake	Class C (unmapped)	NW 13-53-5 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-45	108.9	Unnamed tributary to Wabamun Lake	Class C (unmapped)	NW 13-53-5 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method F
AB-46	109.7	Unnamed Drainage	NCD	NE 14-53-5 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-47	112.6	Unnamed Drainage	NCD	NE 16-53-5 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-48	113.3	Unnamed tributary to Wabamun Lake	Class C (unmapped)	NE 16-53-5 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method F
AB-49	113.3	Unnamed tributary to Wabamun Lake	Class C (unmapped)	NW 16-53-5 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method G
AB-50	113.7	Unnamed Drainage	NCD	NW 16-53-5 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-51	114.5	Unnamed Drainage	NCD	NE 17-53-5 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-52	114.7	Unnamed tributary to Wabamun Lake	Class C (unmapped)	NE 17-53-5 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-53	115.6	Unnamed Drainage	NCD	NE 18-53-5 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-54	116.1	Unnamed Drainage	NCD	NE 18-53-5 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-56	122.8	Unnamed Drainage	NCD	NE 16-53-6 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-57	123.1	Unnamed Drainage	NCD	NW 16-53-6 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-58	123.7	Unnamed Drainage	NCD	NW 16-53-6 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-59	126.1	Unnamed tributary to Sturgeon River	Class C (unmapped)	NE 18-53-6 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present(with water quality monitoring if inside the RAP); open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-60	126.8	Unnamed tributary to Isle Lake	Class C	NW 18-53-6 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F
AB-66	135.0	Pembina River	Class C	NW 17-53-7 W5M	High	September 1 to June 30	July 1 to August 31	Trenchless with water quality monitoring	Isolated trenched inside RAP or open cut outside RAP with water quality monitoring if water present	Existing crossing	Existing crossing	Navigable	Comply with federal and provincial regulations
AB-67	136.8	Unnamed Drainage	NCD	SW 19-53-7 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-69	137.0	Unnamed tributary to Lobstick River	Class C (unmapped)	SW 19-53-7 W5M	Low	September 1 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-70	137.2	Unnamed Drainage	NCD	SE 24-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-72	137.9	Unnamed Drainage	NCD	SE 24-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-73	138.9	Unnamed Drainage	NCD	SE 23-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-74	140.2	Unnamed Drainage	NCD	SW 23-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-75	140.8	Unnamed Drainage	NCD	NE 22-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-76	141.1	Unnamed Drainage	NCD	SE 22-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-77	141.2	Unnamed Drainage	NCD	NE 22-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-78	142.5	Zeb-igler Creek	Class C	NE 21-53-8 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present (with water quality monitoring if inside RAP); open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 3 as per TERA criteria	Standard Procedures and Reclamation Method D
AB-79	142.9	Unnamed Wetland	Wetland	NE 21-53-8 W5M	Low	None	Open	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
AB-80	145.2	Unnamed Drainage	NCD	NW 20-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-81	145.6	Unnamed Drainage	NCD	SE 19-53-8 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-82	146.0	Unnamed tributary to Lobstick River	Class C (unmapped)	SE 19-53-8 W5M	High	September 1 to June 30	July 1 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-83	146.3	Unnamed tributary to Lobstick River	Class C (unmapped)	NW 19-53-8 W5M	High	September 1 to June 30	July 1 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-84	147.1	Unnamed tributary to Lobstick River	Class C (unmapped)	NE 24-53-9 W5M	Low	September 1 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-85	147.8	Unnamed tributary to Lobstick River	Class C (unmapped)	NE 24-53-9 W5M	Low	September 1 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert; Type 5 logfill/swamp mat	Clear-span bridge; Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp Mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-86	147.8	Unnamed Drainage	NCD	NE 24-53-9 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-87	149.3	Unnamed Drainage	NCD	NE 23-53-9 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-88	149.5	Unnamed Drainage	NCD	NW 23-53-9 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-90	151.8	Unnamed tributary to Chip Lake	Class C (unmapped)	NW 22-53-09 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-91	152.0	Unnamed tributary to Chip Lake	Class C	NE 21-53-09 W5M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-92	156.5	Unnamed tributary to Chip Lake	Class C (unmapped)	NW 19-53-09 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Existing crossing; Clear-span bridge; Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/swamp mat	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-93	157.1	Unnamed tributary to Chip Lake	Class C	NE 24-53-10 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method F
AB-95	158.9	Unnamed Drainage	NCD	NE 23-53-10 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-96	159.3	Unnamed Drainage	NCD	NE 23-53-10 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-97	159.6	Unnamed Drainage	NCD	NW 23-53-10 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-98	159.7	Unnamed tributary to Chip Lake	Class C (unmapped)	NW 23-53-10 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-101	164.2	Unnamed tributary to Chip Lake	Class C	SE 29-53-10 W5M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-102	164.3	Unnamed tributary to Chip Lake	Class C (unmapped)	SE 29-53-10 W5M	High	April 16 to June 30	July 1 to April 15	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-103	165.6	Unnamed Drainage	NCD	SE 30-53-10 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-104	166.1	Unnamed Drainage	NCD	SW 30-53-10 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-105	167.0	Unnamed Drainage	NCD	SE 25-53-11 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-106	168.2	Unnamed tributary to Chip Lake	Class C	SW 25-53-11 W5M	Low	April 16 to June 30	Open	Isolated trenched at any time if water present (with water quality monitoring if inside RAP); open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 3 as per TERA criteria	Standard Procedures and Reclamation Method F
AB-107	170.3	Unnamed Drainage	NCD	SE 27-53-11 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-111	173.7	Little Brule Creek	Class C	NE 29-53-11 W5M	High	September 1 to June 30	July 1 to August 31	Trenchless with water quality monitoring; Isolated trench outside RAP with water quality monitoring if water present.	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Comply with federal and provincial regulations
AB-113	177.5	Unnamed Drainage	NCD	NE 25-53-12 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-114	178.9	Unnamed tributary to Brule Creek	Class C (unmapped)	NE 26-53-12 W5M	Low	September 1 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method C

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-116	181.0	Brule Creek	Class C	NW 27-53-12 W5M	High	September 1 to June 30	July 1 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method E
AB-117	185.4	Lobstick River	Class C	NE 30-53-12 W5M	High	September 1 to June 30	July 1 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-118	189.0	Unnamed tributary to Lobstick River	Class C (unmapped)	SE 35-53-13 W5M	Low	September 1 to June 30	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method D
AB-119	193.1	Carrot Creek	Class C	SW 33-53-13 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F
AB-120	195.5	Unnamed Drainage	NCD	SE 31-53-13-W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-121	196.9	Unnamed Drainage	NCD	SE 36-53-14-W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-122	197.1	Unnamed Drainage	NCD	SE 36-53-14-W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-123	198.8	Unnamed tributary to January Creek	Class C (unmapped)	NE 26-53-14 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-124	199.8	Unnamed Lake tributary to January Creek	Class C (unmapped)	SW 26-53-14 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Existing crossing	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-125	202.6	Unnamed tributary to January Creek	Class C (unmapped)	NE 21-53-14 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Existing crossing	Existing crossing; Snowfill/Ice bridge	Not navigable - Class 3 as per TERA criteria	Standard Procedures and Reclamation Method C
AB-126	202.8	Unnamed tributary to January Creek	Class C (unmapped)	NW 21-53-14 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Existing crossing	Existing crossing; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method C
AB-128	207.1	January Creek	Class C	NE 24-53-15 W5M	Low	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-129	220.6	Wolf Creek	Class C	NE 22-53-16 W5M	High	September 1 to July 15	July 16 to August 31	Trenchless with water quality monitoring	Isolated trenched inside RAP with water quality monitoring if water present	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Navigable	Comply with federal and provincial regulations
AB-130	223.7	Unnamed Drainage	NCD	SE 20-53-16 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-131	223.9	Mcleod River	Class C	SE 20-53-16 W5M	High	September 1 to June 30	July 1 to August 31	Trenchless with water quality monitoring	Isolated trenched inside RAP or open cut outside RAP with water quality monitoring if water present	Existing crossing	Existing crossing	Navigable	Comply with federal and provincial regulations
AB-132	227.5	Bench Creek	Class C	NE 24-53-17 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F
AB-133	231.4	Unnamed tributary to Bench Creek	Class C (unmapped)	NW 22-53-17 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-134	232.3	Unnamed tributary to Bench Creek	Class C (unmapped)	NE 21-53-17 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method D

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-135	234.4	Unnamed Drainage	NCD	NE 20-53-17 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice Bridge; Type 3 Culvert; Type 5 Logfill/Swamp Mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-136	236.6	Bench Creek	Class C	SW 19-53-17 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method D
AB-137	245.2	Little Sundance Creek	Class C	SW 17-53-18 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F
AB-138	248.0	Sundance Creek	Class C	SE 13-53-19 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F
AB-140	257.7	Unnamed tributary to Mcleod River	Class C (unmapped)	SW 5-53-19 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Existing crossing	Existing crossing	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-141	260.1	Unnamed tributary to Mcleod River	Class C (unmapped)	SW 1-53-20 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-143	269.6	Unnamed tributary to Mcleod River	Class C	SW 6-53-20 W5M	Low	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method E
AB-144	270.1	Unnamed tributary to Mcleod River	Class C (unmapped)	SW 6-53-20 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-145	275.8	Unnamed Drainage	NCD	SE 4-53-21 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-146	280.4	Unnamed Wetland	Wetland	SW 31-52-21 W5M	Low	None	Open	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
AB-148	288.5	Unnamed Drainage	NCD	SE 5-53-22 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-149	288.9	Unnamed Drainage	NCD	SW 5-53-22 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-150	289.5	Unnamed Drainage	NCD	SE 6-53-22 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-151	290.9	Unnamed Drainage	NCD	SW 6-53-22 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-152	291.8	Unnamed Drainage	NCD	NE 36-52-23 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-153	291.9	Rooster Creek	Class C (unmapped)	NE 36-52-23 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 1 as per Section 11 (2)	TBD
AB-154	294.4	Unnamed tributary to Ponoka Creek	Class C (unmapped)	SW 35-52-23 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time (with water quality monitoring if inside the RAP); open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A and B
AB-155	295.2	Ponoka Creek	Class C	NW 26-52-23 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-156	296.0	Unnamed Drainage	NCD	SE 27-52-23 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Type A
AB-157	298.6	Roundcroft Creek	Class C	NW 21-52-23 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method F
AB-158	298.8	Unnamed tributary to Roundcroft Creek	Class C (unmapped)	NW 21-52-23 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A and B
AB-159	300.2	Unnamed Drainage	NCD	SE 20-52-23 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-160	301.1	Unnamed Drainage	NCD	NW 17-52-23 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-161	301.6	Unnamed Drainage	NCD	NE 18-52-23 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-162	302.4	Sandstone Creek	Class C	SW 18-52-23 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-163	304.7	Unnamed tributary to Hunt Creek	Class C	NW 12-52-24 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Existing crossing	Existing crossing	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-164	304.8	Hunt Creek	Class C	NW 12-52-24 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Existing crossing	Existing crossing	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method E
AB-165	306.9	Unnamed Drainage	NCD	SW 11-52-24 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-166	308.1	Unnamed Drainage	NCD	NW 3-52-24 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-167	309.0	Trail Creek	Class C (unmapped)	NE 4-52-24 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 3 as per TERA criteria	Standard Procedures and Reclamation Method G
AB-168	310.8	Unnamed tributary to Athabasca River	Class C	NW 33-51-24 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Existing crossing	Existing crossing	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method D
AB-169	312.2	Unnamed tributary to Athabasca River	Class C (unmapped)	SW 33-51-24 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert; Type 5 logfill/swamp mat	Clear-span bridge; Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp Mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A and B
AB-170	312.3	Unnamed tributary to Athabasca	Class C (unmapped)	SW 33-51-24 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-171	312.8	Unnamed tributary to Athabasca River	Class C (unmapped)	NW-28-51-24 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-172	313.4	Unnamed tributary to Athabasca	Class C (unmapped)	NW 28-51-24 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-173	313.9	Unnamed Drainage	NCD	SW 28-51-24 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-174	315.0	Unnamed Drainage	NCD	NE 20-51-24 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-175	315.1	Unnamed Drainage	NCD	NE 20-51-24 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-176	315.6	Unnamed tributary to Cache Percotte Creek	Class C (unmapped)	NW 20-51-24 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	TBD
AB-177	316.4	Cache Percotte Creek	Class C (unmapped)	SW 20-51-24 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method F
AB-178	318.6	Unnamed tributary to Hardisty Creek	Class C (unmapped)	SW 18-51-24 W5M	Low	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method G
AB-179	319.0	Unnamed tributary to Hardisty Creek	Class C (unmapped)	SE 13-51-25 W5M	Low	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method G
AB-180	319.8	Hardisty Creek	Class C	NW 12-51-25 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method F
AB-181	320.1	Unnamed Drainage	NCD	NW 12-51-25 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice Bridge; Type 3 Culvert; Type 5 Logfill/Swamp Mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-182	322.2	Unnamed Drainage	NCD	SW 11-51-25 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-183	322.4	Unnamed Drainage	NCD	SW 11-51-25 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-184	322.8	Unnamed Drainage	NCD	SW 11-51-25 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-185	323.1	Happy Creek	Class C	NE 3-51-25 W5M	Low	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge	Clear-span bridge; Snowfill/Ice bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method F
AB-188	327.6	Maskuta Creek	Class C	NW 31-50-25 W5M	High	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present	N/A	Existing crossing; Clear-span bridge	Existing crossing; Clear-span bridge; Snowfill/Ice bridge	Potentially Navigable	Standard Procedures and Reclamation Method F
AB-189	331.6	Unnamed Drainage	NCD	NE 23-50-26 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-190	331.9	Unnamed Drainage	NCD	NE 23-50-26 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-191	332.3	Unnamed Drainage	NCD	NE 23-50-26 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-193	333.5	Unnamed tributary to Maskuta Creek	Class C (unmapped)	NW 14-50-26 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
AB-194	333.6	Unnamed tributary to Maskuta Creek	Class C (unmapped)	NW 14-50-26 W5M	Low	September 1 to July 15	July 16 to August 31	Isolated trenched outside RAP with water quality monitoring if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method F
AB-195	335.5	Unnamed tributary to Maskuta	Class C (unmapped)	NE 10-50-26 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C

TABLE I-1 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (LSD)	Fish Habitat Sensitivity	Restricted Activity Period (Alberta)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Frozen		
AB-196	336.0	Unnamed Drainage	NCD	NW 10-50-26 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-200	337.5	Unnamed Drainage	NCD	NW 3-50-26 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-201	337.6	Unnamed Drainage	NCD	NW 3-50-26 W5M	Low	None	Open	Isolated trenched at any time if water present; open cut if dry or frozen to bottom	N/A	Type 3 Culvert; Type 5 Logfill/Swamp mat	Snowfill/Ice bridge; Type 3 Culvert; Type 5 Logfill/Swamp mat	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method A
AB-202	338.6	Unnamed tributary to Maskuta Creek	Class C (unmapped)	SE 4-50-26 W5M	Low	September 1 to July 15	Open	Isolated trenched at any time if water present (with water quality monitoring if inside RAP); open cut if dry or frozen to bottom	N/A	Clear-span bridge; Type 3 culvert	Clear-span bridge; Snowfill/Ice bridge; Type 3 culvert	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method D

Notes: Recommended contingency methods are not necessarily reflective of biological considerations but are based primarily on engineering and/or hydrdotechnical influences.

N/A Not applicable.

NCD Non-Classified Drainage.

TBD To be determined.

RAP Restricted Activity Period.

For Standard Procedures and Reclamation Methods A, B, C, D, E, F and G, refer to Watercourse Reclamation Measures Table I.0-3

1 Minor Navigable Waters of the Minor Works and Waters (NWPA) Ministerial Order (Government of Canada 2009).

Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

TABLE I-2

SITE-SPECIFIC MITIGATION MEASURES FOR WATERCOURSES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR IN BC

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-1	489.7	Unnamed Drainage	NVC	b-020-B/083-E-03	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-2	489.8	Unnamed Drainage	NCD	c-010-B/083-E-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-11	497.8	Unnamed Drainage	NVC	d-068-K/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-10	499.7	Fraser River	S1B	d-067-K/083-D-14	High	July 15 to August 15 (Contact DFO)	July 15 to August 15 (Contact DFO)	Open-cut inside timing window with water quality monitoring	Open-cut in low flow with water quality monitoring	Multi-Span Bridge or access both banks	Multi-Span Bridge or access both banks	Navigable	Comply with Federal and Provincial Regulations
BC-17	503.5	Unnamed Channel	S6	d-059-K/083-D-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-18	504.7	Unnamed Channel	S6	b-070-K/083-D-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-19	505.8	Unnamed Drainage	NVC	b-051-L/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-20	506.1	Unnamed Channel	S6	b-051-L/083-D-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-21	507.1	Unnamed Channel	S6	b-041-L/083-D-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-23	510.6	Unnamed Drainage	NVC	b-019-K/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-24	511.1	Unnamed Drainage	NVC	c-009-K/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-25	512.2	Unnamed Drainage	NVC	c-098-F/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-26	514.3	Hogan Creek	S6	a-087-F/083-D-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-27	515.5	Teepee Creek	S3	a-076-F/083-D-14	High	June 15 to August 15	June 15 to August 15	Isolated trenched if water present with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method G
BC-29	521.4	Unnamed Drainage	NVC	c-013-F/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-30	521.6	Unnamed Drainage	NVC	b-013-F/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-31	521.7	Unnamed Drainage	NVC	b-013-F/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-32	522.5	Swift Creek	S1B	b-003-F/083-D-14	High	July 15 to August 15 (Contact DFO)	July 15 to August 15 (Contact DFO)	Isolated trenched with fish salvage and water quality monitoring during low flow	Trenchless (any time) or open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-33	523.7	Cranberry Creek	S6	b-093-C/083-D-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-34	524.8	Unnamed Drainage	NVC	b-083-C/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-35	525.7	Cranberry Creek	NVC	a-073-C/083-D-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-36	531.3	Canoe River	S1B	c-011-C/083-D-14	High	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Trenchless (any time) or open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-38	534.5	Camp Creek	S2	c-081-K/083-D-11	High	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Trenchless (any time) or open-cut with water quality monitoring inside timing window	Clear-span bridge	Clear-span bridge	Navigable	TBD
BC-39	537.7	Unnamed Channel	S6	b-051-K/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-40	539.5	Unnamed Drainage	NVC	c-040-J/083-D-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-41	539.9	Unnamed Drainage	NVC	a-040-J/083-D-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-42	540.2	Unnamed Drainage	NVC	a-040-J/083-D-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-43	540.6	Unnamed Channel	S3	c-029-J/083-D-11	High	July 15 to April 15	July 15 to April 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method G
BC-44	541.5	Unnamed Channel	S6	a-029-J/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-45	541.9	Unnamed Channel	S6	c-018-J/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-46	542.8	Unnamed Channel	S6	b-017-J/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-47	543.2	Unnamed Channel	S6	b-017-J/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-48	543.7	Unnamed Channel	S6	d-007-J/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-49	544	Unnamed Drainage	NVC	a-007-J/083-D-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-52	545.9	Camp Creek	S2	d-086-G/083-D-11	High	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Trenchless (any time) or open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Standard Procedures and Reclamation Method G
BC-53	546.1	Unnamed Channel	S6	a-086-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-54	546.2	Unnamed Drainage	NCD	a-086-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-55	546.9	Unnamed Channel	S3	c-075-G/083-D-11	High	July 15 to August 15	Open	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-56	547.6	Camp Creek	S2	a-075-G/083-D-11	High	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Trenchless (any time) or open-cut with water quality monitoring inside timing window	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-57	548.5	Unnamed Drainage	NVC	c-064-G/083-D-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-58	549.2	Unnamed Channel	S6	a-064-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-59	549.6	Unnamed Channel	S6	c-053-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-60	549.8	Unnamed Channel	S6	b-053-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-61	549.9	Unnamed Channel	S6	b-053-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-62	550.2	Unnamed Drainage	NCD	a-053-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-63	550.7	Unnamed Channel	S5	d-043-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-64	551.5	Unnamed Channel	S5	a-042-G/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method D or G
BC-66	552.9	Robina Creek	S5/S2	c-040-H/083-D-11	High	July 22 to August 15	July 22 to August 15	Isolated trenched at any time if water present with water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-68	554.9	Unnamed Channel	S6	d-019-H/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-69	555	Unnamed Channel	S6/S4	d-019-H/083-D-11	Low	July 15 to August 15	Open	Isolated trenched at any time if water present with water quality monitoring	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method F or G
BC-70	555.1	Unnamed Channel	S4	d-019-H/083-D-11	Low	July 15 to August 15	Open	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-71	555.5	Unnamed Channel	S4	b-018-H/083-D-11	High	July 15 to August 15	Open	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-72	556.2	Unnamed Channel	S5/S3	c-008-H/083-D-11	Low	July 15 to August 15	Open	Isolated trenched at any time if water present with water quality monitoring if flowing	Open-cut if dry or frozen to bottom	Clear-span bridge	Snow/Icefill or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method G
BC-73	556.5	Unnamed Drainage (Wetland)	NCD-W	a-008-H/083-D-11	High	July 22 to August 15	Open	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
BC-74	556.8	Unnamed Channel	S4	a-008-H/083-D-11	Low	July 22 to August 15	Open	Isolated trenched at any time if water present with fish salvage and water quality monitoring if flowing	Open-cut if dry or frozen to bottom	Clear-span bridge or Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method G
BC-75	557.5	Unnamed Drainage	NVC	a-098-A/083-D-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-77	559.3	Unnamed Channel	S6	c-078-A/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-79	559.6	Unnamed Channel	S6	a-079-A/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-81	560.9	Unnamed Channel	S6	a-069-A/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-82	561.2	Albreda River	S1B	c-059-A/083-D-11	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-83	562.1	Unnamed Channel	S6	c-049-A/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-84	563.5	Unnamed Channel	S4	a-040-A/083-D-11	High	July 15 to August 15	Open	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge or Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-85	563.6	Albreda River	S2	b-039-A/083-D-11	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Trenchless (any time) or open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-87	565	Unnamed Drainage	NVC	d-019-A/083-D-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-88	565.2	Unnamed Channel	S6	d-019-A/083-D-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-90	565.9	Unnamed Channel	S3	d-009-A/083-D-11	High	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge and/or Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method G
BC-91	566.5	Unnamed Channel	S4	b-009-A/083-D-11	Low	July 15 to August 15	Open	Isolated trenched at any time with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge or Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-95	572.8	Unnamed Channel	S6	a-041-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-96	573	Unnamed Drainage	NCD	a-041-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-97	573.2	Unnamed Channel	S6	c-031-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-98	573.4	Unnamed Channel	S6	c-031-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-99	573.5	Unnamed Channel	S5	d-031-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-100	574.4	Unnamed Drainage	NCD	d-022-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-100a	574.6	Unnamed Channel	S5	d-022-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Ramp and Culvert or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C
BC-101	574.8	Unnamed Channel	S5	a-022-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C
BC-101a	575	Unnamed Channel	S6	b-022-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-102	575.4	Unnamed Drainage	NCD	c-012-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-102a	575.6	Unnamed Drainage	NCD	c-012-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-102b	575.7	Unnamed Channel	S6	c-012-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-103	575.9	Unnamed Drainage	NCD	b-012-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-104	576.3	Unnamed Channel	S2	c-002-J/083-D-06	Low	June 1 to August 15	June 1 to August 15	Isolated trenched with fish salvage and water quality monitoring	Isolated trenched with fish salvage and water quality monitoring during low flow; Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge, Snow/Icefill or other approved crossing method	Potentially Navigable	TBD
BC-105	576.7	Unnamed Drainage	NCD	c-002-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-106	577.1	Unnamed Channel	S6	a-003-J/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-107	577.7	Switch Creek	S3	d-093-G/083-D-06	Low	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Snow/Icefill or other approved crossing method	Not navigable - Class 3	TBD
BC-108	578.3	Unnamed Channel	S6	d-083-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-109	579.2	Unnamed Channel	S6	a-083-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Existing or Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-111	581.2	North Thompson River	S1A	c-064-G/083-D-06	High	July 22 to August 15	July 22 to August 15	HDD (any time) with water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Comply with Federal and Provincial Regulations
BC-114	582.8	Unnamed Drainage	NCD	c-045-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-115	582.9	Unnamed Drainage	NCD	c-045-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-116	583	Unnamed Channel	S6	c-045-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-117	583	Unnamed Channel	S6	c-045-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-118	583.1	Unnamed Drainage	NCD	c-045-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-119	583.2	Unnamed Channel	S6	c-045-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-120	583.6	Amy Creek	S6	b-045-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-121	583.9	Unnamed Channel	S6	c-035-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-122	585	Unnamed Drainage	NCD	d-025-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-123	585.1	Unnamed Drainage	NCD	c-025-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-124	585.2	Unnamed Channel	S6	a-025-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-125	585.6	Unnamed Channel	S6	a-025-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-126	585.7	Unnamed Drainage	NCD	d-015-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-127	585.9	Unnamed Channel	S6	c-015-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method A or B
BC-128	586	Unnamed Channel	S6	c-015-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-129	586.2	Unnamed Channel	S6	b-015-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-130	586.7	Unnamed Drainage	NCD	d-005-G/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-131	586.9	Unnamed Drainage	NVC	d-005-G/083-D-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-132	587.2	Unnamed Channel	S6/NCD-W	a-005-G/083-D-06	Low	(DFO to provide)	TBD	Isolated trenched with water quality monitoring	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-134	587.5	Unnamed Drainage	NVC	a-005-G/083-D-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-135	588	Unnamed Drainage	NVC	d-095-B/083-D-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-136	588.1	Unnamed Drainage	NVC	a-095-B/083-D-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-137	588.2	Unnamed Channel	S6	a-095-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-138	588.4	Unnamed Channel	S6	a-095-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-139	588.6	Unnamed Channel	S6	d-085-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-140	589.3	Unnamed Channel	S6	a-085-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-141	589.5	Unnamed Drainage	NCD	d-075-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-142	589.6	Unnamed Drainage	NCD	d-075-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-143	589.7	Unnamed Channel	S6	d-075-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-144	590	Unnamed Channel	S6	b-075-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-145	590.1	Unnamed Drainage	NCD	b-075-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-146	590.3	Unnamed Channel	S6	b-075-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-147	590.5	Unnamed Channel	S6	c-065-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-148	590.7	Unnamed Channel	S6	c-065-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-149	591	Unnamed Channel	S6	b-065-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-150	591.2	Unnamed Drainage	NVC	b-065-B/083-D-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-151	592.9	Miledge Creek	S1B	c-045-B/083-D-06	High	August 7 to August 15	August 7 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-152	594	Unnamed Channel	S6	a-036-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-153	596.4	Unnamed Channel	S6	c-006-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-154	596.5	Unnamed Drainage	NVC	c-006-B/083-D-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-155	597.1	Unnamed Channel	S6	a-007-B/083-D-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-156	598.4	Unnamed Channel	S6	c-087-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-157	598.5	Unnamed Drainage	NCD	c-087-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-158	598.5	Unnamed Channel	S6	c-087-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-159	598.6	Unnamed Drainage	NCD	c-087-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-160	598.7	Unnamed Channel	S6	c-087-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-161	599.2	Unnamed Channel	S6	b-087-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-162	599.3	Unnamed Drainage	NCD	d-078-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-163	599.3	Unnamed Channel	S6	d-078-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-164	599.4	Unnamed Drainage	NCD	d-078-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-165	599.5	Unnamed Drainage	NVC	d-078-J/083-D-03	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-166	600	Unnamed Drainage	NCD	a-078-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-167	600.1	Unnamed Channel	S6	a-078-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-169	602.5	Unnamed Drainage	NVC	d-049-J/083-D-03	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-170	603.3	Unnamed Channel	S6	c-039-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-171	603.9	Unnamed Drainage	NCD	b-039-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-172	604.5	Unnamed Channel	S6	d-030-J/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-174	606.6	Unnamed Channel	S5	c-001-K/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-175	607.6	Unnamed Channel	S6	a-002-K/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-178	613.8	Blue River	S1B	d-035-F/083-D-03	High	August 7 to August 15	August 7 to August 15	HDD with water quality monitoring	Isolated trenched with fish salvage and water quality monitoring	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-179	614.4	Unnamed Drainage	NVC	a-035-F/083-D-03	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-180	616.9	Goose Creek	NCD-W	c-005-F/083-D-03	High	July 22 to August 15	Open	Isolated trenched with fish salvage and water quality monitoring during low flow conditions	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Swamp Mats, Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-184	622.5	Unnamed Drainage	NCD	b-056-C/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-188	624	Unnamed Channel	S6	c-037-C/083-D-03	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-191	631.4	Unnamed Drainage	NCD	b-075-K/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-199	637.5	Unnamed Drainage	NCD	a-017-K/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	TBD	Standard Procedures and Reclamation Method B
BC-200	638	Unnamed Channel	S6	d-007-K/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-201	638.8	Finn Creek	S2	b-006-K/082-M-14	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Potential navigable	Comply with Federal and Provincial Regulations
BC-202	639.1	Unnamed Drainage	NCD	c-096-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	TBD	Standard Procedures and Reclamation Method B
BC-203	639.6	Unnamed Drainage	NCD	a-096-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-204	640.4	Unnamed Drainage	NCD	d-086-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-205	640.7	Unnamed Drainage	NCD	a-086-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-206	641.5	Unnamed Drainage	NCD	b-075-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-207	641.9	Unnamed Drainage	NCD	c-065-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-208	642	Unnamed Drainage	NCD	c-065-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-209	642.1	Unnamed Channel	S6	c-065-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-210	642.3	Unnamed Channel	S3	c-065-F/082-M-14	Low	July 22 to October 31	July 22 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method G
BC-212	642.5	Unnamed Channel	S6	a-065-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-214	642.8	Unnamed Drainage (Wetland)	NCD-W	a-065-F/082-M-14	High	July 15 to August 15	Open	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
BC-216	644.6	Unnamed Drainage	NVC	a-045-F/082-M-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-218	646	Unnamed Channel	S6	c-024-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-219	646.1	Unnamed Drainage	NCD	c-024-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-220	646.3	Unnamed Channel	S6	a-024-F/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-221	646.5	Unnamed Drainage	NVC	a-024-F/082-M-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-223	647.8	Unnamed Drainage	NVC	d-004-F/082-M-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-226	648.7	Unnamed Drainage	NCD	c-093-C/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-227	648.9	Tumtum Creek	S2	c-093-C/082-M-14	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-228	649.2	Unnamed Channel	S6/S3	b-093-C/082-M-14	Low	July 22 to October 31	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	TBD
BC-230	649.7	Unnamed Channel	S4	c-083-C/082-M-14	Low	July 15 to August 15	Open	Isolated trenched with fish salvage and water quality monitoring if flowing	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span or Snow/Icefill	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-231	650.1	Unnamed Drainage	NVC	c-083-C/082-M-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-232	650.4	Unnamed Drainage	NVC	a-084-C/082-M-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-233	650.7	Unnamed Drainage	NVC	d-074-C/082-M-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-234	650.8	Unnamed Drainage	NVC	d-074-C/082-M-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-236	651.6	North Thompson River	S1A	d-075-C/082-M-14	High	July 22 to August 15	July 22 to August 15	HDD with water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Comply with Federal and Provincial Regulations
BC-238	652.7	Unnamed Channel	S3	c-065-C/082-M-14	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method D or G
BC-240	653.9	Unnamed Channel	S3	c-056-C/082-M-14	High	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method E or G
BC-241	654.4	Unnamed Channel	S6	b-056-C/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-242	656.1	Avola Creek	S3	c-036-C/082-M-14	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method E or G
BC-243	657.2	Unnamed Drainage	NCD	b-026-C/082-M-14	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-244	659.1	Unnamed Channel	S3	d-007-C/082-M-14	High	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method G
BC-245	659.9	Unnamed Channel	S6	c-097-K/082-M-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-248	663.1	Unnamed Channel	S2	b-079-K/082-M-11	High	July 22 to October 31	July 22 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-252	666.6	Unnamed Drainage	NCD	a-042-L/082-M-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-253	668.3	Unnamed Drainage	NVC	b-033-L/082-M-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-254	668.5	Unnamed Drainage	NCD	a-034-L/082-M-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-255	668.9	Unnamed Drainage	NCD	d-024-L/082-M-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-256	669.2	Unnamed Drainage	NVC	b-024-L/082-M-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-257	671.9	Unnamed Drainage	NCD	b-016-L/082-M-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-258	672	Ivy Creek	S5	a-017-L/082-M-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-260	676	Cornet Creek	S3	a-001-I/082-M-12	High	July 22 to October 31	July 22 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method F or G
BC-261	676.7	Unnamed Drainage	NVC	d-002-I/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-262	678.3	Jake Creek	S6	d-004-I/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-263	678.5	Unnamed Drainage	NVC	a-014-I/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-264	678.8	Unnamed Drainage	NCD	b-014-I/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-265	678.9	Unnamed Channel	S6	b-014-I/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-266	679	Unnamed Channel	S6	c-004-I/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-267	679.7	Unnamed Drainage	NVC	d-005-I/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-268	679.8	Unnamed Drainage	NVC	c-005-I/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-269	679.9	Unnamed Drainage	NCD	b-005-I/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-270	680.9	Unnamed Drainage	NCD	b-006-I/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-271	681.4	Unnamed Drainage	NCD	a-007-I/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-272	681.5	Unnamed Drainage	NVC	b-007-I/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-273	681.9	Unnamed Drainage	NVC	b-007-I/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-274	682.8	Unnamed Drainage	NVC	c-008-I/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-275	683.4	Mad River	S2	d-009-I/082-M-12	High	August 7 to September 30	August 7 to September 30	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-278	687.1	Divide Creek	S6	d-003-J/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-279	688.2	Bill Creek	S6	d-094-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-280	688.8	Blackberg Creek	S6	b-094-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-281	689.9	Unnamed Drainage	NVC	b-085-G/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-282	690.7	Unnamed Channel	S6	c-075-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-283	690.8	Unnamed Channel	S6	b-075-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-284	691	Unnamed Drainage	NVC	a-076-G/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-285	691.1	Unnamed Drainage	NVC	a-076-G/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-287	691.8	Unnamed Drainage	NCD	a-066-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-288	691.9	Unnamed Drainage	NCD	a-066-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-289	695.4	Unnamed Channel	S6	c-026-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-290	695.6	Unnamed Drainage	NCD	b-026-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Existing	Snow/Icefill or Existing	None	Standard Procedures and Reclamation Method A
BC-291	697.6	Johnston Creek	NCD	b-018-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-292	697.8	Unnamed Drainage	NCD	b-018-G/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-293	700.6	Unnamed Drainage	NCD	c-001-F/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-294	701.3	Unnamed Drainage	NCD	c-002-F/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-295	701.5	Unnamed Drainage	NCD	c-002-F/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-297	702.4	Unnamed Drainage	NCD	c-003-F/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-298	702.6	Unnamed Drainage	NVC	d-004-F/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-299	702.7	Unnamed Drainage	NVC	d-004-F/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-300	704.3	Unnamed Channel	S6	b-005-F/082-M-12	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-301	704.5	Unnamed Drainage	NVC	a-006-F/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-303	708.8	Unnamed Drainage	NVC	b-020-F/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-304	710.6	Unnamed Drainage	NVC	a-022-E/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-305	710.9	Noblequartz Creek	S5	c-022-E/082-M-12	Low	August 7 to August 15	August 7 to August 15	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C or D
BC-306	711	Unnamed Drainage	NVC	c-022-E/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-307	712.4	Unnamed Drainage	NVC	a-034-E/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-308	713.3	Unnamed Drainage	NVC	d-035-E/082-M-12	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-309	717.7	Raft River	S1B	c-068-E/082-M-12	High	July 22 to August 15	July 22 to August 15	HDD with water quality monitoring	Isolated trenched with fish salvage and water quality monitoring	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-310	719.8	School Creek	S3	c-080-E/082-M-12	Low	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge, Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	TBD
BC-311	721.3	Unnamed Drainage	NVC	c-072-H/092-P-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-312	725.5	Clearwater River	S1A	a-067-H/092-P-09	High	August 7 to August 15	August 7 to August 15	HDD with water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Comply with Federal and Provincial Regulations
BC-313	728.8	Gill Creek	NCD-W	c-038-H/092-P-09	Low	None	Open	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
BC-315	735	Mann Creek	S2	b-081-B/092-P-09	High	July 22 to August 20	July 22 to August 20	HDD with water quality monitoring	Isolated trenched with fish salvage and water quality monitoring during low flow	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	TBD
BC-317	737	Unnamed Drainage (Wetland)	NCD-W	d-074-B/092-P-09	High	July 15 to August 15	Open	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
BC-318	737.3	Unnamed Channel	S6	d-074-B/092-P-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-319	737.5	Unnamed Channel	S6	c-074-B/092-P-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-320	738.6	Unnamed Drainage	NVC	c-075-B/092-P-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-321	739.3	Unnamed Drainage	NVC	a-076-B/092-P-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-322	739.7	Unnamed Drainage	NCD	b-076-B/092-P-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-323	740.8	Unnamed Drainage	NVC	b-067-B/092-P-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-324	741.9	Unnamed Drainage	NCD	a-058-B/092-P-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-325	742.2	Unnamed Drainage	NCD	d-048-B/092-P-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-326	742.8	Unnamed Drainage	NCD	a-048-B/092-P-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-327	745.5	Unnamed Drainage	NCD	a-018-B/092-P-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-328	746.2	-	S6	d-008-B/092-P-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-330	749.3	Lemieux Creek	S1B	c-078-J/092-P-08	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-331	751	Nehalliston Creek	S2	c-058-J/092-P-08	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-333	753.8	Unnamed Drainage	NVC	d-028-J/092-P-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-335	755.3	Spokane Creek	S6	a-018-J/092-P-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-336	757.9	Montigney Creek	S3	c-087-G/092-P-08	High	July 22 to October 31	July 22 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method G
BC-337	760.2	Unnamed Drainage	NCD	d-067-G/092-P-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-338	761.1	Thuya Creek	S2	c-056-G/092-P-08	High	July 22 to October 31	July 22 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-339	762.7	Bryan Creek	NCD	b-046-G/092-P-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-340	763	Unnamed Drainage	NVC	d-036-G/092-P-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-341	764.2	Unnamed Drainage	NVC	c-025-G/092-P-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-342	767.6	Unnamed Channel	S6/S3	a-095-B/092-P-08	Low	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring if flowing	Open-cut if dry or frozen to bottom	Clear-span bridge or Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method F or G
BC-343	768.2	Darlington Creek	S2	a-085-B/092-P-08	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-344	768.5	Lindquist Creek	S2	a-085-B/092-P-08	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-348	812.9	Unnamed Drainage	NVC	d-031-K/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-349	813.2	Unnamed Drainage	NVC	a-031-K/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-350	813.4	Unnamed Drainage	NVC	a-031-K/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-351	813.7	Unnamed Drainage	NVC	d-021-K/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-352	813.9	Unnamed Drainage	NVC	d-021-K/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-353	814	Unnamed Drainage	NVC	a-021-K/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-356	814.5	Unnamed Drainage	NVC	d-011-K/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-364	817.6	Unnamed Drainage	NVC	d-082-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-365	817.8	Unnamed Drainage	NVC	d-082-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-366	817.9	Unnamed Drainage	NVC	a-082-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-367	818.1	Unnamed Drainage	NVC	b-082-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-368	818.5	Unnamed Drainage	NVC	c-072-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-372	823.4	Unnamed Channel	S6	c-034-F/092-I-16	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-373	823.7	Unnamed Drainage	NVC	d-035-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-375	824.7	Unnamed Drainage	NCD	c-025-F/092-I-16	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-378	826.7	Unnamed Drainage	NVC	a-017-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-379	827	Unnamed Drainage	NVC	b-017-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-380	827.8	Unnamed Drainage	NVC	a-008-F/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-385	832.3	Unnamed Drainage	NVC	c-058-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-386	832.3	Unnamed Drainage	NVC	c-058-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method B
BC-389	834.1	Unnamed Drainage	NVC	c-039-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-390	834.4	Unnamed Drainage	NVC	c-039-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-391	834.4	Unnamed Drainage	NVC	c-039-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-392	835	Unnamed Drainage	NVC	b-039-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-393	835.1	Unnamed Drainage	NVC	d-030-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-394	835.5	Unnamed Drainage	NVC	d-030-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-395	835.9	Unnamed Drainage	NVC	a-030-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method B
BC-396	836.2	Unnamed Drainage	NCD	d-020-C/092-I-16	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-398	837	Unnamed Drainage	NCD	b-019-C/092-I-16	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-399	837.6	Unnamed Drainage	NVC	a-010-C/092-I-16	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-400	837.7	Unnamed Drainage	NCD	a-010-C/092-I-16	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-401	838.1	Unnamed Drainage	NVC	d-100-K/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-402	838.5	Unnamed Drainage	NCD	a-100-K/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-403	838.5	Unnamed Drainage	NCD	a-100-K/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-404	838.7	Unnamed Drainage	NCD	a-100-K/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-405	839	Unnamed Drainage	NVC	d-090-K/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-406	839.6	Unnamed Drainage	NCD	d-090-K/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-407	839.6	Unnamed Drainage	NVC	b-090-K/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-408	839.9	Unnamed Drainage	NVC	b-090-K/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-409	841.5	Unnamed Drainage	NVC	a-072-L/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-410	842.3	Unnamed Drainage	NVC	d-063-L/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-411	843	Unnamed Drainage	NCD	c-063-L/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-412	844.1	Unnamed Drainage	NCD	b-064-L/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-413	846.8	Thompson River	S1A	d-035-L/092-I-09	High	July 22 to August 15	July 22 to August 15	HDD with water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Comply with Federal and Provincial Regulations
BC-415	847.5	Unnamed Drainage	NCD	c-024-L/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-416	847.8	Unnamed Drainage	NCD	c-024-L/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-417	848.2	Unnamed Drainage	NCD	b-024-L/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-418	849.4	Unnamed Drainage	NVC	c-004-L/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-419	850.1	Unnamed Drainage	NVC	a-004-L/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-419a	853.6	Unnamed Drainage	NVC	d-063-E/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	TBD

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-419b	854.1	Unnamed Drainage	NVC	a-063-E/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	TBD
BC-419c	854.3	Unnamed Drainage	NVC	d-053-E/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	TBD
BC-429	861.9	Unnamed Drainage	NCD	a-003-E/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-431	864.6	Unnamed Drainage	NVC	a-072-D/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-432	865	Unnamed Drainage	NVC	a-072-D/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-433	865.2	Anderson Creek	NCD-W	c-061-D/092-I-09	High	July 22 to August 15	July 22 to October 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Clear-span bridge or other approved crossing method	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-434	865.4	Unnamed Drainage	NCD	c-061-D/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-435	865.8	Unnamed Channel	S6	b-061-D/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-436	867.3	Unnamed Drainage	NVC	d-041-D/092-I-09	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-437	868.5	Unnamed Channel	S6	c-040-C/092-I-09	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-440	872.3	Unnamed Drainage	NVC	d-100-K/092-I-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-441	874.2	Droppingwater Creek	S6	c-080-K/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-442	874.4	Droppingwater Creek	NCD	c-080-K/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-443	875.8	Unnamed Drainage	NCD	a-061-L/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-444	875.9	Unnamed Drainage	NCD	d-051-L/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-446	877.1	Unnamed Drainage	NCD	c-041-L/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-447	878.5	Unnamed Drainage	NCD	a-032-L/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-449	880.5	Unnamed Drainage	NVC	b-012-L/092-I-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-450	881.6	Unnamed Drainage	NVC	c-092-E/092-I-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-451	883.5	Unnamed Drainage	NVC	d-073-E/092-I-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-452	884.4	Unnamed Drainage	NCD	c-063-E/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-453	885.8	Unnamed Drainage	NCD	d-054-E/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-459	892.8	Moore Creek	S2	c-086-D/092-I-08	High	July 22 to August 31	July 22 to August 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-460	893.5	Cultus Creek	S6	a-087-D/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-461	894.3	Unnamed Drainage	NVC	b-076-D/092-I-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-466	896.8	Disappearing Stream	NCD	a-047-D/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-468	898.4	Unnamed Drainage	NCD	c-027-D/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-469	900.1	Unnamed Drainage	NCD	d-019-D/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-470	900.3	Rocky Gulch	S6	c-019-D/092-I-08	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-472	902.2	Unnamed Drainage	NVC	b-010-D/092-I-08	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-473	903.3	Klup Creek	S5	c-091-I/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C
BC-474	904.3	Unnamed Drainage	NCD	d-082-I/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-475	905.6	Unnamed Drainage	NCD	d-073-I/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-476	906.1	Unnamed Drainage	NVC	b-073-I/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-477	908.1	Unnamed Drainage	NVC	b-075-I/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-478	910.5	Unnamed Drainage	NVC	a-078-I/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-479	911.9	Zoht Creek	S6	b-079-I/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-480	912.8	Unnamed Drainage	NCD	c-070-I/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-481	914.9	Unnamed Drainage	NVC	c-041-J/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-482	915.9	Clapperton Creek	S2	b-042-J/092-I-02	High	July 22 to August 1	July 22 to October 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-483	916.2	Unnamed Drainage	NVC	b-042-J/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-484	916.7	Unnamed Drainage	NVC	d-033-J/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-487	918.6	Unnamed Channel	S6	a-025-J/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-488	919.1	Unnamed Drainage	NCD	a-025-J/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-489	919.6	Unnamed Drainage	NVC	c-015-J/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-490	920	Unnamed Drainage	NCD	a-016-J/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Swamp Mats	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-491	920	Unnamed Drainage	NVC	a-016-J/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-492	920.2	Unnamed Drainage	NVC	a-016-J/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-493	920.3	Unnamed Channel	S6	d-006-J/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Existing or Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-494	920.9	Unnamed Drainage	NVC	c-006-J/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-495	921	Unnamed Drainage	NCD	b-006-J/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-496	921.5	Unnamed Drainage	NCD	a-007-J/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-497	922.1	Unnamed Drainage	NCD	c-097-G/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-498	922.9	Unnamed Drainage	NVC	d-088-G/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-499	923.1	Unnamed Drainage	NVC	d-088-G/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-500	923.4	Unnamed Drainage	NVC	a-088-G/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-501	924.8	Unnamed Drainage	NVC	a-079-G/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-502	925.4	Unnamed Drainage	NVC	c-069-G/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-503	925.9	Unnamed Drainage	NVC	b-069-G/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-505	928.7	Hamilton Creek	NCD	a-040-G/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-506	929	Unnamed Drainage	NCD	d-030-G/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-507	929.1	Unnamed Drainage	NCD	c-030-G/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-508	929.2	Unnamed Drainage	NCD	c-030-G/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-509	929.4	Unnamed Drainage	NCD	c-030-G/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-510	929.8	Unnamed Drainage	NCD	a-021-F/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-511	930	Unnamed Drainage	NVC	a-021-F/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-515	931.9	Unnamed Drainage	NCD	c-002-F/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-516	932.3	Spanish Creek	NCD	b-002-F/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-517	933	Unnamed Drainage	NVC	a-093-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-518	933.4	Unnamed Drainage	NVC	a-093-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-519	934.3	Unnamed Drainage	NVC	c-083-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-520	934.5	Unnamed Drainage	NVC	a-084-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-521	934.7	Unnamed Drainage	NVC	a-084-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-522	935.1	Unnamed Drainage	NVC	d-074-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-523	935.5	Unnamed Drainage	NVC	b-074-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-524	935.7	Unnamed Drainage	NVC	b-074-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-525	935.8	Unnamed Drainage	NVC	b-074-C/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-526	935.9	Unnamed Drainage	NCD	a-075-C/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-527	936.1	Unnamed Drainage	NCD	a-075-C/092-I-02	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-535	945.7	Unnamed Drainage	NVC	c-001-D/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	TBD
BC-536	946.3	Castillion Creek	NVC	d-002-D/092-I-02	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	TBD
BC-537	948	Unnamed Drainage	NCD	a-093-L/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-539	949.9	Unnamed Drainage	NCD	d-074-L/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-540	951.5	Unnamed Drainage	NVC	d-055-L/092-H-15	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-541	952.9	Unnamed Drainage	NVC	d-044-L/092-H-15	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-542	953.4	Unnamed Channel	S6	b-043-L/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-543	954.2	Unnamed Drainage	NCD	b-033-L/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-544	954.9	Unnamed Drainage	NVC	c-023-L/092-H-15	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-545	955.3	Unnamed Drainage	NCD	b-023-L/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-546	955.9	Unnamed Drainage	NCD	c-013-L/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-547	957.4	Unnamed Drainage	NVC	a-004-L/092-H-15	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-548	957.9	Coldwater River	S1B	d-094-E/092-H-15	High	August 7 to August 10	August 7 to August 10	HDD with water quality monitoring	Isolated trenched with fish salvage and water quality monitoring during low flow	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-550	960	Unnamed Drainage	NCD	d-075-E/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-552	960.7	Unnamed Drainage	NCD	a-075-E/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-553	961.7	Unnamed Drainage	NCD	d-055-E/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-557	965.9	Unnamed Drainage	NVC	a-025-E/092-H-15	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-558	969.6	Unnamed Channel	S5	b-085-D/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-561	971.2	Unnamed Channel	S6/S4	c-066-D/092-H-15	Low	July 15 to August 15	Open	Isolated trenched with fish salvage and water quality monitoring, if flowing	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method F or G
BC-562	972	Unnamed Channel	S3	a-067-D/092-H-15	Low	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method E or G
BC-563	972.7	Unnamed Drainage	NCD	d-057-D/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-564	973.6	Unnamed Channel	S3	d-048-D/092-H-15	High	July 22 to October 31	July 22 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method G
BC-565	976	Unnamed Drainage	NCD	b-039-D/092-H-15	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-569	978.9	Unnamed Drainage	NVC	a-001-A/092-H-14	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-570	980.0	Coldwater River	S1B	b-091-I/092-H-11	High	July 15 to August 1	July 15 to August 1	HDD with water quality monitoring	Isolated trenched with fish salvage and water quality monitoring during low flow	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-571	980.8	Juliet Creek	S1B	c-081-I/092-H-11	High	July 15 to August 15	July 15 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Standard Procedures and Reclamation Method G
BC-576	985.3	Unnamed Channel	S6	d-032-I/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-577	985.8	Unnamed Channel	S6	a-032-I/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-578	987	Unnamed Drainage	NVC	a-022-I/092-H-11	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-579	987.1	Mine Creek	S2	a-022-I/092-H-11	High	July 22 to August 15	July 22 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-580	987.6	Unnamed Drainage	NCD	a-012-I/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert or Clear-span bridge	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-580a	987.9	Unnamed Drainage	NCD	a-012-I/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-588	997.3	Fallslake Creek	S3	b-035-H/092-H-11	High	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	TBD
BC-594	1008.6	Unnamed Channel	S6	d-085-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-595	1009.3	Unnamed Channel	S5	c-075-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-597	1011.2	Unnamed Channel	S6	b-066-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-598	1011.3	Unnamed Channel	S6	b-066-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-599	1011.9	Unnamed Channel	S6	b-056-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-600	1012.3	Unnamed Channel	S6	b-056-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-602	1013	Unnamed Channel	S6	a-047-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-603	1013.1	Unnamed Channel	S6	a-047-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-604	1013.2	Unnamed Channel	S6	a-047-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-605	1013.3	Unnamed Channel	S6	a-047-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-606	1013.7	Unnamed Channel	S6	d-037-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-607	1013.8	Unnamed Channel	S6	d-037-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-608	1013.9	Unnamed Channel	S6	a-037-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-609	1013.9	Unnamed Channel	S6	a-037-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-610	1014.1	Unnamed Channel	S6	b-037-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-611	1014.2	Unnamed Channel	S5	b-037-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-612	1014.4	Unnamed Channel	S5	c-027-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C or D
BC-613	1014.5	Unnamed Channel	S6	c-027-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-614	1014.6	Unnamed Channel	S5	c-027-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C or D
BC-615	1014.8	Unnamed Channel	S5	b-027-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-616	1015.1	Unnamed Channel	S5	b-027-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C or D
BC-617	1015.3	Unnamed Channel	S5	d-017-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method D
BC-618	1015.5	Unnamed Drainage	NCD	d-017-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-619	1015.7	Unnamed Channel	S6	d-017-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-620	1015.9	Unnamed Channel	S6	a-017-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D
BC-621	1016.1	Unnamed Drainage	NCD	a-017-B/092-H-11	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-622	1017.9	Unnamed Channel	S6	c-097-J/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Snow/Icefill or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-623	1018.8	Unnamed Channel	S6	a-098-J/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-624	1019	Unnamed Channel	S2	b-098-J/092-H-06	Low	August 1 to October 31	Open	Isolated trenched with water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-625	1019.1	Unnamed Channel	S3	b-098-J/092-H-06	High	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method G

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-626	1019.5	Unnamed Channel	S6	a-099-J/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-627	1019.6	Unnamed Channel	S6	a-099-J/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-628	1019.7	Unnamed Channel	S5	a-099-J/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Swamp Mats or other approved crossing method	Potentially Navigable	Comply with Federal and Provincial Regulations
BC-629	1020.3	Ladner Creek	S2	a-100-J/092-H-06	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Standard Procedures and Reclamation Method G
BC-630	1021.1	Unnamed Channel	S3	c-090-J/092-H-06	Low	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method G
BC-631	1021.8	Coquihalla River	S1B	b-090-J/092-H-06	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-632	1022.9	Dewdney Creek	S1B	d-061-K/092-H-06	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-633	1023.6	Unnamed Drainage	NVC	a-061-K/092-H-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-634	1024.5	Karen Creek	S2	a-051-K/092-H-06	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-635	1025.4	Unnamed Channel	S3	b-041-K/092-H-06	High	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method F or G
BC-636	1026.5	Coquihalla River	S1B	d-032-K/092-H-06	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Comply with Federal and Provincial Regulations
BC-637	1027.3	Unnamed Drainage	NCD	a-033-K/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-638	1027.6	Unnamed Drainage	NVC	b-033-K/092-H-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-639	1028.6	Coquihalla River	S1B	c-024-K/092-H-06	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Standard Procedures and Reclamation Method G
BC-640	1028.9	Unnamed Channel	S5	b-024-K/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-641	1030.6	Unnamed Drainage	NCD	c-005-K/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-642	1030.8	Unnamed Drainage	NCD	c-005-K/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-643	1030.9	Unnamed Drainage	NCD	c-005-K/092-H-06	Low	None	Open	Isolated trenched if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-644	1031.4	Unnamed Channel	S5	b-005-K/092-H-06	Low	None	Open	Isolated trenched if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Existing or Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-645	1032.6	Coquihalla River	S1B	a-096-F/092-H-06	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Standard Procedures and Reclamation Method G
BC-646	1033.2	Railway Creek	S2	a-086-F/092-H-06	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-647	1034.3	Unnamed Drainage	NCD	b-076-F/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-649	1036.7	Unnamed Drainage	NCD	c-057-F/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-650	1037.6	Unnamed Drainage	NVC	c-058-F/092-H-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-653	1040.9	Unnamed Channel	S5	a-052-E/092-H-06	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method B or C
BC-654	1043.2	Coquihalla River	S1B	b-054-E/092-H-06	High	August 1 to August 31	August 1 to August 31	HDD with water quality monitoring	Isolation during low flow or Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Comply with Federal and Provincial Regulations
BC-656	1047	Unnamed Drainage	NVC	c-037-E/092-H-06	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-657	1047.2	Silverhope Creek	S1B	d-038-E/092-H-06	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or access both banks	Navigable	Standard Procedures and Reclamation Method G
BC-658	1051.5	Chawuthen Creek	NCD-W/S2	c-032-H/092-H-05	High	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method B
BC-659	1053	Unnamed Channel	S5	c-034-H/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C or D
BC-660	1053.1	Unnamed Channel	S5	c-034-H/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method D
BC-661	1055.1	Unnamed Drainage	NVC	c-026-H/092-H-05	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-662	1055.5	Hunter Creek	S1B	c-026-H/092-H-05	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Standard Procedures and Reclamation Method G
BC-663	1056.7	Unnamed Drainage	NCD	c-017-H/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-664	1057.5	Unnamed Drainage	NVC	a-018-H/092-H-05	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-665	1058.1	Unnamed Drainage	NVC	c-008-H/092-H-05	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-666	1060.9	Lorenzetta Creek	S2	b-090-A/092-H-05	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Standard Procedures and Reclamation Method F or G
BC-667	1061.2	Unnamed Channel	S6	c-080-A/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C
BC-668	1061.5	Wahleach Creek	S1B	d-071-B/092-H-05	High	August 1 to August 15	August 1 to August 15	Isolated trenched with fish salvage and water quality monitoring inside timing window	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Standard Procedures and Reclamation Method G
BC-669	1062.6	Unnamed Drainage	NCD	c-061-B/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Existing or Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-674	1065.1	Unnamed Channel	S6	b-053-B/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B or C

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-675	1065.4	Unnamed Drainage	NCD	c-043-B/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-676	1065.6	Unnamed Channel	S5	d-044-B/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method C or D
BC-678	1066.5	Unnamed Channel	S5/S2	d-034-B/092-H-05	Low	August 1 to October 31	Open	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	TBD
BC-679	1067.1	Unnamed Drainage	NCD	b-034-B/092-H-05	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-681	1069.2	Unnamed Channel	S3	b-014-B/092-H-05	High	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method G
BC-682	1069.6	Unnamed Channel	S5/S3	d-005-B/092-H-05	Low	August 1 to September 15	August 1 to September 15	Isolated trenched with water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	TBD
BC-683	1070.8	Unnamed Channel	S6/S3	d-095-J/092-H-04	Low	August 1 to October 31	Open	Isolated trenched with water quality monitoring, if flowing	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D or G
BC-684	1071	Unnamed Channel	S5/S3	a-095-J/092-H-04	Low	August 1 to September 15	Open	Isolated trenched with water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method G
BC-685	1071.4	Unnamed Channel	S1B	d-085-J/092-H-04	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-686	1072.1	Unnamed Channel	S6/S3	a-085-J/092-H-04	Low	Open	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	TBD
BC-687	1072.2	Unnamed Channel	S5	a-085-J/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method D
BC-688	1072.3	Unnamed Channel	S2	d-075-J/092-H-04	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-689	1072.6	Unnamed Channel	S5/S2	d-075-J/092-H-04	Low	August 1 to September 15	August 1 to September 15	Isolated trenched with water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Clear-span bridge or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-690	1072.8	Unnamed Channel	S2	a-075-J/092-H-04	Low	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-691	1072.9	Unnamed Channel	S6	a-075-J/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-692	1073.1	Unnamed Channel	S6	b-075-J/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-694	1073.7	Unnamed Channel	S6/S4	c-065-J/092-H-04	Low	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Ramp and Culvert	Clear-span bridge or Ramp and Culvert	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method G
BC-695	1074.2	Unnamed Channel	S3	a-066-J/092-H-04	High	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method G
BC-696	1074.4	Unnamed Channel	S6	d-056-J/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-697	1074.8	Unnamed Channel	S3	c-056-J/092-H-04	Low	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-698	1075	Unnamed Drainage	NCD	c-056-J/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-699	1075.2	Unnamed Drainage	NVC	a-057-J/092-H-04	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-700	1076	Unnamed Channel	S4	c-047-J/092-H-04	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-701	1076.2	Unnamed Drainage	NCD	c-047-J/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method B
BC-702	1076.9	Unnamed Drainage	NVC	a-048-J/092-H-04	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-703	1077.1	Unnamed Drainage	NCD	b-048-J/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Existing or Ramp and Culvert	Existing or Swamp Mats	None	Standard Procedures and Reclamation Method A
BC-704	1077.8	Unnamed Channel	S6	d-039-J/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-705	1078.2	Anderson Creek	S2	b-039-J/092-H-04	High	August 1 to August 15	August 1 to August 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method G
BC-709	1083.9	Dunville Creek	S3	c-004-K/092-H-04	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method D or E
BC-710	1084.4	Unnamed Channel	S3	a-005-K/092-H-04	Low	Open	Open	Isolated trenched with fish salvage	Open-cut if dry or frozen to bottom	Ramp and Culvert	Ramp and Culvert or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-711	1086.3	Unnamed Channel	S6	d-097-F/092-H-04	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-712	1086.6	Unnamed Channel	S3	a-097-F/092-H-04	High	July 15 to September 15	July 15 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge	Existing or Clear-span bridge	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C or D
BC-713	1087.6	Elk Creek	S3	d-088-F/092-H-04	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method C or D
BC-715	1094	Chilliwack Creek	S2	a-054-E/092-H-04	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Clear-span bridge	Clear-span bridge	Navigable	Standard Procedures and Reclamation Method F or G
BC-716	1102.1	Chilliwack/Vedder River Side Channel	S1B	a-022-H/092-G-01	High	July 15 to September 15	July 15 to September 15	HDD with water quality monitoring (included with Chilliwack/Vedder River HDD)	Isolated trenched with fish salvage and water quality monitoring	Clear-span bridge, Swamp Mats may be required	Clear-span bridge	Navigable	Comply with Federal and Provincial Regulations
BC-717	1102.3	Chilliwack/Vedder River	S1B	c-012-H/092-G-01	High	August 1 to August 15	August 1 to August 15	HDD with water quality monitoring	Open-cut with water quality monitoring inside timing window	Existing or access both banks	Existing or both banks	Navigable	Comply with Federal and Provincial Regulations
BC-718	1102.4	Chilliwack/Vedder River Side Channel	S2	c-012-H/092-G-01	High	August 1 to September 15	August 1 to September 15	HDD with water quality monitoring (included with Chilliwack/Vedder River HDD)	Isolated trenched with fish salvage and water quality monitoring	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method E or F
BC-719	1102.7	Unnamed Channel	S2	c-012-H/092-G-01	High	July 15 to September 15	Open	Isolated trenched with fish salvage and water quality monitoring; install sediment barrier	Open-cut if dry or frozen to bottom	Clear-span bridge or Ramp and Culvert	Swamp Mats or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method E or F
BC-720	1103.2	Street Creek	S3	b-012-H/092-G-01	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Not navigable - Class 3	Standard Procedures and Reclamation Method C or D
BC-721	1105	Unnamed Channel	S4	d-094-A/092-G-01	High	July 15 to September 15	July 15 to September 15	Isolated trenched with fish salvage and water quality monitoring if flowing	Open-cut if dry or frozen to bottom	Existing or Clear-span bridge or Ramp and Culvert	Clear-span bridge or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-725	1110.7	Sumas Lake Canal	S1B	a-090-A/092-G-01	High	July 15 to September 15	July 15 to September 15	Isolated trenched with fish salvage and water quality monitoring if flowing	Open-cut with water quality monitoring inside timing window	Existing or Clear-span bridge	Existing or Clear-span bridge	Navigable	Standard Procedures and Reclamation Method F or G
BC-726	1114.6	Sumas River	S1B	b-084-B/092-G-01	High	August 1 to August 15	August 1 to August 15	HDD with water quality monitoring	Other approved trenchless method	Existing or access both banks	Existing or access both banks	Navigable	Comply with Federal and Provincial Regulations

TABLE I-2 Cont'd

Crossing ID Number	RK	Waterbody Name	Waterbody Type	Legal Location (PNG)	Fish Habitat Sensitivity	Provincial and Federal Instream Work Window (MOE and DFO)	Least Risk Biological Window Proposed	Pipeline Crossing Method		Recommended Vehicle Crossing Method		Navigability Status[1]	Reclamation Type
								Recommended	Contingency	Open Water	Winter (Frozen/Non-Frozen)		
BC-729	1118.8	Tributary to Clayburn Creek/Ledgeview Creek	S5	c-088-B/092-G-01	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method D
BC-730	1120.2	Tributary to Clayburn Creek	S3	d-090-B/092-G-01	High	August 1 to September 15	August 1 to September 15	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Not navigable - Class 3	Standard Procedures and Reclamation Method G
BC-731	1122.4	Clayburn Creek	S2	d-092-C/092-G-01	High	August 1 to August 15	August 1 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method F or G
BC-732	1123.4	Clayburn Creek	S2	a-003-F/092-G-01	High	August 1 to August 15	August 1 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut with water quality monitoring inside timing window	Clear-span bridge	Clear-span bridge or other approved crossing method	Potentially Navigable	Standard Procedures and Reclamation Method F or G
BC-733	1125.2	Tributary to Gilford Slough	S3	d-005-F/092-G-01	Low	August 1 to September 15	Open	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method C or D
BC-734	1127.8	McLennan Creek	S2	c-017-F/092-G-01	High	August 1 to August 15	August 1 to August 15	Isolated trenched with fish salvage and water quality monitoring during low flow	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method F or G
BC-735	1129.6	Unnamed Drainage	NCD	c-029-F/092-G-01	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	None	Standard Procedures and Reclamation Method A
BC-736	1129.9	Unnamed Channel	S2	c-029-F/092-G-01	High	August 1 to October 31	August 1 to October 31	Isolated trenched with fish salvage and water quality monitoring	Open-cut if dry or frozen to bottom	Clear-span bridge	Clear-span bridge	Potentially Navigable	Standard Procedures and Reclamation Method F or G
BC-737	1130.5	Unnamed Drainage	NVC	c-030-F/092-G-01	None	None	Open	Open-cut	Open-cut	Ford	Ford	None	Standard Procedures and Reclamation Method A
BC-740	1134.2	Unnamed Channel	S6	a-044-E/092-G-01	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 1 as per Section 11 (2)	Standard Procedures and Reclamation Method B
BC-741	1134.3	Unnamed Channel	S6	b-044-E/092-G-01	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-742	1135.4	Unnamed Channel	S6	c-045-E/092-G-01	Low	None	Open	Isolated trenched at any time if water present	Open-cut if dry or frozen to bottom	Ramp and Culvert	Swamp Mats or other approved crossing method	Not navigable - Class 2 as per Section 11 (2)	Standard Procedures and Reclamation Method C
BC-753	1147.4	Salmon River	S2	a-088-H/092-G-02	High	August 1 to August 31	August 1 to August 31	Isolated trenched with fish salvage and water quality monitoring during low flow	Trenchless (any time) or open-cut with water quality monitoring inside timing window	Clear-span bridge	Clear-span bridge	Navigable	Standard Procedures and Reclamation Method F or G
BC-754	1147.7	Unnamed Drainage (Wetland)	NCD-W/S4	b-088-H/092-G-02	Low	Open	Open	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C	Refer to Wetland Evaluation Technical Report provided in Volume 5C
BC-780	1168.9	Fraser River	S1A	a-067-K/092-G-02	High	August 1 to August 15	August 1 to August 15	HDD with water quality monitoring	Other approved trenchless method	Existing or access both banks	Existing or access both banks	Navigable	Comply with Federal and Provincial Regulations

Notes: Recommended contingency methods are not necessarily reflective of biological considerations but are based primarily on engineering and/or hydrdotechnical influences.

N/A Not applicable.

NCD Non-Classified Drainage.

NVC Non-Visible Channel.

For Standard Procedures and Reclamation Methods A, B, C, D, E, F and G, refer to Watercourse Reclamation Measures Table I.0-3

1 Minor Navigable Waters of the Minor Works and Waters (NWPA) Ministerial Order (Government of Canada 2009).

Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

TABLE I-3

WATERCOURSE RECLAMATION MEASURES

Reclamation Method	Reclamation Measures	Application Criteria
Standard Procedures for all Watercourses	*Prior to Instream Work* • Identify any instream site-specific features at the crossing proposed and record their location *(e.g.,* root wad, large woody debris, large boulders). Salvage these for use later. *During Instream Work* • Salvage upper coarse-textured substrate material from the channel and banks, and stockpile separately from lower substrate. *At the Completion of Instream Work* • Return the watercourse (or wetland) bed and banks to their preconstruction configuration and alignment. • Cap disturbed area of the channel and banks with salvaged substrate; extend replacement of cobbles and boulders to the ordinary high water level (OHWL) if adequate material is available. • Replace any site-specific features that are important for fishes or other aquatic organisms (*i.e.,* as initially salvaged or as directed by Trans Mountain's Environmental Inspector). • Install the appropriate temporary erosion and sediment control measures, where warranted (*e.g.,* sediment fence, erosion control blanket, coir logs, etc.). • Seed with an appropriate grass mix and/or cover crop species as directed in the Reclamation Management Plan for the Project.	Standard procedures that apply to all watercourses listed in Appendix A – Watercourse Crossing Summary Table.
A	• Recontour bed and banks/approach slopes to pre-construction profiles and grades.	For shallow or poorly defined channels, including non-classified drainages with low or gently sloping banks (*e.g.,* intermittent, or seasonal watercourses with low flow or standing water, including small ponds).
B	• Salvage dormant riparian vegetation along the trench line (and vehicle crossing locations, where grading is required), keeping roots intact (*i.e.,* with a sufficient soil root-ball). Store salvaged dormant plants and plant material away from construction activities for replacement or installation during reclamation. Replace salvaged dormant riparian plants and plant material (stakes and brush) during reclamation (see Drawing [Shrub Staking and Transplanting] provided in Appendix R). • Install rooted stock shrubs/trees and/or dormant tree/shrub stakes/brush in disturbed riparian areas to stabilize soils, reduce sedimentation and accelerate vegetation recovery (see Drawing [Shrub Staking and Transplanting] and [Rooted Stock Selection and Installation] provided in Appendix R).	For shallow or poorly defined channels, with low or gently sloping banks and where riparian vegetation and bank material can be salvaged for use in channel reconstruction (*e.g.,* intermittent, or seasonal watercourses with low flow or standing water, including small ponds).
C	• Recontour banks using salvaged bank material and install erosion control blanket and/or coir logs as required (see Drawing [Erosion Control Matting/Blanket] and [Coir/Straw Log Installation] provided in Appendix R). • Install rooted stock plant shrubs/trees and/or dormant shrub stakes/brush in disturbed riparian areas to stabilize soils, reduce sedimentation and accelerate woody vegetation recovery (see Drawing [Shrub Staking and Transplanting and [Rooted Stock Selection and Installation] provided in Appendix R). • Coir soil wrap(s) with dormant brush/stake layering may be used for added bank integrity and to create overhanging vegetation (see Drawing [Streambank Protection – Hedge/Brush Layering] provided in Appendix R)	For watercourses with low to moderate flow, with vertical or steeply sloping banks up to 0.3 m high, and where the channel and base of the banks can be recontoured using cobble or boulder substrate. Install erosion control blanket and/or coir logs above the OHWL or riparian vegetation that will not be wetted by stream flows for prolonged periods.

TABLE I-3 Cont'd

Reclamation Method	Reclamation Measures	Application Criteria
D	• Recontour banks using salvaged bank material, and install erosion control blanket and/or coir logs as required (see Drawing [Erosion Control Matting/Blanket] and [Coir/Straw Log Installation] provided in Appendix R). • If required, install riprap base below OHWL, keyed in to bed and underlain with filter cloth or gravel layer. • Install coir soil wrap(s) above the OHWL (see Drawing [Streambank Protection – Hedge/Brush Layering] provided in Appendix R), or • Log crib structure made from natural logs may be used at the base of the bank (below the OHWL) if appropriate (may be a single log in height, typically a minimum of two logs are used) (see Drawing [Staked Logs/Log Cribwall for Erosion Control] provided in Appendix R). • Install rooted stock shrubs/trees and/or dormant shrub/tree stakes in disturbed riparian areas to stabilize soils, reduce sedimentation and accelerate woody vegetation recovery (see Drawing [Shrub Staking and Transplanting and [Rooted Stock Selection and Installation] provided in Appendix R).	For watercourses with low to moderate flow, with vertical or steeply sloping banks between 0.3 m and 1.5 m high, and where the channel and base of the banks can be recontoured using cobble or boulder substrate. Where multiple tiers of grass rolls are required and will not be wetted by stream flows for prolonged periods. Also for use where brush/stake layering between grass rolls and coir soil wrap(s) is required to provided overhanging vegetation.
E	• Recreate banks using log crib structures made of natural logs (may be a single log in height, typically a minimum of two logs are used) (see Drawing [Staked Logs/Log Cribwall for Erosion Control] provided in Appendix R), or • Install riprap keyed in to bed and underlain with filter cloth or gravel layer if required • Supplement with salvaged bank material as required. • Install rooted stock shrubs/trees and/or dormant shrub/tree stakes in disturbed riparian areas to stabilize soils, reduce sedimentation and accelerate woody vegetation recovery (see Drawing [Shrub Staking and Transplanting and [Rooted Stock Selection and Installation] provided in Appendix R).	Use of log crib structures is appropriate for watercourses with low flow that have a vertical or undercut bank up to 1 m high and where erosion from flow along the base of the bank needs to be mitigated. These watercourses are typically adjacent flood margins with flat or low gradient. This method is also suitable for channels with lower bank heights, adjacent culverts or constrained flows. Cover for fishes is provided by the transplanted shrubs/trees or shrub staking. Log crib structures are not recommended in steeper cobble/boulder systems subject to high velocity seasonal flows found in interior BC.
F	• Recreate banks using log crib structures made of natural logs (typically a minimum of two logs is used) (see Drawing [Staked Logs/Log Cribwall for Erosion Control] provided in Appendix R), or • Install riprap keyed in to bed and underlain with filter cloth or gravel layer (see Drawing [Streambank Protection – Cobble or Riprap Armouring] provided in Appendix R). • Supplement with salvaged bank material as required. • Install coir soil wrap(s) with dormant brush/stake layering above log crib or riprap (see Drawing [Streambank Protection – Hedge/Brush Layering] provided in Appendix R). • Install rooted stock shrubs/trees and/or dormant shrub/tree stakes in disturbed riparian areas to stabilize soils, reduce sedimentation and accelerate woody vegetation recovery (see Drawing [Shrub Staking and Transplanting and [Rooted Stock Selection and Installation] provided in Appendix R).	For watercourses with moderate to high flow that have a vertical or undercut bank >1 m high and where erosion from flow along the base of the bank needs to be mitigated. Used where steeper flood margins extend from the top of the bank. This method is also suitable for channels with lower bank heights, adjacent culverts or constrained flows. Cover for fishes is provided by the brush/stake layering between the coir soil wraps, rooted shrubs/trees and/or shrub/tree staking.
G	• Recontour bed and banks using native cobble and boulder armouring to the OHWL. • Supplement with locally obtained riprap if required to stabilize banks. • Install rooted stock shrubs/trees and/or dormant shrub/tree stakes in disturbed riparian areas to stabilize soils, reduce sedimentation and accelerate woody vegetation recovery (see Drawing [Shrub Staking and Transplanting and [Rooted Stock Selection and Installation] provided in Appendix R).	For larger watercourses subject to high seasonal flows, or watercourses with a steep (>5%) gradient and bed/banks comprised of large cobbler or boulder substrate. Usually in watercourses that experience high flow conditions.

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX J

VEGETATION (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for rare plants and rare ecological communities encountered along the Project's proposed pipeline corridor in Alberta and BC.

The rare plant features encountered with corresponding resource site-specific mitigation measures are provided in Table J-1. Weed species and locations encountered with corresponding resource-specific mitigation measures are provided in Table J-2 to be included prior to construction.

Refer to the Vegetation Technical Report for further details regarding weed species, rare plants and rare plant communities encountered and coinciding mitigation recommendations.

TABLE J-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR RARE PLANT COMMUNITIES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start RK	End RK	Legal Location (LSD/PNG)	Feature	Species Name (Rank)[1]	Abbreviated Species Name	Common Name	Reference to Potential Mitigation Measures
62.77	62.88	8-6-53-27 W4M	Rare Plants	*Conocephalum salebrosum* (S2)	CONOSAL	snakeskin liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
62.87	62.87	8-6-53-27 W4M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
91.26	91.27	15-9-53-3 W5M	Rare Plants	*Chrysosplenium sp.*	CHRYSP	saxifrage species	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
91.35	91.43	10-9-53-3 W5M to 11-9-53-3 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
100.92	100.98	11-10-53-4 W5M	Rare Ecological Community	*Salix bebbiana, Cornus stolonifera* (S3?)	Sali/Corn	beaked willow/red-osier dogwood	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
136.58	136.58	3-19-53-7 W5M	Rare Plants	*Anastrophyllum helleranum* (S2)	ANASHEL	Anastrophyllum liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
136.58	136.58	3-19-53-7 W5M	Rare Plants	*Riccardia latifrons* (S2)	RICCLAT	Riccardia liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
141.07	141.07	10-22-53-8 W5M	Rare Plants	*Chrysosplenium sp.*	CHRYSP	saxifrage species	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan
141.58	141.60	11-22-53-8 W5M	Rare Plants	*Lactuca biennis* (S2)	LACTBIE	tall blue lettuce	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
141.61	141.65	11-22-53-8 W5M	Rare Ecological Community	*Betula papyrifera/Lycopodium annotinum* (S2?)	Betu/Lyco	white birch/stiff club-moss woodland	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
141.79	141.82	12-22-53-8 W5M	Rare Ecological Community	*Betula papyrifera/Lycopodium annotinum* (S2?)	Betu/Lyco	white birch/stiff club-moss woodland	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
141.87	141.92	12-22-53-8 W5M	Rare Ecological Community	*Betula papyrifera/Lycopodium annotinum* (S2?)	Betu/Lyco	white birch/stiff club-moss woodland	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
157.16	157.16	9-24-53-10 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	saxifrage species	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
159.84	159.85	12-23-53-10 W5M	Rare Plants	*Conocephalum salebrosum* (S2)	CONOSAL	snakeskin liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
174.82	174.89	12-29-53-11 W5M	Rare Plants	*Coptis trifolia* (S3, watched)	COPTTRI	goldthread	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
174.91	176.29	12-29-53-11 W5M to 12-30-53-11 W5M	Rare Plants	*Coptis trifolia* (S3, watched)	COPTTRI	goldthread	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
199.81	199.84	5-26-53-14 W5M	Rare Plants	*Cardamine pratensis* (S3, watched)	CARDPRA	meadow bitter cress	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
199.82	199.84	5-26-53-14 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
206.89	206.93	9-24-53-15 W5M to 16-24-53-15 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
240.11	240.11	14-14-53-18 W5M	Rare Plants	*Sphenopholis obtusata* (S2)	SPHEOBT	prairie wedge grass	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
241.57	241.57	15-15-53-18 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
244.78	244.95	10-17-53-18 W5M	Rare Plants	*Conocephalum salebrosum* (S2)	CONOSAL	snakeskin liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
244.88	244.89	7-17-53-18 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
245.12	245.12	7-17-53-18 W5M	Rare Plants	*Sphenopholis obtusata* (S2)	SPHEOBT	prairie wedge grass	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
247.87	247.89	5-18-53-18 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
257.07	257.07	2-5-53-19 W5M	Rare Ecological Community	*Carex rostrata marsh* (S2)	CAREROS	beaked sedge marsh	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
257.10	257.10	02-05-053-19 W5M	Rare Plants	*Najas flexilis* (S2)	NAJAFLE	slender naiad	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
260.94	260.95	3-1-53-20 W5M	Rare Plants	*Sphenopholis obtusata* (S2)	SPHEOBT	prairie wedge grass	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
261.03	261.41	3-1-53-20 W5M to 4-1-53-20 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan
267.11	267.11	1-5-53-20 W5M	Rare Plants	*Potamogeton strictifolius* (S2)	POTASTR	linear-leaved pondweed	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
269.56	269.56	6-6-53-20 W5M	Rare Plants	*Chrysosplenium iowense* (S3?)	CHRYIOW	golden saxifrage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
278.70	278.77	13-32-52-21 W5M	Rare Plants	*Carex capitata* (S3, watched)	CARECAP	capitate sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
284.90	285.17	2-3-53-22 W5M	Rare Plants	*Carex capitata* (S3, watched)	CARECAP	capitate sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
285.42	285.42	6-3-53-22 W5M	Rare Plants	*Juncus sp*	JUNCSP	rush species	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
285.44	285.44	6-3-53-22 W5M	Rare Plants	*Sphenopholis obtusata* (S2)	SPHEOBT	prairie wedge grass	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
286.81	286.84	7-4-53-22 W5M to 10-4-53-22 W5M	Rare Plants	*Gymnocarpium disjunctum* (S1)	GYMNDIS	western oak fern	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
291.78	291.87	15-36-52-23 W5M	Rare Plants	*Conocephalum salebrosum* (S2)	CONOSAL	snakeskin liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan
291.89	291.89	15-36-52-23 W5M	Rare Plants	*Sphenopholis obtusata* (S2)	SPHEOBT	prairie wedge grass	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
295.30	295.31	12-26-52-23 W5M	Rare Plants	*Sphenopholis obtusata* (S2)	SPHEOBT	prairie wedge grass	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
298.58	298.58	11-21-52-23 W5M	Rare Plants	*Conocephalum salebrosum* (S2)	CONOSAL	snakeskin liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
333.34	333.34	13-14-50-26 W5M	Rare Plants	*Botrychium crenulatum* (S1)	BOTRCRE	scalloped grape fern	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
335.80	335.80	10-10-50-26 W5M	Rare Plants	*Botrychium spathulatum* (S2)	BOTRSPA	spatulate grape fern	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
339.28	339.29	14-33-49-26 W5M	Rare Plants	*Juncus brevicaudatus* (S2)	JUNCBRE	short-tail rush	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
508.00	508.47	b-031-L/083-D-14 to d-021-L/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.

TABLE J-1 Cont'd

Start RK	End RK	Legal Location (LSD/PNG)	Feature	Species Name (Rank)[1]	Abbreviated Species Name	Common Name	Reference to Potential Mitigation Measures
508.56	508.56	d-021-L/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
508.61	508.61	d-021-L/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
509.16	509.16	a-021-L/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
509.37	509.37	b-030-K/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
509.40	509.40	b-030-K/083-D-14	Rare Ecological Community	*Pinus contorta/Vaccinium myrtilloides/Cladonia spp.* (S2S3, Blue)	Pinu/Vacc/Clad	lodgepole pine/velvet-leaved blueberry/Clad lichens	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
509.68	509.85	c-020-K/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
509.80	509.85	c-020-K/083-D-14	Rare Ecological Community	*Pinus contorta/Vaccinium myrtilloides/Cladonia spp.* (S2S3, Blue)	Pinu/Vacc/Clad	lodgepole pine/velvet-leaved blueberry/Clad lichens	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
509.97	509.97	d-020-K/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
510.49	510.59	a-020-K/083-D-14 to b-019-K/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
510.49	510.59	a-020-K/083-D-14 to b-019-K/083-D-14	Rare Ecological Community	*Pinus contorta/Vaccinium myrtilloides/Cladonia spp.* (S2S3, Blue)	Pinu/Vacc/Clad	lodgepole pine/velvet-leaved blueberry/Clad lichens	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
510.57	510.57	a-020-K/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
510.67	510.69	b-019-K/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
510.84	510.99	c-009-K/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
511.14	511.66	c-009-K/083-D-14 to a-009-K/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
511.16	511.17	c-009-K/083-D-14	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
511.16	511.17	c-009-K/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan
511.22	511.63	c-009-K/083-D-14 to a-009-K/083-D-14	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
511.22	511.22	c-009-K/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
511.54	511.54	a-009-K/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
511.58	511.63	a-009-K/083-D-14	Rare Plants	*Botrychium michiganense sp. nov. ined.* (S1S3, Red)	BOTRMIC	Michigan moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
511.61	511.62	a-009-K/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
515.09	515.10	b-076-F/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
515.28	515.34	a-076-F/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
519.01	521.34	a-044-F/083-D-14 to c-013-F/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
519.38	519.38	d-034-F/083-D-14	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
519.45	519.46	d-034-F/083-D-14	Rare Plants	*Botrychium michiganense sp. nov. ined.* (S1S3, Red)	BOTRMIC	Michigan moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
519.47	519.47	d-034-F/083-D-14	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
520.79	520.98	b-023-F/083-D-14	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
520.87	520.89	b-023-F/083-D-14	Rare Plants	*Botrychium michiganense sp. nov. ined.* (S1S3, Red)	BOTRMIC	Michigan moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
520.88	520.88	b-023-F/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
523.06	523.14	d-094-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
523.18	523.63	d-094-C/083-D-14 to a-094-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
523.27	523.49	d-094-C/083-D-14 to a-094-C/083-D-14	Rare Plants	*Botrychium crenulatum* (S2S3, Blue)	BOTRCRE	dainty moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
523.36	523.53	d-094-C/083-D-14 to a-094-C/083-D-14	Rare Ecological Community	*Pinus contorta/Vaccinium myrtilloides/Cladonia spp.* (S2S3, Blue)	Pinu/Vacc/Clad	lodgepole pine/velvet-leaved blueberry/Clad lichens	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
523.43	523.45	d-094-C/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
526.17	526.17	d-063-C/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
526.18	526.90	d-063-C/083-D-14 to b-062-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
526.40	526.44	d-063-C/083-D-14 to c-062-C/083-D-14	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
530.47	531.04	d-021-C/083-D-14 to a-021-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
531.40	531.44	c-011-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
531.47	531.47	c-011-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
531.78	531.78	a-011-C/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
531.98	532.02	a-011-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
532.06	532.07	a-011-C/083-D-14	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.

TABLE J-1 Cont'd

Start RK	End RK	Legal Location (LSD/PNG)	Feature	Species Name (Rank)[1]	Abbreviated Species Name	Common Name	Reference to Potential Mitigation Measures
532.14	532.41	a-011-C/083-D-14 to d-001-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
532.34	532.34	d-001-C/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
532.65	532.70	d-001-C/083-D-14 to a-001-C/083-D-14	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
532.93	533.29	a-001-C/083-D-14 to d-091-K/083-D-11	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan
533.01	533.01	a-001-C/083-D-14	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
533.52	534.37	d-091-K/083-D-11 to c-081-K/083-D-11	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
534.60	535.41	c-081-K/083-D-11 to d-072-K/083-D-11	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
534.83	535.14	b-081-K/083-D-11 to a-082-K/083-D-11	Rare Ecological Community	*Pinus contorta/Vaccinium myrtilloides/Cladonia spp.* (S2S3, Blue)	Pinu/Vacc/Clad	lodgepole pine/velvet-leaved blueberry/Clad lichens	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan
539.39	539.46	c-040-J/083-D-11	Rare Plants	*Carex tonsa var. tonsa* (S2S3, Blue)	CARETON	bald sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
539.58	539.63	c-040-J/083-D-11	Rare Plants	*Botrychium crenulatum* (S2S3, Blue)	BOTRCRE	dainty moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
539.65	539.65	c-040-J/083-D-11	Rare Plants	*Botrychium echo* (S1S2, Red)	BOTRECH	echo moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
539.65	539.65	c-040-J/083-D-11	Rare Plants	*Botrychium montanum* (S1S2, Red)	BOTRMON	mountain moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
539.74	539.77	b-040-J/083-D-11	Rare Plants	*Botrychium crenulatum* (S2S3, Blue)	BOTRCRE	dainty moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
539.88	539.88	b-040-J/083-D-11	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
539.89	539.89	b-040-J/083-D-11	Rare Plants	*Botrychium crenulatum* (S2S3, Blue)	BOTRCRE	dainty moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
540.06	540.09	a-040-J/083-D-11	Rare Plants	*Botrychium crenulatum* (S2S3, Blue)	BOTRCRE	dainty moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
546.68	546.86	d-076-G/083-D-11 to c-075-G/083-D-11	Rare Ecological Community	*Pinus contorta/Vaccinium myrtilloides/Cladonia spp.* (S2S3, Blue)	Pinu/Vacc/Clad	lodgepole pine/velvet-leaved blueberry/Clad lichens	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
556.18	556.20	c-008-H/083-D-11	Rare Plants	*Chrysosplenium sp.*	CHRYSP	saxifrage species	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
565.70	565.77	a-019-A/083-D-11	Rare Plants	*Anemone canadensis* (S2S3, Blue)	ANEMCAN	Canada anemone	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
581.23	581.24	b-064-G/083-D-06	Rare Plants	*Botrychium crenulatum* (S2S3, Blue)	BOTRCRE	dainty moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
581.50	581.50	a-065-G/083-D-06	Rare Plants	*Botrychium crenulatum* (S2S3, Blue)	BOTRCRE	dainty moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
582.00	582.00	d-055-G/083-D-06	Rare Plants	*Botrychium crenulatum* (S2S3, Blue)	BOTRCRE	dainty moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
586.28	586.28	a-015-G/083-D-06	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
586.48	586.49	a-015-G/083-D-06	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
587.68	587.72	d-095-B/083-D-06	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
587.68	587.72	d-095-B/083-D-06	Rare Plants	*Botrychium michiganense sp. nov. ined.* (S1S3, Red)	BOTRMIC	Michigan moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
587.68	587.72	d-095-B/083-D-06	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
588.17	588.17	a-095-B/083-D-06	Rare Plants	*Botrychium michiganense sp. nov. ined.* (S1S3, Red)	BOTRMIC	Michigan moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
588.18	588.18	a-095-B/083-D-06	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
590.23	590.24	b-075-B/083-D-06	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
590.53	590.55	c-065-B/083-D-06	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
590.91	590.91	b-065-B/083-D-06	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
591.01	591.07	b-065-B/083-D-06	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
591.06	591.07	b-065-B/083-D-06	Rare Plants	*Botrychium ascendens* (S2, Red)	BOTRASC	upswept moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
591.19	591.40	b-065-B/083-D-06 to d—055-B/083-D-06	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
591.36	591.36	c-055-B/083-D-06	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
603.72	603.78	c-039-J/083-D-03	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
620.75	621.04	d-066-C/083-D-03 to c-066-C/083-D-03	Rare Plants	*Dryopteris cristata* (S2S3, Blue)	DRYOCRI	crested wood fern	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
622.60	622.61	b-056-C/083-D-03	Rare Lichen	*Arctoparmelia incurva* (S2S3, Blue)	ARCTINC	finger ring	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
654.00	654.00	c-056-C/082-M-14	Rare Liverwort	*Tritomaria exsecta* (S1)	TRITEXS	cut notchwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
654.04	654.04	c-056-C/082-M-14	Rare Liverwort	*Dicranum montanum* (S3, Blue)	DICRMON	montane Dicranum moss	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
654.05	654.06	c-056-C/082-M-14	Rare Liverwort	*Cephaloziella sp.* (SNR)	CEPHSP	Cephaloziella liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
654.31	654.32	b-056-C/082-M-14	Rare Plants	*Carex canescens ssp. disjuncta* (SU)	CARECAN	silvery sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
663.13	663.14	b-079-K/082-M-11	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
663.52	663.52	d-070-K/082-M-11	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
664.69	664.77	c-060-K/082-M-11 to d-051-L/082-M-11	Rare Plants	*Botrychium hesperium* (S2S3, Blue)	BOTRHES	western moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
666.02	666.11	d-042-L/082-M-11	Rare Plants	*Dryopteris cristata* (S2S3, Blue)	DRYOCRI	crested wood fern	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.

TABLE J-1 Cont'd

Start RK	End RK	Legal Location (LSD/PNG)	Feature	Species Name (Rank)[1]	Abbreviated Species Name	Common Name	Reference to Potential Mitigation Measures
666.42	666.42	a-042-L/082-M-11	Rare Plants	*Botrychium spathulatum* (S1, Red)	BOTRSPA	spoon-shaped moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
666.43	666.46	a-042-L/082-M-11	Rare Plants	*Botrychium pedunculosum* (S2, Red)	BOTRPED	stalked moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
666.43	666.44	a-042-L/082-M-11	Rare Plants	*Botrychium alaskense* (S1S3 according to Natureserve) ** not in database	BOTRALA	Alaska moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
668.95	668.95	d-024-L/082-M-11	Rare Plants	*Carex vulpinoidea* (S2S3, Blue)	CAREVUL	fox sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
674.69	674.70	b-009-L/082-M-11	Rare Plants	*Carex canescens ssp. disjuncta* (SU)	CARECAN	silvery sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
728.75	728.77	b-048-H/092-P-09	Rare Ecological Community	*Typha latifolia marsh* (S3, Blue)	TYPHLAT	common cattail marsh	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
732.25	732.52	d-010-H/092-P-09 to b-010-H/092-P-09	Rare Plants	*Carex tenera* (S2S3, Blue)	CARETEN	tender sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
732.30	732.55	a-010-H/092-P-09 to b-010-H/092-P-09	Rare Plants	*Carex tenera* (S2S3, Blue)	CARETEN	tender sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
734.65	734.81	a-081-B/092-P-09 to b-081-B/092-P-09	Rare Plants	*Carex tenera* (S2S3, Blue)	CARETEN	tender sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
738.06	738.06	d-075-B/092-P-09	Rare Plants	*Botrychium simplex var. compositum* (S2S3, Blue)	BOTRSIM	least moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
741.15	741.15	c-057-B/092-P-09	Rare Plants	*Carex tenera* (S2S3, Blue)	CARETEN	tender sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
749.16	749.16	d-078-J/092-P-08	Rare Plants	*Pyrola elliptica* (S2S3, blue)	PYROELL	white wintergreen	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
749.71	749.81	b-078-J/092-P-08	Rare Ecological Community	*Thuja plicata - Betula papyrifera/Gymnocarpium dryopteris* (S2S3, Blue)	Thuj/Betu/Gym	western redcedar - paper birch/oak fern	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
749.95	749.96	c-068-J/092-P-08	Rare Plants	*Azolla mexicana* (S2, Red)	AZOLMEX	Mexican mosquito fern	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
768.12	768.19	d-085-B/092-P-08 to a-085-B/092-P-08	Rare Plants	*Anemone virginiana var. cylindroidea* (S3, Blue)	ANEMVIR	riverbank anemone	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
814.26	814.26	a-021-K/092-I-16	Rare Plants	*Carex sychnocephala* (S3, Blue)	CARESYC	many-headed sedge	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
846.92	846.94	c-034-L/092-I-09 to b-034-L/092-I-09	Rare Ecological Community	*Salix exigua Shrubland* (S2, Red)	SALIEXI	narrow-leaf willow shrubland	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
847.12	847.16	a-035-L/092-I-09 to b-034-L/092-I-09	Rare Ecological Community	*Salix exigua Shrubland* (S2, Red)	SALIEXI	narrow-leaf willow shrubland	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
847.26	847.27	a-035-L/092-I-09	Rare Ecological Community	*Salix exigua Shrubland* (S2, Red)	SALIEXI	narrow-leaf willow shrubland	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
868.58	868.58	c-040-C/092-I-09	Rare Lichen	*Leptogium tenuissimum* (S2?, Red)	LEPTTEN	birdnest vinyl	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
868.58	868.58	c-040-C/092-I-09	Rare Lichen	*Peltigera sp. nov blue* (undescribed)	PELTNOVBLU	Peltigera lichen	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
927.29	927.54	d-050-G/092-I-02 to a-050-G/092-I-02	Rare Ecological Community	*Artemisia tridentata/Pseudoroegneria spicata* (S2, Red)	Arte/Pseu	big sagebrush/bluebunch wheatgrass	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
978.12	978.12	b-020-D/092-H-15	Unique Ecological Community	*Picea hybrid spp - Pseudotsuga menziesii/Abies lasiocarpa*	Pice/Pseu/Abie	hybrid spruce species - Douglas-fir/subalpine fir	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
988.48	988.56	d-002-I/092-H-11 to a-002-I/092-H-11	Rare Plants	*Botrychium alaskense* (S1S3 according to Natureserve) ** not in database	BOTRALA	Alaska moonwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1007.91	1007.91	b-094-B/092-H-11	Rare Ecological Community	*Abies amabilis/Thuja plicata/Oplopanax horridus* (Moist Submaritime:S3, Blue; Wet Submaritime: S4, Yellow)	Abie/Thuj/Oplo	amabilis fir - western redcedar/devil's club	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1008.05	1008.05	B-094-B/092-H-11	Rare Plants	*Eleocharis nitida* (S1, Red)	ELEONIT	slender spike rush	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1013.19	1013.19	a-047-B/092-H-11	Rare Ecological Community	*Abies amabilis/Thuja plicata/Oplopanax horridus* (Moist Submaritime:S3, Blue; Wet Submaritime: S4, Yellow)	Abie/Thuj/Oplo	amabilis fir - western redcedar/devil's club	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1014.42	1014.42	c-027-B/092-H-11	Rare Lichen	*Usnea quasirigida*	USNEQUA	Usnea lichen	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1021.92	1021.92	c-080-J/092-H-06	Rare Lichen	*Ahtiana sphaerosporella* (S2S3, Blue)	AHTISPH	mountain candlewax	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1021.92	1021.92	c-080-J/092-H-06	Rare Lichen	*Letharia columbiana* (S3?, Blue)	LETHCOL	brown-eyed wolf	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1028.71	1028.71	c-024-K/092-H-06	Rare Moss	*Racomitrium affine* (S2S3, Blue)	RACOAFF	Racomitrium moss	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1030.04	1030.04	d-015-K/092-H-06	Rare Liverwort	*Cephaloziella sp.* (SNR)	CEPHSP	Cephaloziella liverwort	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1036.73	1036.75	d-058-F/092-H-06	Rare Plants	*Silene sp*	SILESP	campion species	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1080.25	1080.28	a-021-K/092-H-04	Rare Ecological Community	*Typha latifolia Marsh* (S3, Blue)	TYPHLAT	common cattail marsh	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1116.58	1116.61	c-086-B/092-G-01	Rare Ecological Community	*Typha latifolia Marsh* (S3, Blue)	TYPHLAT	common cattail marsh	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1117.09	1117.15	d-087-B/092-G-01	Rare Plants	*Hydrophyllum tenuipes* (S2, Red)	HYDRTEN	Pacific waterleaf	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1117.44	1118.42	a-097-B/092-G-01 to a-098-B/092-G-01	Rare Plants	*Hydrophyllum tenuipes* (S2, Red)	HYDRTEN	Pacific waterleaf	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1119.79	1120.12	c-089-B/092-G-01 to d-090-B/092-G-01	Rare Plants	*Hydrophyllum tenuipes* (S2, Red)	HYDRTEN	Pacific waterleaf	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1142.54	1142.76	a-073-H/092-G-02	Rare Ecological Community	*Populus trichocarpa - Alnus rubra/Rubus spectabilis* (S3, Blue)	Popu/Alnu/Rubu	black cottonwood –red alder/salmonberry	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.

TABLE J-1 Cont'd

Start RK	End RK	Legal Location (LSD/PNG)	Feature	Species Name (Rank)[1]	Abbreviated Species Name	Common Name	Reference to Potential Mitigation Measures
1142.99	1143.03	b-073-H/092-G-02	Rare Ecological Community	*Thuja plicata - Picea sitchensis/Lysichiton americanus* (S3?, Blue)	Thuj/Pice/Lysi	western redcedar – sitka spruce/skunk cabbage	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.
1145.62	1145.64	d-076-H/092-G-02	Rare Ecological Community	*Populus trichocarpa - Alnus rubra/Rubus spectabilis* (S3, Blue)	Popu/Alnu/Rubu	black cottonwood –red alder/salmonberry	See Appendix – C Rare Ecological Community and Rare Plant Population Management Plan.

Sources: ACIMS 2013a, ACIMS 2013b, BC MOE 2013a, NatureServe 2012

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

1 Definitions of ranks are provided in the footnotes of Appendix B in the Vegetation Technical Report.

TABLE J-2

RESOURCE-SPECIFIC MITIGATION MEASURES FOR WEEDS ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start (RK)	End (RK)	Legal Location	Feature	Issue	Description	Potential Mitigation

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX K

WETLANDS (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for key areas where there is potential to encounter wetlands along the Project's proposed pipeline corridor. The wetland features encountered with corresponding resource site-specific mitigation measures are provided in Table K-1.

Refer to the Environmental Alignment Sheets for further details regarding wetland features encountered and coinciding mitigation recommendations.

TABLE K-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR WETLANDS ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
0.47	0.57	Seasonal Emergent Marsh	10-32-052-23 W4M 11-32-052-23 W4M 12-32-052-23 W4M 13-32-052-23 W4M 14-32-052-23 W4M 15-32-052-23 W4M	0.41	98.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
0.61	0.63	Seasonal Emergent Marsh	12-32-052-23 W4M	0.04	29.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
0.73	0.76	Seasonal Emergent Marsh	12-32-052-23 W4M	0.13	38.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1.10	1.11	Seasonal Emergent Marsh	11-32-052-23 W4M	0.00	11.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1.38	1.79	Open Water Pond	07-32-052-23 W4M 08-32-052-23 W4M	1.95	405.2	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1.40	1.49	Seasonal Emergent Marsh	10-32-052-23 W4M	0.20	95.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1.45	1.59	Shrubby Swamp	10-32-052-23 W4M 07-32-052-23 W4M	1.01	145.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
1.54	1.58	Seasonal Emergent Marsh	10-32-052-23 W4M	0.01	43.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1.86	2.06	Shrubby Swamp	08-32-052-23 W4M 09-32-052-23 W4M	0.46	207.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
2.09	2.15	Seasonal Emergent Marsh	09-32-052-23 W4M	0.15	63.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
2.32	2.51	Shrubby Swamp	12-33-052-23 W4M 05-33-052-23 W4M	0.65	182.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
2.72	2.77	Shrubby Swamp	06-33-052-23 W4M	0.27	47.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
3.90	3.95	Shrubby Swamp	14-28-052-23 W4M	0.13	47.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
7.01	7.06	Seasonal Emergent Marsh	14-16-052-23 W4M	0.08	54.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
7.22	7.34	Open Water Pond	14-16-052-23 W4M	0.51	116.4	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
7.67	7.75	Seasonal Emergent Marsh	11-16-052-23 W4M	0.20	84.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
7.69	7.75	Seasonal Emergent Marsh	10-16-052-23 W4M 11-16-052-23 W4M	0.25	59.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
7.80	7.89	Seasonal Emergent Marsh	11-16-052-23 W4M 06-16-052-23 W4M 07-16-052-23 W4M	0.56	96.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
7.85	7.95	Shrubby Swamp	06-16-052-23 W4M	0.12	100.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
8.16	8.31	Seasonal Emergent Marsh	03-16-052-23 W4M 06-16-052-23 W4M	0.53	143.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
8.55	8.59	Seasonal Emergent Marsh	02-16-052-23 W4M 03-16-052-23 W4M	0.09	42.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
8.94	9.05	Mixedwood Treed Swamp	11-09-052-23 W4M 12-09-052-23 W4M 14-09-052-23 W4M 05-09-052-23 W4M 06-09-052-23 W4M	0.19	111.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
9.71	9.75	Seasonal Emergent Marsh	06-09-052-23 W4M	0.03	36.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
9.99	10.06	Shrubby Swamp	03-09-052-23 W4M	0.33	69.2	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
10.15	10.19	Shrubby Swamp	03-09-052-23 W4M	0.09	42.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
10.39	10.44	Seasonal Emergent Marsh	14-04-052-23 W4M	0.08	48.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
10.56	10.69	Seasonal Emergent Marsh	11-04-052-23 W4M 14-04-052-23 W4M	0.45	125.5	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
11.07	11.20	Deep Marsh	06-04-052-23 W4M	0.88	126.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
11.26	11.38	Seasonal Emergent Marsh	06-04-052-23 W4M	0.23	118.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
11.51	11.65	Seasonal Emergent Marsh	05-04-052-23 W4M	0.42	133.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
12.56	12.59	Deep Marsh	16-32-051-23 W4M	0.07	36.5	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
12.56	12.61	Deep Marsh	16-32-051-23 W4M	0.22	50.5	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
12.60	12.65	Seasonal Emergent Marsh	16-32-051-23 W4M	0.17	47.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
12.65	12.73	Seasonal Emergent Marsh	15-32-051-23 W4M 16-32-051-23 W4M 09-32-051-23 W4M	0.73	79.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
12.73	12.76	Shrubby Swamp	16-32-051-23 W4M 09-32-051-23 W4M	0.11	30.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
12.95	13.09	Seasonal Emergent Marsh	10-32-051-23 W4M	0.28	133.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
13.09	13.19	Seasonal Emergent Marsh	10-32-051-23 W4M 07-32-051-23 W4M	0.16	105.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
13.21	13.26	Shrubby Swamp	10-32-051-23 W4M	0.13	47.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
13.31	13.42	Shrubby Swamp	10-32-051-23 W4M 06-32-051-23 W4M 07-32-051-23 W4M	0.40	106.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
13.88	14.11	Seasonal Emergent Marsh	04-32-051-23 W4M 05-32-051-23 W4M	2.11	232.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
16.32	16.40	Shrubby Swamp	16-25-051-24 W4M	0.42	78.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
18.02	18.84	Shrubby Swamp	14-26-051-24 W4M 15-26-051-24 W4M 16-26-051-24 W4M	7.23	817.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
20.79	20.86	Seasonal Emergent Marsh	04-34-051-24 W4M	0.01	75.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
21.47	21.54	Seasonal Emergent Marsh	10-28-051-24 W4M 16-28-051-24 W4M 09-28-051-24 W4M	0.24	66.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
21.55	21.90	Seasonal Emergent Marsh	10-28-051-24 W4M 15-28-051-24 W4M 16-28-051-24 W4M 09-28-051-24 W4M	2.92	352.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
29.60	29.67	Seasonal Emergent Marsh	12-26-051-25 W4M	0.35	64.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
29.77	29.85	Seasonal Emergent Marsh	12-26-051-25 W4M	0.28	75.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
30.44	30.52	Seasonal Emergent Marsh	01-34-051-25 W4M 16-27-051-25 W4M	0.14	76.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
30.72	30.83	Seasonal Emergent Marsh	01-34-051-25 W4M	0.33	107.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
30.97	31.05	Seasonal Emergent Marsh	08-34-051-25 W4M	0.24	75.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
31.21	31.24	Seasonal Emergent Marsh	08-34-051-25 W4M	0.06	28.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
34.32	34.38	Seasonal Emergent Marsh	15-04-052-25 W4M	0.24	56.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
34.80	34.80	Seasonal Emergent Marsh	10-04-052-25 W4M	0.38	0.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
40.44	40.62	Seasonal Emergent Marsh	04-20-052-25 W4M	0.80	181.1	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for fish mitigation (Volume 5C)
43.93	44.02	Seasonal Emergent Marsh	02-25-052-26 W4M	0.32	91.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
44.52	44.61	Seasonal Emergent Marsh	03-25-052-26 W4M	0.34	86.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
45.04	45.04	Seasonal Emergent Marsh	04-25-052-26 W4M	0.00	3.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
46.63	46.74	Seasonal Emergent Marsh	05-26-052-26 W4M 06-26-052-26 W4M	0.15	110.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
46.96	47.00	Shrubby Swamp	05-26-052-26 W4M	0.10	36.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
47.44	47.48	Seasonal Emergent Marsh	08-27-052-26 W4M	0.13	44.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
47.73	47.80	Shrubby Swamp	02-27-052-26 W4M	0.19	69.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
47.82	47.86	Shrubby Swamp	07-27-052-26 W4M	0.12	46.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
50.39	50.48	Seasonal Emergent Marsh	12-28-052-26 W4M	0.32	90.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
51.11	51.17	Seasonal Emergent Marsh	10-29-052-26 W4M 15-29-052-26 W4M	0.09	54.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
51.89	51.96	Seasonal Emergent Marsh	13-29-052-26 W4M	0.25	66.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
59.36	59.44	Open Water Pond	07-33-052-27 W4M	0.38	76.8	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
59.40	59.51	Shrubby Swamp	07-33-052-27 W4M	0.36	117.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
59.50	59.65	Seasonal Emergent Marsh	06-33-052-27 W4M 07-33-052-27 W4M	0.85	146.4	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
61.48	61.90	Seasonal Emergent Marsh	10-32-052-27 W4M 11-32-052-27 W4M 13-32-052-27 W4M 14-32-052-27 W4M 15-32-052-27 W4M	3.80	416.8	COP Notification Crown Land Determination	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
64.79	65.39	Seasonal Emergent Marsh	01-12-053-28 W4M 15-01-053-28 W4M 16-01-053-28 W4M 02-12-053-28 W4M	4.71	606.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
64.98	65.17	Seasonal Emergent Marsh	01-12-053-28 W4M 02-12-053-28 W4M	0.32	192.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
65.39	65.52	Open Water Pond	15-01-053-28 W4M 02-12-053-28 W4M	0.64	126.6	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
65.51	65.76	Shrubby Swamp	14-01-053-28 W4M 15-01-053-28 W4M 02-12-053-28 W4M 03-12-053-28 W4M	2.44	254.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
66.36	66.43	Seasonal Emergent Marsh	02-12-053-01 W5M	0.39	65.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
66.76	66.95	Seasonal Emergent Marsh	14-01-053-01 W5M 03-12-053-01 W5M	0.73	191.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
66.88	66.93	Deep Marsh	14-01-053-01 W5M 03-12-053-01 W5M	0.12	46.8	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
67.28	67.29	Seasonal Emergent Marsh	13-01-053-01 W5M	0.00	11.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
67.98	68.01	Seasonal Emergent Marsh	15-02-053-01 W5M 16-02-053-01 W5M	0.05	26.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
68.08	68.14	Seasonal Emergent Marsh	15-02-053-01 W5M	0.14	61.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
68.29	68.35	Seasonal Emergent Marsh	15-02-053-01 W5M	0.11	53.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
68.99	69.00	Seasonal Emergent Marsh	12-02-053-01 W5M	0.01	12.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
69.33	69.39	Open Water Pond	09-03-053-01 W5M	0.18	53.5	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
69.79	70.13	Shrubby Swamp	10-03-053-01 W5M 14-03-053-01 W5M 15-03-053-01 W5M	1.42	336.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
69.82	69.91	Seasonal Emergent Marsh	10-03-053-01 W5M	0.26	88.3	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
69.95	69.99	Seasonal Emergent Marsh	10-03-053-01 W5M 15-03-053-01 W5M	0.16	40.0	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
70.23	70.27	Seasonal Emergent Marsh	11-03-053-01 W5M	0.14	42.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
70.38	70.41	Seasonal Emergent Marsh	11-03-053-01 W5M	0.05	33.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
70.47	70.50	Seasonal Emergent Marsh	13-03-053-01 W5M	0.07	28.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
70.48	70.54	Seasonal Emergent Marsh	11-03-053-01 W5M 12-03-053-01 W5M	0.12	60.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
70.74	70.77	Seasonal Emergent Marsh	13-03-053-01 W5M	0.10	37.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
70.80	70.83	Seasonal Emergent Marsh	13-03-053-01 W5M	0.05	36.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
71.97	71.99	Seasonal Emergent Marsh	14-04-053-01 W5M	0.06	23.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
72.03	72.05	Seasonal Emergent Marsh	14-04-053-01 W5M	0.01	27.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
72.03	72.06	Seasonal Emergent Marsh	14-04-053-01 W5M	0.07	28.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
72.21	72.25	Seasonal Emergent Marsh	13-04-053-01 W5M	0.06	38.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
72.28	72.30	Seasonal Emergent Marsh	13-04-053-01 W5M	0.03	22.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
72.33	72.37	Seasonal Emergent Marsh	13-04-053-01 W5M	0.09	38.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
72.39	72.41	Seasonal Emergent Marsh	13-04-053-01 W5M	0.06	24.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
72.52	72.55	Seasonal Emergent Marsh	16-05-053-01 W5M	0.08	36.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
72.58	72.61	Seasonal Emergent Marsh	16-05-053-01 W5M	0.03	23.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
74.67	74.71	Seasonal Emergent Marsh	02-07-053-01 W5M	0.22	45.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
74.83	74.96	Seasonal Emergent Marsh	02-07-053-01 W5M	0.64	135.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
76.03	76.05	Open Water Pond	01-12-053-02 W5M	0.04	21.6	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
76.18	76.23	Seasonal Emergent Marsh	01-12-053-02 W5M	0.02	44.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
76.85	76.92	Seasonal Emergent Marsh	03-12-053-02 W5M	0.33	74.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
78.29	78.36	Seasonal Emergent Marsh	06-11-053-02 W5M	0.26	65.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
78.37	78.43	Seasonal Emergent Marsh	06-11-053-02 W5M	0.15	63.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
78.88	78.96	Deep Marsh	04-11-053-02 W5M 05-11-053-02 W5M	0.15	72.3	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
78.99	79.04	Seasonal Emergent Marsh	05-11-053-02 W5M	0.08	50.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
79.50	79.60	Shrubby Swamp	02-10-053-02 W5M 07-10-053-02 W5M 08-10-053-02 W5M	0.21	97.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
79.51	79.58	Seasonal Emergent Marsh	02-10-053-02 W5M 07-10-053-02 W5M	0.16	63.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
79.74	79.82	Treed Fen	07-10-053-02 W5M	0.21	79.6	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
79.78	79.80	Seasonal Emergent Marsh	02-10-053-02 W5M 07-10-053-02 W5M	0.04	21.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
80.00	80.21	Deep Marsh	03-10-053-02 W5M 06-10-053-02 W5M	1.68	204.8	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
80.34	80.43	Shrubby Swamp	04-10-053-02 W5M 05-10-053-02 W5M	0.53	88.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
80.36	80.39	Seasonal Emergent Marsh	04-10-053-02 W5M	0.05	29.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
81.40	81.41	Seasonal Emergent Marsh	02-09-053-02 W5M	0.01	17.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
81.54	81.56	Seasonal Emergent Marsh	02-09-053-02 W5M 03-09-053-02 W5M 06-09-053-02 W5M 07-09-053-02 W5M	0.07	21.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
81.64	81.69	Seasonal Emergent Marsh	03-09-053-02 W5M 06-09-053-02 W5M	0.10	44.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
82.37	82.63	Shrubby Swamp	01-08-053-02 W5M 02-08-053-02 W5M 05-09-053-02 W5M 07-08-053-02 W5M 08-08-053-02 W5M 09-08-053-02 W5M	2.14	262.8	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
82.44	82.49	Seasonal Emergent Marsh	02-08-053-02 W5M 05-09-053-02 W5M 07-08-053-02 W5M 08-08-053-02 W5M	0.02	45.4	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
83.46	83.50	Shrubby Swamp	06-08-053-02 W5M	0.15	42.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
83.49	83.51	Seasonal Emergent Marsh	06-08-053-02 W5M	0.06	22.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
84.99	85.10	Open Water Pond	11-07-053-02 W5M 06-07-053-02 W5M	1.02	102.1	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for fish and fish habitat mitigation (Volume 5C)
85.38	85.42	Seasonal Emergent Marsh	12-07-053-02 W5M	0.03	40.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
85.45	85.49	Seasonal Emergent Marsh	12-07-053-02 W5M	0.06	35.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
86.39	86.46	Seasonal Emergent Marsh	10-12-053-03 W5M 07-12-053-03 W5M	0.20	64.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
86.53	86.99	Seasonal Emergent Marsh	10-12-053-03 W5M 11-12-053-03 W5M 12-12-053-03 W5M 06-12-053-03 W5M	2.64	456.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
87.23	87.26	Seasonal Emergent Marsh	12-12-053-03 W5M	0.07	30.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
87.54	87.59	Shrubby Swamp	09-11-053-03 W5M	0.29	53.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
88.41	88.76	Deep Marsh	11-11-053-03 W5M 12-11-053-03 W5M	1.16	345.6	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
88.48	88.57	Open Water Pond	11-11-053-03 W5M 12-11-053-03 W5M	0.14	90.1	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
88.72	88.91	Shrubby Swamp	12-11-053-03 W5M	1.29	186.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
89.11	89.13	Seasonal Emergent Marsh	09-10-053-03 W5M	0.02	27.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
89.30	89.33	Seasonal Emergent Marsh	09-10-053-03 W5M	0.03	26.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
90.02	90.10	Seasonal Emergent Marsh	11-10-053-03 W5M	0.45	80.3	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
90.08	90.17	Seasonal Emergent Marsh	11-10-053-03 W5M 14-10-053-03 W5M	0.81	90.2	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
90.08	90.09	Deep Marsh	11-10-053-03 W5M	0.00	6.4	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
90.21	90.32	Treed Bog	12-10-053-03 W5M	0.69	114.2	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
90.22	90.32	Seasonal Emergent Marsh	12-10-053-03 W5M	0.32	94.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
90.61	90.65	Seasonal Emergent Marsh	09-09-053-03 W5M	0.09	36.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
91.01	91.13	Seasonal Emergent Marsh	10-09-053-03 W5M 15-09-053-03 W5M 09-09-053-03 W5M	0.85	120.8	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
91.30	91.48	Treed Fen	14-09-053-03 W5M 15-09-053-03 W5M	0.98	179.7	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
91.55	91.62	Shrubby Swamp	14-09-053-03 W5M	0.21	69.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
91.93	92.16	Shrubby Swamp	12-09-053-03 W5M 13-09-053-03 W5M	1.57	224.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
92.69	92.80	Seasonal Emergent Marsh	15-08-053-03 W5M	0.20	112.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
92.88	92.91	Seasonal Emergent Marsh	15-08-053-03 W5M	0.11	35.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
93.20	93.30	Seasonal Emergent Marsh	14-08-053-03 W5M	0.31	103.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
93.20	93.23	Seasonal Emergent Marsh	14-08-053-03 W5M	0.04	32.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
93.36	93.49	Seasonal Emergent Marsh	13-08-053-03 W5M 14-08-053-03 W5M	0.53	123.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
93.38	93.39	Seasonal Emergent Marsh	14-08-053-03 W5M	0.05	5.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
93.80	93.95	Seasonal Emergent Marsh	04-17-053-03 W5M	0.76	143.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
94.00	94.03	Seasonal Emergent Marsh	04-17-053-03 W5M	0.08	36.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
95.11	95.19	Seasonal Emergent Marsh	03-18-053-03 W5M	0.25	78.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
95.29	95.38	Open Water Pond	03-18-053-03 W5M	0.29	90.9	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
95.67	95.80	Seasonal Emergent Marsh	04-18-053-03 W5M	0.43	128.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
96.19	96.22	Seasonal Emergent Marsh	01-13-053-04 W5M	0.07	30.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
96.59	96.65	Open Water Pond	02-13-053-04 W5M 03-13-053-04 W5M	0.17	67.7	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
98.38	98.50	Open Water Pond	03-14-053-04 W5M	0.16	119.9	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
98.58	98.63	Seasonal Emergent Marsh	03-14-053-04 W5M	0.03	53.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
98.72	98.72	Seasonal Emergent Marsh	03-14-053-04 W5M 04-14-053-04 W5M	0.00	3.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
98.82	98.83	Seasonal Emergent Marsh	04-14-053-04 W5M	0.01	13.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
100.50	101.21	Seasonal Emergent Marsh	10-10-053-04 W5M 11-10-053-04 W5M 12-10-053-04 W5M	5.05	714.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
100.70	101.27	Shrubby Swamp	10-10-053-04 W5M 11-10-053-04 W5M 12-10-053-04 W5M 13-10-053-04 W5M 14-10-053-04 W5M	4.72	562.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
101.87	101.92	Seasonal Emergent Marsh	09-09-053-04 W5M	0.09	44.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
101.92	102.33	Shrubby Swamp	10-09-053-04 W5M 07-09-053-04 W5M 09-09-053-04 W5M	3.37	416.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
104.28	104.30	Open Water Pond	08-17-053-04 W5M	0.01	18.6	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
105.40	105.46	Seasonal Emergent Marsh	11-17-053-04 W5M 12-17-053-04 W5M	0.14	66.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
106.97	107.03	Seasonal Emergent Marsh	14-18-053-04 W5M	0.19	56.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
110.71	110.81	Shrubby Swamp	13-14-053-05 W5M 16-15-053-05 W5M	0.71	102.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
115.49	115.55	Shrubby Swamp	13-17-053-05 W5M	0.13	66.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
115.53	115.57	Shrubby Swamp	13-17-053-05 W5M	0.07	39.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
118.44	118.86	Treed Fen	10-12-053-06 W5M 11-12-053-06 W5M 11-13-053-06 W5M 12-12-053-06 W5M 12-13-053-06 W5M 13-12-053-06 W5M 13-13-053-06 W5M 14-12-053-06 W5M 14-13-053-06 W5M 16-14-053-06 W5M 03-13-053-06 W5M 04-13-053-06 W5M 05-13-053-06 W5M 06-12-053-06 W5M 06-13-053-06 W5M 07-12-053-06 W5M	6.05	417.2	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
120.06	120.11	Seasonal Emergent Marsh	11-14-053-06 W5M 14-14-053-06 W5M	0.19	56.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
120.91	121.17	Shrubby Swamp	10-15-053-06 W5M 15-15-053-06 W5M 09-15-053-06 W5M	0.77	265.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
124.15	124.24	Seasonal Emergent Marsh	16-17-053-06 W5M	0.39	93.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
124.48	124.54	Seasonal Emergent Marsh	10-17-053-06 W5M 15-17-053-06 W5M	0.36	54.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
124.74	124.76	Seasonal Emergent Marsh	14-17-053-06 W5M	0.02	18.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
124.81	124.86	Seasonal Emergent Marsh	14-17-053-06 W5M	0.07	49.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
124.83	124.94	Seasonal Emergent Marsh	11-17-053-06 W5M 14-17-053-06 W5M	0.54	116.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
125.01	125.08	Seasonal Emergent Marsh	13-17-053-06 W5M 14-17-053-06 W5M	0.20	72.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
125.09	125.10	Seasonal Emergent Marsh	12-17-053-06 W5M 13-17-053-06 W5M	0.02	13.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
125.63	125.87	Shrubby Swamp	16-18-053-06 W5M 09-18-053-06 W5M	1.27	237.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
125.91	126.16	Seasonal Emergent Marsh	12-18-053-06 W5M 13-18-053-06 W5M 14-18-053-06 W5M 15-18-053-06 W5M 16-18-053-06 W5M	0.65	253.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
125.99	126.16	Seasonal Emergent Marsh	10-18-053-06 W5M 15-18-053-06 W5M	0.87	169.6	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
126.10	126.17	Seasonal Emergent Marsh	10-18-053-06 W5M	0.15	74.5	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
127.38	127.47	Seasonal Emergent Marsh	16-13-053-07 W5M	0.41	89.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
128.13	128.19	Shrubby Swamp	11-13-053-07 W5M 14-13-053-07 W5M	0.06	60.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
128.22	128.25	Seasonal Emergent Marsh	14-13-053-07 W5M	0.04	28.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
128.36	128.43	Seasonal Emergent Marsh	13-13-053-07 W5M	0.13	65.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
128.92	129.13	Shrubby Swamp	10-14-053-07 W5M 15-14-053-07 W5M 16-14-053-07 W5M 09-14-053-07 W5M	2.27	207.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
129.82	129.89	Open Water Pond	14-14-053-07 W5M 03-23-053-07 W5M	0.39	75.3	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
129.92	129.98	Seasonal Emergent Marsh	14-14-053-07 W5M	0.32	64.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
130.03	130.19	Shrubby Swamp	13-14-053-07 W5M	0.46	168.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
130.32	130.39	Seasonal Emergent Marsh	13-14-053-07 W5M	0.58	66.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
130.89	131.01	Seasonal Emergent Marsh	15-15-053-07 W5M	0.58	122.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
131.42	131.59	Seasonal Emergent Marsh	13-15-053-07 W5M 14-15-053-07 W5M	0.73	168.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
131.82	131.99	Seasonal Emergent Marsh	13-15-053-07 W5M	0.41	171.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
132.15	132.26	Shrubby Swamp	01-21-053-07 W5M 16-16-053-07 W5M	0.51	108.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
132.42	132.54	Shrubby Fen	01-21-053-07 W5M 15-16-053-07 W5M 16-16-053-07 W5M 02-21-053-07 W5M	0.91	115.9	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
132.54	132.78	Seasonal Emergent Marsh	15-16-053-07 W5M	2.90	249.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
132.68	133.05	Open Water Pond	10-16-053-07 W5M 11-16-053-07 W5M 14-16-053-07 W5M 15-16-053-07 W5M 02-21-053-07 W5M 03-21-053-07 W5M 06-16-053-07 W5M 07-16-053-07 W5M	3.10	372.8	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
133.07	133.21	Open Water Pond	03-21-053-07 W5M 04-21-053-07 W5M	0.31	144.2	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
133.42	133.45	Open Water Pond	04-21-053-07 W5M	0.13	34.4	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
134.52	134.76	Shrubby Swamp	14-17-053-07 W5M 15-17-053-07 W5M 02-20-053-07 W5M 03-20-053-07 W5M	2.86	238.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
134.54	134.62	Deep Marsh	02-20-053-07 W5M	0.16	80.2	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
136.39	136.51	Treed Fen	14-18-053-07 W5M	0.91	116.2	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
136.66	136.74	Seasonal Emergent Marsh	13-18-053-07 W5M	0.31	86.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
136.70	136.74	Open Water Pond	13-18-053-07 W5M	0.11	41.4	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
136.71	136.79	Shrubby Swamp	03-19-053-07 W5M 04-19-053-07 W5M	0.45	82.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
137.15	137.19	Shrubby Swamp	01-24-053-08 W5M	0.11	41.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
137.73	137.80	Mixedwood Treed Swamp	07-24-053-08 W5M	0.31	72.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
140.91	141.12	Seasonal Emergent Marsh	10-22-053-08 W5M 07-22-053-08 W5M	1.70	207.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
141.35	141.42	Treed Fen	11-22-053-08 W5M 12-22-053-08 W5M 13-22-053-08 W5M 14-22-053-08 W5M	0.07	69.0	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
141.46	141.54	Seasonal Emergent Marsh	11-22-053-08 W5M	0.31	81.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
142.43	142.55	Open Water Pond	10-21-053-08 W5M 08-21-053-08 W5M 09-21-053-08 W5M	0.57	122.4	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for fish and fish habitat mitigation (Volume 5C)
142.56	142.67	Shrubby Swamp	10-21-053-08 W5M 11-21-053-08 W5M	0.16	109.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
142.97	143.29	Treed Fen	11-21-053-08 W5M 12-21-053-08 W5M	4.11	320.5	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
145.37	145.40	Seasonal Emergent Marsh	09-19-053-08 W5M	0.17	31.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
149.96	150.04	Seasonal Emergent Marsh	12-23-053-09 W5M	0.14	78.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
149.98	150.06	Seasonal Emergent Marsh	12-23-053-09 W5M	0.10	85.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
149.99	150.05	Shrubby Swamp	12-23-053-09 W5M	0.21	60.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
151.54	151.60	Shrubby Swamp	12-22-053-09 W5M	0.07	64.2	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
151.86	151.89	Seasonal Emergent Marsh	12-22-053-09 W5M	0.00	23.4	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
151.93	152.14	Seasonal Emergent Marsh	10-21-053-09 W5M 15-21-053-09 W5M 16-21-053-09 W5M 09-21-053-09 W5M	0.90	209.8	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
155.17	155.19	Open Water Pond	12-20-053-09 W5M	0.05	21.2	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
156.22	156.27	Seasonal Emergent Marsh	11-19-053-09 W5M	0.18	54.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
156.46	156.50	Shrubby Swamp	11-19-053-09 W5M 12-19-053-09 W5M 05-19-053-09 W5M	0.37	43.9	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
156.52	156.57	Seasonal Emergent Marsh	12-19-053-09 W5M	0.24	49.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
156.98	157.11	Seasonal Emergent Marsh	16-24-053-10 W5M 09-24-053-10 W5M	1.15	138.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
157.08	157.38	Mixedwood treed Swamp	10-24-053-10 W5M 15-24-053-10 W5M 16-24-053-10 W5M 09-24-053-10 W5M	3.23	294.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
157.84	158.20	Shrubby Swamp	11-24-053-10 W5M 12-24-053-10 W5M	3.74	352.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
157.94	157.99	Seasonal Emergent Marsh	11-24-053-10 W5M 06-24-053-10 W5M	0.27	58.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
158.15	158.39	Needle-leaf Treed Swamp	12-24-053-10 W5M 05-24-053-10 W5M 06-24-053-10 W5M	1.95	243.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
159.65	159.83	Shrubby Swamp	11-23-053-10 W5M 12-23-053-10 W5M	1.87	183.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
159.76	159.94	Treed Fen	12-23-053-10 W5M 13-23-053-10 W5M 14-23-053-10 W5M	1.83	179.1	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
160.79	160.98	Deep Marsh	10-22-053-10 W5M 15-22-053-10 W5M	2.43	190.0	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
161.81	162.46	Shrubby Swamp	13-22-053-10 W5M 15-21-053-10 W5M 16-21-053-10 W5M	4.99	643.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
164.08	164.24	Deep Marsh	02-29-053-10 W5M	1.52	160.7	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
170.22	170.37	Shrubby Swamp	08-27-053-11 W5M	0.35	147.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
170.83	170.92	Seasonal Emergent Marsh	06-27-053-11 W5M 07-27-053-11 W5M	0.84	98.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
170.88	170.98	Shrubby Swamp	02-27-053-11 W5M 03-27-053-11 W5M 06-27-053-11 W5M 07-27-053-11 W5M	0.60	103.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
171.37	171.54	Open Water Pond	03-27-053-11 W5M 04-27-053-11 W5M 05-27-053-11 W5M 06-27-053-11 W5M	2.49	171.3	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
171.81	171.93	Seasonal Emergent Marsh	01-28-053-11 W5M 08-28-053-11 W5M 09-28-053-11 W5M	0.99	119.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
172.27	172.59	Shrubby Swamp	10-28-053-11 W5M 11-28-053-11 W5M 06-28-053-11 W5M 07-28-053-11 W5M	2.35	317.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
173.60	173.70	Seasonal Emergent Marsh	08-29-053-11 W5M 09-29-053-11 W5M	0.53	102.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
174.56	175.12	Shrubby Swamp	11-29-053-11 W5M 12-29-053-11 W5M 05-29-053-11 W5M 08-30-053-11 W5M 09-30-053-11 W5M	3.20	563.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
175.82	175.96	Shrubby Swamp	10-30-053-11 W5M 11-30-053-11 W5M 06-30-053-11 W5M 07-30-053-11 W5M	1.03	143.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
176.38	176.47	Shrubby Swamp	12-30-053-11 W5M 05-30-053-11 W5M 06-30-053-11 W5M	0.50	91.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
177.46	177.56	Treed Fen	01-25-053-12 W5M 10-25-053-12 W5M 11-25-053-12 W5M 02-25-053-12 W5M 03-25-053-12 W5M 06-25-053-12 W5M 07-25-053-12 W5M 08-25-053-12 W5M	0.49	96.6	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
178.86	178.90	Treed Fen	01-26-053-12 W5M 10-26-053-12 W5M 02-26-053-12 W5M 07-26-053-12 W5M 08-26-053-12 W5M 09-26-053-12 W5M	0.09	34.5	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for fish and fish habitat mitigation (Volume 5C)
178.90	178.96	Seasonal Emergent Marsh	10-26-053-12 W5M	0.67	64.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
180.67	180.87	Open Water Pond	10-27-053-12 W5M 11-27-053-12 W5M	1.70	194.6	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
188.86	189.09	Mixedwood Treed Swamp	02-35-053-13 W5M 03-35-053-13 W5M 06-35-053-13 W5M 07-35-053-13 W5M	2.08	230.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
195.45	195.49	Shrubby Swamp	02-31-053-13 W5M	0.44	43.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
198.53	198.58	Open Water Pond	09-26-053-14 W5M	0.17	50.9	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
198.56	198.84	Seasonal Emergent Marsh	10-26-053-14 W5M 15-26-053-14 W5M 09-26-053-14 W5M	2.34	281.6	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
198.58	198.59	Shrubby Swamp	10-26-053-14 W5M 07-26-053-14 W5M 09-26-053-14 W5M	0.00	10.1	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
198.74	198.87	Seasonal Emergent Marsh	10-26-053-14 W5M	0.65	130.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
198.75	198.84	Deep Marsh	10-26-053-14 W5M	0.43	86.5	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
199.74	199.94	Shrubby Fen	04-26-053-14 W5M 05-26-053-14 W5M	1.25	199.3	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
202.49	202.83	Seasonal Emergent Marsh	10-21-053-14 W5M 11-21-053-14 W5M 12-21-053-14 W5M 14-21-053-14 W5M 15-21-053-14 W5M	3.53	338.0	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
202.57	202.67	Seasonal Emergent Marsh	14-21-053-14 W5M 15-21-053-14 W5M	0.10	100.1	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
202.88	203.08	Seasonal Emergent Marsh	11-21-053-14 W5M 12-21-053-14 W5M	1.03	206.3	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
202.93	202.99	Open Water Pond	11-21-053-14 W5M	0.19	57.2	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
203.41	203.41	Shrubby Swamp	13-21-053-14 W5M	0.00	1.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
204.13	204.35	Needle-leaf Treed Swamp	10-20-053-14 W5M 14-20-053-14 W5M 15-20-053-14 W5M 16-20-053-14 W5M	2.66	223.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
206.66	207.43	Deep Marsh	10-24-053-15 W5M 12-19-053-14 W5M 13-19-053-14 W5M 15-24-053-15 W5M 16-24-053-15 W5M 09-24-053-15 W5M	3.73	776.0	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
211.87	212.01	Shrubby Swamp	01-28-053-15 W5M	1.30	142.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
212.66	212.77	Shrubby Swamp	14-21-053-15 W5M 03-28-053-15 W5M	1.12	110.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
217.09	217.12	Shrubby Swamp	01-25-053-16 W5M	0.03	27.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
220.43	220.84	Non-Woody Fen	10-22-053-16 W5M 07-22-053-16 W5M 08-22-053-16 W5M 09-22-053-16 W5M	3.63	413.8	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
220.62	220.79	Treed Fen	10-22-053-16 W5M 07-22-053-16 W5M 08-22-053-16 W5M 09-22-053-16 W5M	0.24	167.7	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
220.66	220.80	Treed Fen	10-22-053-16 W5M 09-22-053-16 W5M	0.67	142.0	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
221.31	222.15	Treed Fen	01-21-053-16 W5M 11-22-053-16 W5M 12-22-053-16 W5M 13-22-053-16 W5M 04-22-053-16 W5M 05-22-053-16 W5M 06-22-053-16 W5M 08-21-053-16 W5M	17.75	840.0	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
222.91	223.27	Shrubby Swamp	03-21-053-16 W5M 04-21-053-16 W5M 05-21-053-16 W5M 06-21-053-16 W5M	6.18	361.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
227.48	227.60	Shrubby Swamp	15-24-053-17 W5M 16-24-053-17 W5M	0.98	117.3	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
230.33	230.47	Shrubby Swamp	13-23-053-17 W5M	0.81	145.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
235.13	236.11	Treed Fen	01-19-053-17 W5M 10-19-053-17 W5M 12-20-053-17 W5M 13-20-053-17 W5M 15-19-053-17 W5M 16-19-053-17 W5M 02-19-053-17 W5M 04-20-053-17 W5M 05-20-053-17 W5M 07-19-053-17 W5M 08-19-053-17 W5M 09-19-053-17 W5M	13.82	984.2	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
236.11	236.20	Seasonal Emergent Marsh	01-19-053-17 W5M 13-17-053-17 W5M 16-18-053-17 W5M 02-19-053-17 W5M 03-19-053-17 W5M 04-20-053-17 W5M 06-19-053-17 W5M 07-19-053-17 W5M	0.32	90.0	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
236.51	236.71	Deep Marsh	06-19-053-17 W5M	1.10	199.3	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
237.46	237.68	Needle-leaf Treed Swamp	01-24-053-18 W5M 08-24-053-18 W5M	1.12	222.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
237.87	238.13	Treed Fen	01-23-053-18 W5M 10-14-053-18 W5M 11-24-053-18 W5M 13-13-053-18 W5M 14-13-053-18 W5M 14-14-053-18 W5M 15-13-053-18 W5M 15-14-053-18 W5M 16-14-053-18 W5M 02-23-053-18 W5M 02-24-053-18 W5M 03-23-053-18 W5M 03-24-053-18 W5M 04-24-053-18 W5M 05-24-053-18 W5M 06-24-053-18 W5M 07-14-053-18 W5M 07-23-053-18 W5M 07-24-053-18 W5M 08-23-053-18 W5M	2.67	258.0	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
240.11	240.19	Shrubby Fen	14-14-053-18 W5M	0.46	86.4	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
240.25	240.38	Shrubby Swamp	13-14-053-18 W5M	0.66	133.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
240.41	240.67	Seasonal Emergent Marsh	13-14-053-18 W5M	1.13	265.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
240.89	241.73	Treed Fen	10-15-053-18 W5M 14-15-053-18 W5M 15-15-053-18 W5M 16-15-053-18 W5M 09-15-053-18 W5M	4.32	835.1	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
243.66	243.68	Seasonal Emergent Marsh	14-16-053-18 W5M	0.04	25.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
245.08	245.27	Seasonal Emergent Marsh	10-17-053-18 W5M 11-17-053-18 W5M 03-17-053-18 W5M 06-17-053-18 W5M 07-17-053-18 W5M	1.76	187.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
245.46	245.58	Shrubby Fen	05-17-053-18 W5M 06-17-053-18 W5M	0.94	119.8	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
247.87	248.12	Shrubby Swamp	01-13-053-19 W5M 10-13-053-19 W5M 03-18-053-18 W5M 04-18-053-18 W5M 05-18-053-18 W5M 07-13-053-19 W5M 08-13-053-19 W5M 09-13-053-19 W5M	3.50	249.9	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
248.59	248.86	Non-Woody Fen	10-12-053-19 W5M 13-07-053-18 W5M 15-12-053-19 W5M 16-12-053-19 W5M 09-12-053-19 W5M	4.42	266.9	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
248.85	248.92	Seasonal Emergent Marsh	02-13-053-19 W5M	0.41	74.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
248.85	248.87	Treed Fen	14-12-053-19 W5M 15-12-053-19 W5M 02-13-053-19 W5M 03-13-053-19 W5M	0.00	17.5	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
250.65	250.72	Mixedwood Treed Swamp	08-11-053-19 W5M	0.21	68.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
251.23	251.30	Seasonal Emergent Marsh	03-11-053-19 W5M 06-11-053-19 W5M	0.47	74.0	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
251.47	251.61	Seasonal Emergent Marsh	14-02-053-19 W5M 15-02-053-19 W5M 02-11-053-19 W5M 03-11-053-19 W5M	1.78	140.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
252.36	252.51	Treed Fen	12-02-053-19 W5M 13-02-053-19 W5M	0.82	154.4	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
252.48	252.62	Needle-leaf Treed Swamp	12-02-053-19 W5M 09-03-053-19 W5M	0.79	142.5	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
255.16	255.52	Needle-leaf Treed Swamp	02-04-053-19 W5M 03-04-053-19 W5M 06-04-053-19 W5M	2.43	359.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
255.37	255.58	Seasonal Emergent Marsh	02-04-053-19 W5M 03-04-053-19 W5M	0.66	207.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
257.04	257.24	Deep Marsh	02-05-053-19 W5M 07-05-053-19 W5M	1.90	203.5	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
257.66	257.82	Shrubby Swamp	03-05-053-19 W5M 04-05-053-19 W5M 05-05-053-19 W5M	1.61	162.0	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
259.42	259.62	Shrubby Swamp	01-01-053-20 W5M 13-31-052-19 W5M 14-31-052-19 W5M 03-06-053-19 W5M 04-06-053-19 W5M 05-06-053-19 W5M	2.65	194.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
259.97	260.18	Shrubby Swamp	01-01-053-20 W5M 08-01-053-20 W5M	2.73	212.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
260.56	260.94	Treed Fen	02-01-053-20 W5M 03-01-053-20 W5M 06-01-053-20 W5M 07-01-053-20 W5M	0.04	385.4	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
260.99	261.66	Treed Fen	01-02-053-20 W5M 03-01-053-20 W5M 04-01-053-20 W5M 05-01-053-20 W5M 08-02-053-20 W5M	9.15	669.4	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
263.13	263.28	Treed Fen	01-10-053-20 W5M 01-03-053-20 W5M 01-09-053-20 W5M 10-03-053-20 W5M 11-02-053-20 W5M 11-03-053-20 W5M 12-02-053-20 W5M 12-03-053-20 W5M 13-02-053-20 W5M 13-03-053-20 W5M 13-35-052-20 W5M 14-02-053-20 W5M 14-03-053-20 W5M 14-04-053-20 W5M 15-03-053-20 W5M 15-04-053-20 W5M 16-03-053-20 W5M 16-34-052-20 W5M 16-04-053-20 W5M 02-10-053-20 W5M 02-02-053-20 W5M 02-03-053-20 W5M 02-09-053-20 W5M 03-10-053-20 W5M 03-11-053-20 W5M 03-02-053-20 W5M 03-09-053-20 W5M 04-10-053-20 W5M 04-11-053-20 W5M 04-02-053-20 W5M 04-09-053-20 W5M 05-02-053-20 W5M 05-03-053-20 W5M 06-02-053-20 W5M 06-03-053-20 W5M 07-02-053-20 W5M 07-03-053-20 W5M 08-03-053-20 W5M 08-04-053-20 W5M 09-03-053-20 W5M 09-04-053-20 W5M	0.60	140.9	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
266.11	266.45	Needle-leaf Treed Swamp	03-04-053-20 W5M 04-04-053-20 W5M	2.63	335.2	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
267.04	267.28	Open Water Pond	01-05-053-20 W5M 02-05-053-20 W5M 07-05-053-20 W5M 08-05-053-20 W5M	0.54	236.7	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
267.26	267.52	Treed Fen	02-05-053-20 W5M 07-05-053-20 W5M 08-05-053-20 W5M	0.35	253.7	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
267.84	269.50	Treed Fen	01-06-053-20 W5M 02-06-053-20 W5M 03-05-053-20 W5M 04-05-053-20 W5M 05-05-053-20 W5M 06-05-053-20 W5M 06-06-053-20 W5M 07-06-053-20 W5M 08-06-053-20 W5M	16.31	1659.4	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
269.48	269.63	Seasonal Emergent Marsh	11-06-053-20 W5M 02-06-053-20 W5M 03-06-053-20 W5M 06-06-053-20 W5M 07-06-053-20 W5M	1.62	156.6	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
270.01	270.11	Seasonal Emergent Marsh	12-06-053-20 W5M 05-06-053-20 W5M 09-01-053-21 W5M	1.15	103.4	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
275.89	275.89	Treed Fen	14-33-052-21 W5M 15-33-052-21 W5M 02-04-053-21 W5M 03-04-053-21 W5M	0.00	2.2	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
276.91	277.11	Treed Fen	12-33-052-21 W5M 13-33-052-21 W5M	2.45	193.3	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
278.51	278.71	Treed Fen	12-32-052-21 W5M 13-32-052-21 W5M	1.51	203.3	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
279.42	279.60	Open Water Pond	10-31-052-21 W5M 11-31-052-21 W5M 14-31-052-21 W5M 15-31-052-21 W5M 16-31-052-21 W5M	0.37	181.0	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
280.26	280.33	Open Water Pond	11-31-052-21 W5M 12-31-052-21 W5M 05-31-052-21 W5M 06-31-052-21 W5M	0.01	65.2	COP Notification Crown Land Determination Potentially navigable if open water channel or pond within construction ROW, if crossed by ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for fish and fish habitat mitigation (Volume 5C)
280.91	281.78	Non-Woody Fen	10-36-052-22 W5M 11-36-052-22 W5M 06-36-052-22 W5M 07-36-052-22 W5M 08-36-052-22 W5M 09-36-052-22 W5M	2.81	871.0	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
281.86	283.73	Treed Fen	10-35-052-22 W5M 11-36-052-22 W5M 12-36-052-22 W5M 14-35-052-22 W5M 15-35-052-22 W5M 03-02-053-22 W5M 05-36-052-22 W5M 06-36-052-22 W5M 09-35-052-22 W5M	12.37	1868.0	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
284.50	284.92	Needle-leaf Treed Swamp	01-03-053-22 W5M 02-03-053-22 W5M 03-02-053-22 W5M 04-02-053-22 W5M 05-02-053-22 W5M 07-03-053-22 W5M 08-03-053-22 W5M	1.91	411.2	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
285.59	285.67	Treed Fen	11-03-053-22 W5M 12-03-053-22 W5M 06-03-053-22 W5M	0.24	83.3	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
287.47	287.72	Seasonal Emergent Marsh	12-04-053-22 W5M 05-04-053-22 W5M	1.62	251.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
291.54	291.68	Shrubby Swamp	15-36-052-23 W5M 16-36-052-23 W5M	0.83	145.8	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
295.89	295.99	Non-woody Fen	10-27-052-23 W5M 02-27-052-23 W5M 07-27-052-23 W5M	0.96	96.5	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
295.98	296.26	Non-woody Fen	02-27-052-23 W5M 07-27-052-23 W5M	1.40	282.6	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
298.96	299.72	Seasonal Emergent Marsh	01-20-052-23 W5M 12-21-052-23 W5M 02-20-052-23 W5M 05-21-052-23 W5M 08-20-052-23 W5M	5.13	756.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
304.62	304.76	Seasonal Emergent Marsh	13-12-052-24 W5M 14-12-052-24 W5M	0.36	147.7	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
304.78	304.93	Seasonal Emergent Marsh	13-12-052-24 W5M	0.67	146.9	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
305.19	305.51	Needle-leaf Treed Swamp	10-11-052-24 W5M 12-12-052-24 W5M 16-11-052-24 W5M 05-12-052-24 W5M 08-11-052-24 W5M 09-11-052-24 W5M	2.58	328.1	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
311.50	311.62	Shrubby Fen	12-33-051-24 W5M 05-33-051-24 W5M 08-32-051-24 W5M 09-32-051-24 W5M	0.99	124.9	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
311.66	311.74	Shrubby Swamp	12-33-051-24 W5M 05-33-051-24 W5M 08-32-051-24 W5M	0.40	82.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
312.59	312.68	Treed Fen	13-28-051-24 W5M 14-28-051-24 W5M 02-33-051-24 W5M 03-33-051-24 W5M 04-33-051-24 W5M 07-33-051-24 W5M	0.36	96.4	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
313.22	313.37	Treed Fen	12-28-051-24 W5M 09-29-051-24 W5M	1.72	148.1	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
315.69	315.77	Mixedwood Treed Swamp	11-20-051-24 W5M 06-20-051-24 W5M	0.18	86.6	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
319.41	319.62	Treed Fen	10-12-051-25 W5M 15-12-051-25 W5M 16-12-051-25 W5M 09-12-051-25 W5M	1.06	216.5	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
319.63	319.74	Shrubby Swamp	15-12-051-25 W5M	0.49	108.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
325.03	325.24	Non-Woody Fen	08-04-051-25 W5M	1.14	217.3	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
325.84	325.92	Non-Woody Fen	03-04-051-25 W5M	0.01	78.5	None Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
326.00	326.87	Treed Fen	10-31-050-25 W5M 12-32-050-25 W5M 13-32-050-25 W5M 16-31-050-25 W5M 03-04-051-25 W5M 04-04-051-25 W5M 07-31-050-25 W5M 09-31-050-25 W5M	9.19	869.0	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
327.59	327.61	Seasonal Emergent Marsh	11-31-050-25 W5M	0.04	27.1	COP Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
328.19	328.31	Seasonal Emergent Marsh	04-31-050-25 W5M 05-31-050-25 W5M	0.31	119.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
332.49	332.62	Shrubby Swamp	06-23-050-26 W5M 07-23-050-26 W5M	0.57	126.7	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
332.82	332.89	Needle-leaf Treed Swamp	03-23-050-26 W5M 05-23-050-26 W5M 06-23-050-26 W5M	0.32	67.4	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
335.62	335.80	Treed Fen	10-10-050-26 W5M	0.17	173.8	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
336.07	336.58	Treed Fen	10-10-050-26 W5M 03-10-050-26 W5M 05-10-050-26 W5M 06-10-050-26 W5M 07-10-050-26 W5M	3.49	508.7	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
337.11	337.31	Needle-leaf Treed Swamp	13-03-050-26 W5M	2.19	199.9	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
337.48	337.55	Treed Fen	12-03-050-26 W5M 09-04-050-26 W5M	0.24	67.9	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
338.65	338.79	Shrubby Swamp	02-04-050-26 W5M	0.66	137.6	COP Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
339.22	339.35	Shrubby Fen	14-33-049-26 W5M	0.58	136.6	None	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
503.65	503.76	Shrubby Swamp	a-059-K/083-D-14 c-059-K/083-D-14 d-059-K/083-D-14	0.52	107.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
505.16	505.25	Shrubby Swamp	c-060-K/083-D-14 d-051-L/083-D-14	0.44	88.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
510.02	510.25	Shrubby Swamp	d-020-K/083-D-14	0.52	229.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
510.03	510.07	Shrubby Swamp	d-020-K/083-D-14	0.07	36.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
523.56	523.87	Deep Marsh	b-093-C/083-D-14 a-094-C/083-D-14 c-094-C/083-D-14 d-094-C/083-D-14	3.30	308.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
532.51	532.59	Non-Woody Fen	d-001-C/083-D-14	0.16	76.5	OGC Notification Potentially navigable if open water channel or pond within construction ROW, if channels present	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
532.65	532.65	Treed Fen	c-091-K/083-D-11 b-001-C/083-D-14 d-001-C/083-D-14 a-001-C/083-D-14 c-001-C/083-D-14 a-002-C/083-D-14	0.00	9.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
532.66	532.85	Non-Woody Fen	d-001-C/083-D-14 a-001-C/083-D-14	0.69	189.5	OGC Notification Potentially navigable if open water channel or pond within construction ROW, if channels present	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
533.21	533.38	Non-Woody Fen	d-091-K/083-D-11 c-091-K/083-D-11 b-001-C/083-D-14 a-001-C/083-D-14	0.54	171.0	OGC Notification Potentially navigable if open water channel or pond within construction ROW, if channels present	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
542.10	542.33	Mixedwood Treed Swamp	b-018-J/083-D-11 c-018-J/083-D-11	1.04	235.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
545.81	545.94	Shrubby Swamp	c-086-G/083-D-11 d-086-G/083-D-11 a-086-G/083-D-11	0.47	124.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
545.83	546.35	Shrubby Swamp	d-076-G/083-D-11 c-086-G/083-D-11 c-075-G/083-D-11 b-086-G/083-D-11 d-086-G/083-D-11 b-085-G/083-D-11 a-086-G/083-D-11	3.57	512.7	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
550.91	551.03	Treed Fen	c-042-G/083-D-11 d-042-G/083-D-11 a-053-G/083-D-11 d-043-G/083-D-11 a-052-G/083-D-11 b-052-G/083-D-11	0.18	122.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
552.38	552.56	Shrubby Swamp	a-031-G/083-D-11 c-031-G/083-D-11 d-031-G/083-D-11	0.27	181.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
553.91	553.97	Deep Marsh	d-030-H/083-D-11	0.11	62.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
553.92	554.08	Shrubby Swamp	d-030-H/083-D-11 c-029-H/083-D-11	1.17	160.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
555.13	555.48	Mixedwood Treed Swamp	a-019-H/083-D-11 b-018-H/083-D-11 c-018-H/083-D-11 d-019-H/083-D-11	2.17	358.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
555.79	555.91	Seasonal Emergent Marsh	c-008-H/083-D-11 b-018-H/083-D-11	0.17	115.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
556.43	556.76	Open Water Pond	b-008-H/083-D-11 c-008-H/083-D-11 d-008-H/083-D-11 a-008-H/083-D-11	4.65	330.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
556.93	557.22	Seasonal Emergent Marsh	d-098-A/083-D-11 a-008-H/083-D-11	1.35	292.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
559.01	559.48	Mixedwood Treed Swamp	b-078-A/083-D-11 c-078-A/083-D-11 a-079-A/083-D-11 d-079-A/083-D-11	4.09	474.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
559.29	559.34	Mixedwood Treed Swamp	c-078-A/083-D-11	0.20	51.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
560.22	560.57	Shrubby Swamp	a-069-A/083-D-11 d-069-A/083-D-11	2.54	355.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
560.23	560.25	Shrubby Swamp	d-069-A/083-D-11	0.06	27.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
560.24	560.36	Shrubby Swamp	d-069-A/083-D-11	0.62	119.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
560.32	560.42	Shrubby Swamp	a-069-A/083-D-11 d-069-A/083-D-11	0.63	95.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
560.51	560.77	Shrubby Swamp	a-069-A/083-D-11	2.21	258.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
561.15	561.28	Shrubby Swamp	d-059-A/083-D-11	0.49	133.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
561.18	561.52	Shrubby Swamp	a-059-A/083-D-11 c-059-A/083-D-11 a-059-A/083-D-11 b-059-A/083-D-11	1.16	342.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
561.19	561.58	Shrubby Swamp	d-059-A/083-D-11 c-059-A/083-D-11 a-059-A/083-D-11 b-059-A/083-D-11	1.42	390.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
563.19	563.42	Mixedwood Treed Swamp	c-039-A/083-D-11 a-040-A/083-D-11 d-040-A/083-D-11	3.99	230.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
565.35	565.55	Deep Marsh	a-019-A/083-D-11 d-019-A/083-D-11	0.54	202.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
565.48	565.49	Deep Marsh	a-019-A/083-D-11 c-019-A/083-D-11 d-019-A/083-D-11	0.00	11.5	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
566.29	566.85	Shrubby Swamp	c-009-A/083-D-11 a-010-A/083-D-11 b-009-A/083-D-11	0.53	556.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
566.29	566.86	Shrubby Swamp	c-099-I/083-D-06 c-009-A/083-D-11 b-009-A/083-D-11	3.53	567.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
580.36	580.42	Shrubby Swamp	a-074-G/083-D-06	0.34	59.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
587.44	587.52	Seasonal Emergent Marsh	a-005-G/083-D-06	0.11	86.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
591.36	591.80	Shrubby Swamp	a-055-B/083-D-06 d-055-B/083-D-06	0.58	434.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
600.25	600.69	Mixedwood Treed Swamp	c-068-J/083-D-03 d-068-J/083-D-03 a-078-J/083-D-03	3.09	436.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
601.16	601.36	Mixedwood Treed Swamp	c-058-J/083-D-03 b-068-J/083-D-03	0.96	193.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
601.22	601.26	Open Water Pond	c-058-J/083-D-03 b-068-J/083-D-03	0.12	45.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
611.00	611.16	Shrubby Swamp	d-063-F/083-D-03 a-063-F/083-D-03 b-063-F/083-D-03 c-063-F/083-D-03 a-073-F/083-D-03	0.23	164.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
613.89	614.01	Open Water Pond	d-035-F/083-D-03 c-034-F/083-D-03	0.51	128.5	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
615.70	615.96	Shrubby Swamp	c-015-F/083-D-03 b-025-F/083-D-03	1.46	264.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
616.10	616.78	Mixedwood Treed Swamp	c-005-F/083-D-03 d-005-F/083-D-03 d-016-F/083-D-03 a-015-F/083-D-03 b-015-F/083-D-03 c-015-F/083-D-03 d-015-F/083-D-03	8.69	680.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
616.75	617.26	Shrubby Swamp	c-005-F/083-D-03 b-005-F/083-D-03 d-005-F/083-D-03 b-015-F/083-D-03	5.30	509.8	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
617.08	617.47	Seasonal Emergent Marsh	c-005-F/083-D-03 b-005-F/083-D-03	1.21	385.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
617.68	617.81	Mixedwood Treed Swamp	c-095-C/083-D-03 b-005-F/083-D-03	0.42	128.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
618.39	618.81	Shrubby Swamp	c-085-C/083-D-03 b-095-C/083-D-03	2.60	424.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
618.80	618.85	Shrubby Swamp	c-085-C/083-D-03	0.07	49.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
619.31	619.33	Seasonal Emergent Marsh	a-086-C/083-D-03	0.01	24.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
619.71	619.86	Needle-leaf Treed Swamp	d-076-C/083-D-03	0.53	149.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
619.73	619.86	Shrubby Swamp	d-076-C/083-D-03	0.28	130.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
619.73	619.86	Needle-leaf Treed Swamp	d-076-C/083-D-03	0.37	130.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
619.94	620.03	Mixedwood Treed Swamp	b-076-C/083-D-03 c-076-C/083-D-03 d-076-C/083-D-03	0.29	92.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
620.11	620.29	Mixedwood Treed Swamp	b-075-C/083-D-03 c-075-C/083-D-03 a-076-C/083-D-03 d-076-C/083-D-03	0.89	179.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
620.71	621.06	Deep Marsh	a-066-C/083-D-03 b-066-C/083-D-03 c-066-C/083-D-03 d-066-C/083-D-03	0.68	351.8	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
620.76	621.05	Open Water Pond	a-066-C/083-D-03 b-066-C/083-D-03 c-066-C/083-D-03 d-066-C/083-D-03	0.93	285.7	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
623.17	623.60	Mixedwood Treed Swamp	d-047-C/083-D-03 a-047-C/083-D-03	1.73	430.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
638.68	638.74	Shrubby Swamp	a-007-K/082-M-14	0.34	60.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
638.86	638.96	Seasonal Emergent Marsh	c-096-F/082-M-14	0.14	98.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
639.30	639.34	Shrubby Swamp	c-096-F/082-M-14	0.14	41.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
641.65	641.85	Seasonal Emergent Marsh	b-075-F/082-M-14	0.86	195.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
641.65	641.89	Seasonal Emergent Marsh	b-075-F/082-M-14 c-065-F/082-M-14	1.13	234.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
642.05	642.20	Shrubby Swamp	c-065-F/082-M-14	0.50	149.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
642.70	642.98	Mixedwood Treed Swamp	a-065-F/082-M-14 d-055-F/082-M-14	0.48	274.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
642.80	642.98	Deep Marsh	a-065-F/082-M-14 d-055-F/082-M-14	0.31	188.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
642.98	643.09	Deep Marsh	d-055-F/082-M-14	0.20	102.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
643.13	643.48	Open Water Pond	a-055-F/082-M-14 d-055-F/082-M-14	1.01	347.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
643.72	644.12	Seasonal Emergent Marsh	d-045-F/082-M-14 a-055-F/082-M-14	2.37	402.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
643.77	644.05	Open Water Pond	d-045-F/082-M-14 a-055-F/082-M-14	0.96	279.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
645.22	645.33	Seasonal Emergent Marsh	c-034-F/082-M-14 b-034-F/082-M-14	0.23	115.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
645.26	645.31	Seasonal Emergent Marsh	c-034-F/082-M-14	0.07	45.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
647.03	647.13	Mixedwood Treed Swamp	d-014-F/082-M-14	0.33	106.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
648.67	648.87	Shrubby Fen	c-093-C/082-M-14 a-094-C/082-M-14 d-094-C/082-M-14 b-093-C/082-M-14 a-004-F/082-M-14	0.84	197.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
648.78	648.88	Shrubby Swamp	c-093-C/082-M-14	0.25	94.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
649.23	649.51	Mixedwood Treed Swamp	c-093-C/082-M-14 a-094-C/082-M-14 d-094-C/082-M-14 b-093-C/082-M-14	0.68	287.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
649.40	649.53	Open Water Pond	b-093-C/082-M-14	0.31	128.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
649.48	649.80	Deep Marsh	c-074-C/082-M-14 c-083-C/082-M-14 d-074-C/082-M-14 a-094-C/082-M-14 a-084-C/082-M-14 d-084-C/082-M-14 b-093-C/082-M-14	0.84	312.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
650.92	651.23	Shrubby Swamp	c-074-C/082-M-14 d-074-C/082-M-14	0.55	303.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
651.05	651.18	Seasonal Emergent Marsh	c-074-C/082-M-14 b-084-C/082-M-14	1.05	130.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
652.43	652.60	Shrubby Swamp	c-065-C/082-M-14	0.95	169.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
652.50	652.64	Seasonal Emergent Marsh	c-065-C/082-M-14	0.25	141.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
652.61	652.63	Open Water Pond	c-065-C/082-M-14	0.00	16.3	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
652.64	652.68	Open Water Pond	c-065-C/082-M-14	0.09	42.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
652.64	652.70	Open Water Pond	c-065-C/082-M-14	0.10	56.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
654.11	654.37	Mixedwood Treed Swamp	a-057-C/082-M-14 b-056-C/082-M-14 c-056-C/082-M-14 d-057-C/082-M-14	2.45	252.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
654.73	654.76	Seasonal Emergent Marsh	c-046-C/082-M-14 b-056-C/082-M-14	0.07	35.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
655.97	656.22	Shrubby Swamp	b-036-C/082-M-14 c-036-C/082-M-14	0.77	250.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
656.30	656.45	Shrubby Swamp	b-036-C/082-M-14	0.60	148.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
656.60	656.68	Shrubby Swamp	b-036-C/082-M-14 c-026-C/082-M-14	0.41	85.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
657.18	657.25	Seasonal Emergent Marsh	b-026-C/082-M-14	0.13	62.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
657.33	657.34	Shrubby Swamp	c-016-C/082-M-14 b-016-C/082-M-14 d-016-C/082-M-14 a-026-C/082-M-14 b-026-C/082-M-14	0.00	12.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
658.37	658.45	Non-Woody Fen	c-006-C/082-M-14 d-007-C/082-M-14 a-017-C/082-M-14 c-016-C/082-M-14 B-016-C/082-M-14	0.27	80.0	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
658.40	658.58	Shrubby Fen	a-017-C/082-M-14	1.22	180.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
659.29	659.63	Non-Woody Fen	c-097-K/082-M-11 a-007-C/082-M-14 b-007-C/082-M-14	0.61	343.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
659.76	659.88	Shrubby Swamp	c-097-K/082-M-11	0.23	120.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
661.00	662.04	Shrubby Swamp	c-078-K/082-M-11 d-079-K/082-M-11 d-088-K/082-M-11 a-089-K/082-M-11 a-088-K/082-M-11 c-088-K/082-M-11 b-088-K/082-M-11	14.18	1037.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
661.08	661.84	Deep Marsh	c-078-K/082-M-11 d-079-K/082-M-11 d-088-K/082-M-11 a-088-K/082-M-11 b-088-K/082-M-11	6.88	755.5	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
661.43	661.77	Shrubby Fen	c-078-K/082-M-11 d-078-K/082-M-11 a-088-K/082-M-11 b-088-K/082-M-11	2.33	342.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
663.28	663.58	Shrubby Swamp	c-059-K/082-M-11 a-070-K/082-M-11 d-070-K/082-M-11 d-060-K/082-M-11 b-069-K/082-M-11 c-069-K/082-M-11	1.50	303.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
663.50	663.57	Open Water Pond	d-070-K/082-M-11 c-069-K/082-M-11	0.28	71.3	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
663.64	663.67	Open Water Pond	a-070-K/082-M-11 d-070-K/082-M-11 b-069-K/082-M-11 c-069-K/082-M-11	0.05	27.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
663.66	663.96	Deep Marsh	a-070-K/082-M-11 d-060-K/082-M-11 b-069-K/082-M-11	1.30	298.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
665.25	665.40	Shrubby Swamp	a-051-L/082-M-11	0.44	147.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
665.92	666.10	Deep Marsh	c-041-L/082-M-11 d-042-L/082-M-11	1.42	178.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
666.35	666.39	Open Water Pond	a-042-L/082-M-11	0.07	41.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
672.23	672.29	Shrubby Swamp	a-017-L/082-M-11	0.11	61.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
672.28	672.61	Shrubby Swamp	b-017-L/082-M-11 a-017-L/082-M-11	0.34	334.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
672.86	672.91	Broad-leaf Treed Swamp	a-018-L/082-M-11 b-017-L/082-M-11	0.10	50.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
677.61	677.71	Seasonal Emergent Marsh	d-003-I/082-M-12	0.33	91.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
678.65	678.68	Seasonal Emergent Marsh	a-014-I/082-M-12	0.05	29.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
678.81	678.86	Seasonal Emergent Marsh	c-004-I/082-M-12 b-014-I/082-M-12	0.39	45.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
686.28	686.33	Seasonal Emergent Marsh	c-002-J/082-M-12	0.09	50.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
691.74	691.78	Shrubby Swamp	d-066-G/082-M-12	0.06	35.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
694.99	695.06	Seasonal Emergent Marsh	c-026-G/082-M-12 b-036-G/082-M-12	0.17	65.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
695.01	695.02	Open Water Pond	b-036-G/082-M-12	0.01	9.7	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
695.29	695.29	Seasonal Emergent Marsh	c-026-G/082-M-12	0.00	0.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
695.72	695.76	Seasonal Emergent Marsh	b-026-G/082-M-12	0.12	42.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
696.16	696.18	Seasonal Emergent Marsh	d-017-G/082-M-12	0.03	16.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
708.65	708.68	Seasonal Emergent Marsh	b-020-F/082-M-12	0.09	31.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
715.45	715.84	Shrubby Swamp	d-047-E/082-M-12 a-057-E/082-M-12 b-057-E/082-M-12	1.16	387.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
731.61	731.65	Deep Marsh	c-010-H/092-P-09 a-020-H/092-P-09 b-020-H/092-P-09	0.09	33.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
732.39	732.49	Needle-leaf Treed Swamp	a-010-H/092-P-09 b-010-H/092-P-09	0.49	103.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
732.39	732.42	Seasonal Emergent Marsh	a-010-H/092-P-09 b-010-H/092-P-09	0.11	35.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
732.48	732.52	Open Water Pond	b-010-H/092-P-09	0.09	35.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
732.50	732.62	Needle-leaf treed Swamp	b-010-H/092-P-09	0.58	119.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
732.53	732.56	Open Water Pond	b-010-H/092-P-09	0.02	28.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
732.57	732.73	Deep Marsh	b-010-H/092-P-09	0.74	157.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
732.58	732.63	Needle-leaf Treed Swamp	b-010-H/092-P-09	0.08	51.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
734.33	734.41	Shrubby Swamp	d-081-B/092-P-09 a-081-B/092-P-09	0.15	73.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
734.48	734.52	Deep Marsh	a-081-B/092-P-09	0.04	46.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
734.63	734.97	Deep Marsh	a-081-B/092-P-09 b-081-B/092-P-09	0.55	343.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
734.74	735.09	Open Water Pond	c-071-B/092-P-09 a-081-B/092-P-09 b-081-B/092-P-09	1.15	352.0	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
734.91	735.06	Broad-leaf Treed Swamp	c-071-B/092-P-09 b-081-B/092-P-09	0.84	152.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
735.08	735.11	Seasonal Emergent Marsh	b-081-B/092-P-09	0.05	29.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
735.44	735.46	Seasonal Emergent Marsh	d-072-B/092-P-09 a-082-B/092-P-09	0.06	28.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
736.22	736.22	Deep Marsh	a-083-B/092-P-09	0.00	1.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
736.26	736.28	Deep Marsh	d-073-B/092-P-09	0.04	25.7	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
736.35	736.47	Seasonal Emergent Marsh	d-073-B/092-P-09	0.23	119.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
737.01	737.06	Shrubby Swamp	c-073-B/092-P-09 d-074-B/092-P-09 b-083-B/092-P-09	0.09	43.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
737.05	737.07	Open Water Pond	d-074-B/092-P-09	0.01	11.8	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
739.42	739.52	Seasonal Emergent Marsh	b-076-B/092-P-09	0.26	101.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
739.64	739.73	Seasonal Emergent Marsh	c-066-B/092-P-09 b-076-B/092-P-09	0.10	92.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
740.49	740.64	Seasonal Emergent Marsh	a-067-B/092-P-09	0.41	151.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
741.55	741.65	Mixedwood Treed Swamp	a-058-B/092-P-09	0.26	96.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
745.48	745.54	Seasonal Emergent Marsh	a-018-B/092-P-09	0.27	68.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
749.81	749.99	Shrubby Swamp	c-068-J/092-P-08 b-078-J/092-P-08	0.68	185.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
749.96	750.00	Open Water Pond	c-068-J/092-P-08	0.16	45.0	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
750.00	750.42	Mixedwood Treed Swamp	c-068-J/092-P-08 b-068-J/092-P-08 d-068-J/092-P-08	1.35	422.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
750.38	750.59	Seasonal Emergent Marsh	b-068-J/092-P-08	0.32	209.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
751.57	751.80	Shrubby Swamp	c-048-J/092-P-08 b-058-J/092-P-08	0.92	227.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
756.85	757.00	Open Water Pond	c-097-G/092-P-08	0.25	149.5	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
757.12	757.14	Shrubby Swamp	b-097-G/092-P-08 c-097-G/092-P-08	0.02	21.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
759.75	759.79	Seasonal Emergent Marsh	c-066-G/092-P-08	0.05	35.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
815.40	815.82	Seasonal Emergent Marsh	c-001-K/092-I-16 d-001-K/092-I-16	0.80	420.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
817.88	818.01	Shrubby Swamp	a-082-F/092-I-16 d-072-F/092-I-16	0.24	133.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
819.53	819.54	Seasonal Emergent Marsh	c-062-F/092-I-16	0.00	3.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
819.59	819.62	Seasonal Emergent Marsh	c-062-F/092-I-16	0.06	33.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
824.62	824.68	Seasonal Emergent Marsh	c-025-F/092-I-16	0.32	60.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
825.03	825.08	Open Water Pond	b-025-F/092-I-16	0.12	44.7	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
830.57	830.60	Seasonal Emergent Marsh	b-078-C/092-I-16	0.06	36.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
830.61	830.67	Shrubby Swamp	b-078-C/092-I-16	0.09	66.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
831.18	831.38	Broad-leaf Treed Swamp	d-068-C/092-I-16 c-068-C/092-I-16	1.37	209.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
832.58	832.60	Seasonal Emergent Marsh	b-058-C/092-I-16	0.02	20.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
833.49	833.61	Alkali Marsh	d-049-C/092-I-16 a-049-C/092-I-16 c-049-C/092-I-16	0.28	119.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
833.98	834.06	Seasonal Emergent Marsh	d-039-C/092-I-16 c-039-C/092-I-16 b-049-C/092-I-16 a-049-C/092-I-16	0.36	73.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
835.06	835.38	Broad-leaf Treed Swamp	c-029-C/092-I-16 d-030-C/092-I-16	1.08	310.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
841.11	841.24	Seasonal Emergent Marsh	b-071-L/092-I-09	0.64	132.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
841.65	841.85	Seasonal Emergent Marsh	b-072-L/092-I-09 a-072-L/092-I-09	1.02	201.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
843.27	843.33	Seasonal Emergent Marsh	b-063-L/092-I-09	0.31	57.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
848.22	848.26	Seasonal Emergent Marsh	b-024-L/092-I-09	0.07	40.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
853.50	853.72	Alkali Marsh	a-063-E/092-I-09 d-063-E/092-I-09	0.42	217.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
854.23	854.31	Alkali Marsh	c-053-E/092-I-09 d-053-E/092-I-09 a-063-E/092-I-09 b-063-E/092-I-09	0.13	78.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
856.19	856.24	Alkali Marsh	a-044-E/092-I-09	0.26	47.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
860.86	860.90	Seasonal Emergent Marsh	a-003-E/092-I-09 b-003-E/092-I-09 c-003-E/092-I-09 d-003-E/092-I-09	0.12	39.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
862.40	862.46	Seasonal Emergent Marsh	c-092-D/092-I-09	0.23	69.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
865.12	865.30	Deep Marsh	d-062-D/092-I-09 c-061-D/092-I-09	0.79	179.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
865.48	865.64	Seasonal Emergent Marsh	b-061-D/092-I-09 c-061-D/092-I-09	0.84	160.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
867.99	868.33	Deep Marsh	c-040-C/092-I-09 b-050-C/092-I-09	1.07	347.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
869.31	869.45	Deep Marsh	d-030-C/092-I-09	0.10	144.0	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
869.66	870.09	Deep Marsh	d-020-C/092-I-09 b-029-C/092-I-09 a-030-C/092-I-09	1.87	424.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
869.71	869.90	Shrubby Fen	a-030-C/092-I-09	0.46	186.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Potential Shrub Staking
869.85	870.05	Non-Woody Fen	d-020-C/092-I-09 a-030-C/092-I-09	1.26	195.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
869.86	870.09	Open Water Pond	b-029-C/092-I-09 a-030-C/092-I-09	0.51	227.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
871.15	871.19	Open Water Pond	d-010-C/092-I-09 c-009-C/092-I-09	0.01	40.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
871.54	871.92	Seasonal Emergent Marsh	b-009-C/092-I-09 a-010-C/092-I-09	3.10	371.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
871.55	871.66	Shrubby Swamp	b-009-C/092-I-09	0.77	111.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
874.42	874.48	Seasonal Emergent Marsh	b-080-K/092-I-08	0.18	64.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
876.04	876.14	Seasonal Emergent Marsh	a-051-L/092-I-08 d-051-L/092-I-08	0.12	100.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
878.36	878.40	Seasonal Emergent Marsh	b-031-L/092-I-08 a-032-L/092-I-08	0.13	40.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
878.59	878.68	Seasonal Emergent Marsh	b-031-L/092-I-08 a-032-L/092-I-08	0.51	88.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
879.49	879.56	Seasonal Emergent Marsh	a-022-L/092-I-08	0.31	68.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
879.63	879.74	Seasonal Emergent Marsh	d-012-L/092-I-08 c-012-L/092-I-08 a-022-L/092-I-08 b-022-L/092-I-08	1.17	110.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
880.56	880.66	Seasonal Emergent Marsh	c-002-L/092-I-08 d-002-L/092-I-08 b-012-L/092-I-08	0.21	99.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
881.61	881.67	Seasonal Emergent Marsh	c-092-E/092-I-08	0.12	50.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
882.19	882.22	Seasonal Emergent Marsh	a-093-E/092-I-08	0.02	31.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
882.53	882.58	Seasonal Emergent Marsh	d-083-E/092-I-08	0.08	51.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
886.57	886.96	Seasonal Emergent Marsh	b-044-E/092-I-08 c-044-E/092-I-08 d-045-E/092-I-08	1.42	393.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
887.01	887.19	Seasonal Emergent Marsh	b-044-E/092-I-08	1.20	183.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
887.26	887.42	Seasonal Emergent Marsh	c-034-E/092-I-08 b-044-E/092-I-08 a-045-E/092-I-08	1.38	155.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
890.33	890.38	Alkali Marsh	a-016-E/092-I-08 d-006-E/092-I-08	0.03	47.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
893.17	893.48	Needle-leaf Treed Swamp	a-087-D/092-I-08 c-076-D/092-I-08 b-086-D/092-I-08	3.19	307.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
898.31	898.42	Needle-leaf Treed Swamp	c-027-D/092-I-08	0.68	105.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
904.48	904.52	Seasonal Emergent Marsh	d-082-I/092-I-02 a-082-I/092-I-02	0.06	37.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
905.28	905.33	Seasonal Emergent Marsh	c-072-I/092-I-02	0.10	56.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
906.63	906.71	Seasonal Emergent Marsh	d-064-I/092-I-02 a-074-I/092-I-02	0.33	86.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
910.13	910.19	Open Water Pond	d-068-I/092-I-02 a-078-I/092-I-02 c-067-I/092-I-02	0.10	55.8	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
910.22	910.27	Open Water Pond	d-068-I/092-I-02 a-078-I/092-I-02	0.13	51.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
911.31	911.45	Seasonal Emergent Marsh	a-079-I/092-I-02	0.52	139.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
918.28	918.42	Shrubby Swamp	c-024-J/092-I-02 b-024-J/092-I-02	1.10	132.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
927.77	928.10	Shrubby Swamp	c-039-G/092-I-02 d-040-G/092-I-02 b-049-G/092-I-02 a-050-G/092-I-02	3.91	328.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C) Potential Shrub Staking
928.27	928.29	Seasonal Emergent Marsh	d-040-G/092-I-02	0.00	22.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
931.23	931.36	Seasonal Emergent Marsh	a-012-F/092-I-02	0.62	121.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
931.40	931.50	Seasonal Emergent Marsh	d-002-F/092-I-02	0.28	96.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
932.65	932.69	Seasonal Emergent Marsh	d-093-C/092-I-02 c-092-C/092-I-02	0.07	35.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
932.82	932.85	Seasonal Emergent Marsh	c-092-C/092-I-02	0.04	26.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
935.40	935.43	Seasonal Emergent Marsh	c-074-C/092-I-02	0.05	33.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
935.88	935.95	Shrubby Swamp	a-075-C/092-I-02	0.21	67.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
936.07	936.38	Shrubby Swamp	c-065-C/092-I-02 d-065-C/092-I-02 a-075-C/092-I-02	1.38	305.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
938.18	938.22	Seasonal Emergent Marsh	b-055-C/092-I-02	0.05	31.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
946.41	946.41	Open Water Pond	a-002-D/092-I-02 b-001-D/092-I-02	0.00	3.5	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
948.03	948.07	Seasonal Emergent Marsh	a-093-L/092-H-15 b-093-L/092-H-15	0.11	35.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
950.71	950.80	Seasonal Emergent Marsh	d-065-L/092-H-15 c-064-L/092-H-15	0.17	83.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
957.88	958.15	Mixedwood Treed Swamp	c-094-E/092-H-15 d-094-E/092-H-15	3.00	266.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
958.04	958.10	Mixedwood Treed Swamp	d-094-E/092-H-15	0.13	62.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
959.63	959.73	Seasonal Emergent Marsh	a-085-E/092-H-15	0.32	104.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
959.75	959.80	Seasonal Emergent Marsh	d-075-E/092-H-15	0.07	52.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
959.75	959.80	Seasonal Emergent Marsh	d-075-E/092-H-15 a-085-E/092-H-15	0.05	46.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
962.91	962.93	Deep Marsh	c-035-E/092-H-15 d-045-E/092-H-15 a-045-E/092-H-15 b-045-E/092-H-15 c-045-E/092-H-15 c-035-E/092-H-15	0.00	16.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
964.53	964.84	Open Water Pond	c-025-E/092-H-15 b-035-E/092-H-15	1.42	303.0	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
971.05	971.26	Broad-leaf Treed Swamp	c-066-D/092-H-15 b-076-D/092-H-15	1.40	212.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
971.96	972.05	Open Water Pond	a-067-D/092-H-15	0.16	90.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
974.46	974.52	Shrubby Swamp	b-048-D/092-H-15	0.22	58.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
978.88	978.91	Seasonal Emergent Marsh	a-001-A/092-H-14	0.19	35.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
980.10	980.12	Seasonal Emergent Marsh	b-091-I/092-H-11	0.06	19.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
989.18	989.23	Seasonal Emergent Marsh	d-092-H/092-H-11	0.20	52.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
989.67	989.93	Open Water Pond	a-092-H/092-H-11 d-082-H/092-H-11	1.47	265.0	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
991.18	991.29	Open Water Pond	d-071-H/092-H-11	0.47	109.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
992.05	992.09	Seasonal Emergent Marsh	a-071-H/092-H-11	0.11	45.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
992.63	992.66	Seasonal Emergent Marsh	b-061-H/092-H-11 a-061-H/092-H-11	0.13	31.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
992.76	992.80	Seasonal Emergent Marsh	b-061-H/092-H-11	0.05	40.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1040.53	1040.55	Shrubby Swamp	b-051-E/092-H-06 c-051-E/092-H-06	0.01	26.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1045.41	1045.69	Open Water Pond	b-046-E/092-H-06 c-046-E/092-H-06	1.29	283.7	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1051.43	1051.47	Open Water Pond	c-032-H/092-H-05	0.10	44.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
1059.71	1059.77	Seasonal Emergent Marsh	a-100-A/092-H-05 b-099-A/092-H-05	0.19	63.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1062.80	1062.94	Open Water Pond	d-062-B/092-H-05	0.28	138.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1063.08	1063.26	Seasonal Emergent Marsh	a-062-B/092-H-05 b-062-B/092-H-05 d-062-B/092-H-05	0.79	174.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1063.36	1063.52	Shrubby Swamp	b-062-B/092-H-05	1.24	153.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1063.71	1063.76	Deep Marsh	a-063-B/092-H-05 b-062-B/092-H-05	0.02	50.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1067.27	1067.34	Seasonal Emergent Marsh	c-024-B/092-H-05 b-034-B/092-H-05	0.30	68.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1068.30	1068.50	Open Water Pond	d-015-B/092-H-05 a-025-B/092-H-05	0.50	201.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1071.19	1071.22	Seasonal Emergent Marsh	a-095-J/092-H-04	0.06	29.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1078.67	1078.73	Seasonal Emergent Marsh	c-029-J/092-H-04	0.25	62.0	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1080.02	1080.07	Seasonal Emergent Marsh	a-021-K/092-H-04 d-021-K/092-H-04	0.09	50.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1080.05	1080.10	Seasonal Emergent Marsh	a-021-K/092-H-04	0.06	44.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1097.21	1097.30	Seasonal Emergent Marsh	c-037-E/092-H-04 b-047-E/092-H-04	0.16	88.8	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1097.33	1097.39	Seasonal Emergent Marsh	c-037-E/092-H-04 b-047-E/092-H-04	0.24	61.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1102.11	1102.17	Deep Marsh	d-012-H/092-G-01 a-022-H/092-G-01	0.03	58.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1102.12	1102.23	Open Water Pond	d-012-H/092-G-01 c-012-H/092-G-01 a-022-H/092-G-01 b-022-H/092-G-01	0.75	113.1	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1102.22	1102.31	Deep Marsh	d-012-H/092-G-01 c-012-H/092-G-01 b-022-H/092-G-01	0.84	87.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1102.63	1102.77	Seasonal Emergent Marsh	a-012-H/092-G-01 b-012-H/092-G-01 d-012-H/092-G-01 c-012-H/092-G-01	1.14	139.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
1107.52	1107.57	Open Water Pond	b-096-A/092-G-01	0.16	46.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1117.81	1117.94	Shrubby Swamp	b-097-B/092-G-01	0.34	136.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1121.13	1121.19	Open Water Pond	a-091-C/092-G-01	0.19	59.5	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1127.09	1127.17	Seasonal Emergent Marsh	a-017-F/092-G-01 d-017-F/092-G-01	0.68	87.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1129.01	1129.13	Shrubby Swamp	a-029-F/092-G-01	0.19	116.6	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
1132.47	1132.51	Seasonal Emergent Marsh	c-032-E/092-G-01	0.06	40.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
1133.72	1133.77	Open Water Pond	d-034-E/092-G-01 c-033-E/092-G-01	0.02	46.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1134.47	1134.53	Shrubby Swamp	b-044-E/092-G-01	0.22	60.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1137.99	1138.07	Shrubby Swamp	a-058-E/092-G-01 c-058-E/092-G-01 d-058-E/092-G-01	0.53	79.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
1138.89	1138.90	Seasonal Emergent Marsh	d-059-E/092-G-01	0.00	9.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1139.15	1139.21	Open Water Pond	c-059-E/092-G-01	0.21	58.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1139.34	1139.36	Open Water Pond	c-059-E/092-G-01	0.02	16.8	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1139.60	1139.62	Open Water Pond	b-069-E/092-G-01	0.01	18.6	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1139.70	1139.76	Open Water Pond	a-070-E/092-G-01	0.09	55.9	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
1140.07	1140.14	Seasonal Emergent Marsh	b-070-E/092-G-01 a-070-E/092-G-01	0.08	67.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1142.18	1142.20	Open Water Pond	b-072-H/092-G-02	0.02	23.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1142.93	1142.99	Shrubby Swamp	a-073-H/092-G-02 b-073-H/092-G-02	0.13	66.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1145.15	1145.20	Deep Marsh	c-075-H/092-G-02	0.21	48.2	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1145.68	1145.71	Seasonal Emergent Marsh	d-076-H/092-G-02	0.28	30.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1145.72	1145.75	Seasonal Emergent Marsh	d-076-H/092-G-02	0.19	23.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1146.85	1146.90	Seasonal Emergent Marsh	c-077-H/092-G-02	0.11	49.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1147.27	1147.37	Deep Marsh	a-088-H/092-G-02	0.33	95.7	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1147.30	1147.39	Deep Marsh	a-088-H/092-G-02	0.15	89.0	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
1148.68	1148.80	Seasonal Emergent Marsh	b-098-H/092-G-02	0.29	117.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1148.72	1148.81	Shrubby Swamp	b-098-H/092-G-02	0.34	85.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1148.92	1148.99	Deep Marsh	b-098-H/092-G-02 c-098-H/092-G-02 a-099-H/092-G-02 d-099-H/092-G-02	0.20	60.3	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1151.14	1151.37	Seasonal Emergent Marsh	b-019-I/092-G-02 a-020-I/092-G-02	0.35	238.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1152.56	1152.76	Seasonal Emergent Marsh	c-011-J/092-G-02 d-011-J/092-G-02	0.43	202.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1153.51	1153.55	Seasonal Emergent Marsh	d-012-J/092-G-02	0.07	40.4	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1153.93	1153.98	Seasonal Emergent Marsh	c-012-J/092-G-02 b-022-J/092-G-02	0.21	47.3	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
1154.00	1154.18	Shrubby Swamp	c-012-J/092-G-02 d-013-J/092-G-02 b-022-J/092-G-02 a-023-J/092-G-02	1.26	182.2	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1154.66	1154.69	Shrubby Swamp	b-023-J/092-G-02	0.05	32.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1159.31	1159.36	Seasonal Emergent Marsh	b-028-J/092-G-02	0.08	48.7	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1161.61	1161.77	Deep Marsh	c-040-J/092-G-02 d-040-J/092-G-02 d-050-J/092-G-02 b-050-J/092-G-02 b-049-J/092-G-02 c-049-J/092-G-02 a-050-J/092-G-02	0.90	160.4	OGC Notification Potentially navigable if open water channel or pond within construction ROW	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)

TABLE K-1 Cont'd

Start RK	End RK	Wetland Type	Legal Locations (LSD/PNG)	Area of Wetland Within Corridor (ha)	Length of Wetland Crossed by Corridor (m)	Regulatory Considerations	Reference to Potential Mitigation Measures
1163.11	1163.35	Mixedwood Treed Swamp	d-050-J/092-G-02 c-049-J/092-G-02 a-050-J/092-G-02 c-050-J/092-G-02 b-060-J/092-G-02 a-060-J/092-G-02 d-041-K/092-G-02 c-041-K/092-G-02 a-051-K/092-G-02 b-051-K/092-G-02	1.98	236.9	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)
1176.42	1176.55	Shrubby Swamp	b-003-D/092-G-07	1.21	129.5	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0) Refer to Aquatics for watercourse mitigation (Volume 5C)
1180.91	1180.99	Seasonal Emergent Marsh	b-035-D/092-G-07 a-036-D/092-G-07	0.30	79.1	OGC Notification	Wetland Evaluation Technical Report - Volume 5C (Section 6.0)

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor), only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

COP and OGC notifications will only be made for those wetlands that may be disturbed during construction. Not all of the wetlands located within the proposed pipeline corridor will be disturbed.

Recommended potential wetland mitigation measures relating to Crown ownership determination in Alberta and navigability in Alberta and BC will be confirmed upon route refinement.

APPENDIX L

WILDLIFE AND WILDLIFE HABITAT (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for key wildlife and wildlife habitat along the Project's proposed pipeline corridor. The key wildlife or wildlife habitat features encountered are provided in Table L-1. The resource site-specific mitigation measures are provided in Table L-2.

Refer to the Wildlife Technical Report for further details regarding key wildlife and wildlife habitat encountered and coinciding mitigation recommendations.

TABLE L-1

WILDLIFE FEATURES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

RK Spread (Includes Recommended Buffer)		From Legal Location	To Legal Location	Wildlife Feature ID	Wildlife Feature
From RK	To RK				
66.76	66.96	3-12-53-1 W5M	14-1-53-1 W5M	WILD-128	Red-tailed Hawk Nest
267.13	267.34	1-5-53-20 W5M	2-5-53-20 W5M	WILD-4	Amphibian Breeding Pond (western toad)
298.95	299.36	12-21-52-23 W5M	5-21-52-23 W5M	WILD-51	Amphibian Breeding Pond (wood frog and western toad)
339.07	339.44	15-33-49-26 W5M	11-33-49-26 W5M	WILD-52	Amphibian Breeding Pond (long-toed salamander)
523.50	523.80	a-094-C/083-D-14	a-094-C/083-D-14	WILD-46	Amphibian Breeding Pond (Columbia spotted frog and western toad)
523.50	523.80	a-094-C/083-D-14	a-094-C/083-D-14	WILD-5	Amphibian Breeding Pond (western toad)
526.12	526.26	d-063-C/083-D-14	c-062-C/083-D-14	WILD-47	Amphibian Breeding Pond (western toad)
553.82	554.12	d-030-H/083-D-11	c-029-H/083-D-11	WILD-48	Amphibian Breeding Pond (western toad)
566.31	566.61	c-009-A/083-D-11	b-009-A/083-D-11	WILD-49	Amphibian Breeding Pond (Columbia spotted frog and western toad)
616.69	616.99	b-015-F/083-D-03	c-005-F/083-D-03	WILD-50	Amphibian Breeding Pond (Columbia spotted frog)
621.45	621.80	b-066-C/083-D-03	c-056-C/083-D-03	WILD-41	Amphibian Breeding Pond (Columbia spotted frog, wood frog and western toad)
642.69	643.00	a-065-F/082-M-14	d-055-F/082-M-14	WILD-40	Amphibian Breeding Pond (Columbia spotted frog)
643.16	643.46	d-055-F/082-M-14	a-055-F/082-M-14	WILD-39	Amphibian Breeding Pond (long-toed salamander and Columbia spotted frog)
645.13	645.42	c-034-F/082-M-14	b-034-F/082-M-14	WILD-36	Amphibian Breeding Pond (long-toed salamander, Columbia spotted frog and western toad)
650.88	651.28	d-074-C/082-M-14	c-074-C/082-M-14	WILD-35	Amphibian Breeding Pond (wood frog and unidentified tadpoles [frog])
663.47	663.87	d-070-K/082-M-11	a-070-K/082-M-11	WILD-1	Bald Eagle Nest
665.13	665.44	a-051-L/082-M-11	b-051-L/082-M-11	WILD-37	Amphibian Breeding Pond (Columbia spotted frog)
665.86	666.14	d-042-L/082-M-11	d-042-L/082-M-11	WILD-38	Amphibian Breeding Pond (Columbia spotted frog, northern pacific tree frog and unidentified frog species)
695.49	695.79	c-026-G/082-M-12	b-026-G/082-M-12	WILD-34	Amphibian Breeding Pond (long-toed salamander)
730.79	731.07	b-029-H/092-P-09	d-020-H/092-P-09	WILD-27	Amphibian Breeding Pond (western toad)
736.53	736.83	d-073-B/092-P-09	c-073-B/092-P-09	WILD-31	Amphibian Breeding Pond (Columbia spotted frog, northern pacific tree frog and western toad)
739.24	739.45	a-076-B/092-P-09	b-076-B/092-P-09	WILD-28	Amphibian Breeding Pond (Columbia spotted frog and western toad)
739.33	739.63	a-076-B/092-P-09	b-076-B/092-P-09	WILD-30	Amphibian Breeding Pond (Columbia spotted frog and western toad)
739.45	739.79	b-076-B/092-P-09	c-066-B/092-P-09	WILD-29	Amphibian Breeding Pond (Columbia spotted frog and western toad)
755.83	756.12	d-008-J/092-P-08	a-008-J/092-P-08	WILD-32	Amphibian Breeding Pond (Columbia spotted frog, northern pacific tree frog and western toad)
756.74	757.03	d-098-G/092-P-08	c-097-G/092-P-08	WILD-33	Amphibian Breeding Pond (western toad)

TABLE L-1 Cont'd

RK Spread (Includes Recommended Buffer)		From Legal Location	To Legal Location	Wildlife Feature ID	Wildlife Feature
758.68	758.98	a-087-G/092-P-08	c-076-G/092-P-08	WILD-43	Amphibian Breeding Pond (Columbia spotted frog and western toad)
758.97	759.28	c-076-G/092-P-08	b-076-G/092-P-08	WILD-44	Amphibian Breeding Pond (western toad)
813.61	813.95	d-021-K/092-I-16	a-021-K/092-I-16	WILD-110	Unidentified Raptor Nest
813.74	814.10	d-021-K/092-I-16	a-021-K/092-I-16	WILD-111	Unidentified Raptor Nest
821.89	822.09	a-054-F/092-I-16	a-054-F/092-I-16	WILD-55	Mineral Lick
857.38	857.67	d-035-E/092-I-09	b-035-E/092-I-09	WILD-127	Amphibian Breeding Pond (Columbia spotted frog, northern pacific tree frog and western toad)
869.81	870.11	a-030-C/092-I-09	d-020-C/092-I-09	WILD-121	Amphibian Breeding Pond (Columbia spotted frog and northern pacific tree frog)
870.30	870.52	c-019-C/092-I-09	c-019-C/092-I-09	WILD-122	Amphibian Breeding Pond (northern pacific tree frog)
870.42	870.70	d-020-C/092-I-09	a-020-C/092-I-09	WILD-123	Amphibian Breeding Pond (northern pacific tree frog)
870.43	870.72	d-020-C/092-I-09	b-019-C/092-I-09	WILD-124	Amphibian Breeding Pond (northern pacific tree frog)
887.05	887.35	b-044-E/092-I-08	b-044-E/092-I-08	WILD-126	Amphibian Breeding Pond (western toad)
888.67	888.97	c-025-E/092-I-08	b-025-E/092-I-08	WILD-125	Amphibian Breeding Pond (northern pacific tree frog and western toad)
927.04	927.43	c-049-G/092-I-02	c-049-G/092-I-02	WILD-8	Unidentified Raptor Nest
927.73	928.09	a-050-G/092-I-02	d-040-G/092-I-02	WILD-114	Unidentified Raptor Nest
927.80	928.19	b-049-G/092-I-02	d-040-G/092-I-02	WILD-2	Osprey Nest
976.03	976.33	b-039-D/092-H-15	d-030-D/092-H-15	WILD-97	Amphibian Breeding Stream (coastal tailed frog)
978.39	978.69	c-010-D/092-H-15	d-001-A/092-H-14	WILD-98	Amphibian Breeding Stream (coastal tailed frog)
997.93	998.31	d-026-H/092-H-11	d-026-H/092-H-11	WILD-99	Amphibian Breeding Stream (coastal tailed frog)
998.85	999.19	b-026-H/092-H-11	a-027-H/092-H-11	WILD-100	Amphibian Breeding Stream (coastal tailed frog)
1002.97	1003.33	b-020-H/092-H-11	a-011-G/092-H-11	WILD-92	Amphibian Breeding Stream (coastal tailed frog)
1007.68	1007.95	b-094-B/092-H-11	a-095-B/092-H-11	WILD-96	Amphibian Breeding Stream (coastal tailed frog)
1008.48	1008.78	d-085-B/092-H-11	a-085-B/092-H-11	WILD-95	Amphibian Breeding Stream (coastal tailed frog)
1009.14	1009.47	b-085-B/092-H-11	c-075-B/092-H-11	WILD-94	Amphibian Breeding Stream (coastal tailed frog)
1010.89	1011.24	a-066-B/092-H-11	b-066-B/092-H-11	WILD-93	Amphibian Breeding Stream (coastal tailed frog)
1011.78	1012.08	c-056-B/092-H-11	b-056-B/092-H-11	WILD-88	Amphibian Breeding Stream (coastal tailed frog)
1011.83	1012.13	c-056-B/092-H-11	b-056-B/092-H-11	WILD-87	Amphibian Breeding Stream (coastal tailed frog)
1012.30	1012.67	b-056-B/092-H-11	d-047-B/092-H-11	WILD-89	Amphibian Breeding Stream (coastal tailed frog)
1012.46	1012.78	c-046-B/092-H-11	d-047-B/092-H-11	WILD-91	Amphibian Breeding Stream (coastal tailed frog)
1012.52	1012.82	c-046-B/092-H-11	d-047-B/092-H-11	WILD-90	Amphibian Breeding Stream (coastal tailed frog)
1012.85	1013.19	d-047-B/092-H-11	a-047-B/092-H-11	WILD-86	Amphibian Breeding Stream (coastal tailed frog)

TABLE L-1 Cont'd

RK Spread (Includes Recommended Buffer)		From Legal Location	To Legal Location	Wildlife Feature ID	Wildlife Feature
1013.07	1013.39	a-047-B/092-H-11	d-037-B/092-H-11	WILD-85	Amphibian Breeding Stream (coastal tailed frog)
1013.51	1013.82	d-037-B/092-H-11	d-037-B/092-H-11	WILD-84	Amphibian Breeding Stream (coastal tailed frog)
1013.61	1013.90	d-037-B/092-H-11	a-037-B/092-H-11	WILD-83	Amphibian Breeding Stream (coastal tailed frog)
1013.79	1014.11	d-037-B/092-H-11	a-037-B/092-H-11	WILD-82	Amphibian Breeding Stream (coastal tailed frog)
1013.99	1014.32	a-037-B/092-H-11	a-037-B/092-H-11	WILD-56	Amphibian Breeding Stream (coastal tailed frog)
1014.12	1014.47	a-037-B/092-H-11	d-027-B/092-H-11	WILD-57	Amphibian Breeding Stream (coastal tailed frog)
1014.47	1014.81	c-027-B/092-H-11	b-027-B/092-H-11	WILD-58	Amphibian Breeding Stream (coastal tailed frog)
1014.72	1015.05	c-027-B/092-H-11	a-027-B/092-H-11	WILD-59	Amphibian Breeding Stream (coastal tailed frog)
1015.75	1016.05	d-017-B/092-H-11	a-017-B/092-H-11	WILD-60	Amphibian Breeding Stream (coastal tailed frog)
1018.76	1019.06	a-098-J/092-H-06	b-098-J/092-H-06	WILD-81	Amphibian Breeding Stream (coastal tailed frog)
1018.99	1019.30	b-098-J/092-H-06	b-098-J/092-H-06	WILD-61	Amphibian Breeding Stream (coastal tailed frog)
1019.40	1019.71	a-099-J/092-H-06	a-099-J/092-H-06	WILD-62	Amphibian Breeding Stream (coastal tailed frog)
1019.57	1019.87	a-099-J/092-H-06	b-099-J/092-H-06	WILD-63	Amphibian Breeding Stream (coastal tailed frog)
1020.84	1021.18	c-090-J/092-H-06	c-090-J/092-H-06	WILD-80	Amphibian Breeding Stream (coastal tailed frog)
1020.97	1021.28	c-090-J/092-H-06	c-090-J/092-H-06	WILD-64	Amphibian Breeding Stream (coastal tailed frog)
1023.42	1023.71	a-061-K/092-H-06	a-061-K/092-H-06	WILD-65	Amphibian Breeding Stream (coastal tailed frog)
1025.08	1025.37	d-041-K/092-H-06	b-041-K/092-H-06	WILD-79	Amphibian Breeding Stream (coastal tailed frog and western red-backed salamander)
1025.23	1025.53	c-041-K/092-H-06	b-041-K/092-H-06	WILD-66	Amphibian Breeding Stream (coastal tailed frog)
1031.27	1031.60	b-005-K/092-H-06	a-006-K/092-H-06	WILD-78	Amphibian Breeding Stream (coastal tailed frog and western red-backed salamander)
1033.05	1033.40	d-086-F/092-H-06	a-086-F/092-H-06	WILD-67	Amphibian Breeding Stream (coastal tailed frog)
1054.01	1055.04	b-035-H/092-H-05	d-026-H/092-H-05	WILD-115	Peregrine Falcon Nest
1069.43	1069.80	d-005-B/092-H-05	d-005-B/092-H-05	WILD-68	Amphibian Breeding Stream (coastal tailed frog)
1072.03	1072.49	a-085-J/092-H-04	d-075-J/092-H-04	WILD-77	Amphibian Breeding Stream (coastal tailed frog)
1072.68	1073.02	c-075-J/092-H-04	b-075-J/092-H-04	WILD-69	Amphibian Breeding Stream (coastal tailed frog)
1073.19	1073.48	b-075-J/092-H-04	c-065-J/092-H-04	WILD-70	Amphibian Breeding Stream (coastal tailed frog)
1073.56	1073.85	c-065-J/092-H-04	a-066-J/092-H-04	WILD-71	Amphibian Breeding Stream (coastal tailed frog)
1074.11	1074.39	a-066-J/092-H-04	d-056-J/092-H-04	WILD-72	Amphibian Breeding Stream (coastal tailed frog)
1074.57	1074.92	c-056-J/092-H-04	c-056-J/092-H-04	WILD-73	Amphibian Breeding Stream (coastal tailed frog)

TABLE L-1 Cont'd

RK Spread (Includes Recommended Buffer)		From Legal Location	To Legal Location	Wildlife Feature ID	Wildlife Feature
1078.04	1078.39	d-039-J/092-H-04	b-039-J/092-H-04	WILD-74	Amphibian Breeding Stream (coastal tailed frog)
1079.32	1079.66	d-030-J/092-H-04	c-030-J/092-H-04	WILD-116	Unidentified Raptor Nest
1079.72	1080.07	c-030-J/092-H-04	d-021-K/092-H-04	WILD-53	Osprey Nest
1084.54	1084.84	a-005-K/092-H-04	b-005-K/092-H-04	WILD-76	Amphibian Breeding Stream (coastal tailed frog)
1102.25	1102.55	d-012-H/092-G-01	c-012-H/092-G-01	WILD-10	Amphibian Breeding Pond (northwestern salamander, northern red-legged frog and green frog)
1102.49	1102.78	c-012-H/092-G-01	b-012-H/092-G-01	WILD-9	Amphibian Breeding Pond (northwestern salamander, northern red-legged frog and green frog)
1103.04	1103.34	b-012-H/092-G-01	c-002-H/092-G-01	WILD-11	Amphibian Breeding Pond (northern red-legged frog)
1105.15	1105.50	d-094-A/092-G-01	b-094-A/092-G-01	WILD-12	Amphibian Breeding Pond (northwestern salamander and northern red-legged frog)
1106.71	1107.01	b-095-A/092-G-01	a-096-A/092-G-01	WILD-13	Amphibian Breeding Pond (northwestern salamander)
1113.53	1113.93	d-073-B/092-G-01	c-073-B/092-G-01	WILD-118	Red-tailed Hawk Nest
1119.58	1119.90	c-089-B/092-G-01	c-089-B/092-G-01	WILD-14	Amphibian Breeding Pond (northwestern salamander, unidentified *ambystoma* species, northern pacific tree frog and green frog)
1120.12	1120.40	d-090-B/092-G-01	d-090-B/092-G-01	WILD-15	Amphibian Breeding Pond (northwestern salamander, unidentified *ambystoma* species, rough-skinned newt, northern red-legged frog and northern pacific tree frog)
1121.01	1121.31	b-100-B/092-G-01	a-091-C/092-G-01	WILD-16	Amphibian Breeding Pond (northwestern salamander, unidentified *ambystoma* species, northern red-legged frog and northern pacific tree frog)
1132.25	1132.65	a-032-E/092-G-01	c-032-E/092-G-01	WILD-7	Red-tailed Hawk Nest
1132.30	1132.60	d-032-E/092-G-01	c-032-E/092-G-01	WILD-17	Amphibian Breeding Pond (unidentified *ambystoma* species, northern red-legged frog, northern pacific tree frog and green frog)
1133.41	1133.69	c-033-E/092-G-01	b-043-E/092-G-01	WILD-18	Amphibian Breeding Pond (northwestern salamander, unidentified ambystoma species, rough-skinned newt, American bullfrog, northern red-legged frog, northern pacific tree frog and green frog)
1133.60	1133.90	c-033-E/092-G-01	a-044-E/092-G-01	WILD-19	Amphibian Breeding Pond (northwestern salamander, rough-skinned newt, American bullfrog northern red-legged frog and northern pacific tree frog)
1133.70	1133.99	c-033-E/092-G-01	a-044-E/092-G-01	WILD-20	Amphibian Breeding Pond (rough-skinned newt, American bullfrog and green frog)
1139.56	1139.86	c-059-E/092-G-01	a-070-E/092-G-01	WILD-21	Amphibian Breeding Pond (northwestern salamander, unidentified *ambystoma* species, northern pacific tree frog and green frog)
1140.13	1140.43	b-070-E/092-G-01	b-070-E/092-G-01	WILD-22	Amphibian Breeding Pond (northwestern salamander, American bullfrog and northern pacific tree frog)

TABLE L-1 Cont'd

RK Spread (Includes Recommended Buffer)		From Legal Location	To Legal Location	Wildlife Feature ID	Wildlife Feature
1142.21	1142.51	c-062-H/092-G-02	d-063-H/092-G-02	WILD-23	Amphibian Breeding Pond (northwestern salamander, unidentified *ambystoma* species, rough-skinned newt, northern red-legged frog, northern pacific tree frog and green frog)
1143.27	1143.57	b-073-H/092-G-02	d-074-H/092-G-02	WILD-24	Amphibian Breeding Pond (northwestern salamander, American bullfrog, northern red-legged frog, northern pacific tree frog and green frog)
1145.57	1145.87	d-076-H/092-G-02	c-076-H/092-G-02	WILD-25	Amphibian Breeding Pond (northwestern salamander, unidentified *ambystoma* species, rough-skinned newt, American bullfrog, northern red-legged frog, northern pacific tree frog and green frog)
1147.54	1147.84	a-088-H/092-G-02	b-088-H/092-G-02	WILD-26	Amphibian Breeding Pond (northwestern salamander, unidentified *ambystoma* species, rough-skinned newt, American bullfrog, green frog and northern red-legged frog)
1147.55	1147.85	a-088-H/092-G-02	b-088-H/092-G-02	WILD-6	Amphibian Breeding Pond (unknown salamander species)
1179.53	1180.16	c-015-D/092-G-07	b-025-D/092-G-07	WILD-119	Red-tailed Hawk Nest

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

TABLE L-2

WILDLIFE AND WILDLIFE HABITAT ENVIRONMENTAL PROTECTION MEASURES – PROPOSED PIPELINE CORRIDOR

Concern	Province/Location	Recommended Mitigation
Habitat Loss/Alteration	Alberta/BC	• Avoid activity during sensitive time periods for wildlife species to the extent feasible. • Share workspace with the adjacent existing TMPL right-of-way or other existing rights-of-way where practical to reduce the construction right-of-way-width. • Do not clear timber, stumps, brush or other vegetation beyond the marked construction right-of-way boundary. • Where grading is not required, cut/mow/walk down shrubs and small diameter deciduous trees at ground level to facilitate rapid regeneration. • Use natural recovery as the preferred method of reclamation on level terrain and at wetlands unless otherwise requested by the regulator and where bio-engineering (*e.g.*, shrub staking/planting) will be conducted. • Plant native tree seedlings and/or shrubs at select locations to be determined in the field by the Environmental Inspector, in consultation with the Wildlife Resource Specialist. • Avoid the use of pesticides (except for herbicides to control invasive plants or noxious weeds; only use as spot treatments and outside the migratory bird breeding season) (BC MOE 2012a). • Reduce the width of grubbing near watercourses, wetlands and through other wet areas to facilitate the restoration of shrub communities. • Reduce disturbance at riparian areas, and where practical, extend the riparian buffer by implementing trenchless pipeline crossing techniques, or cut/mow/walk down shrubs and small diameter deciduous trees at ground level to facilitate rapid regeneration. • Limit vegetation control along the right-of-way and allow natural regeneration during the operation phase to the extent feasible. • Conduct pre-construction surveys to identify site-specific habitat features (*e.g.*, mineral licks) and implement the appropriate setbacks and/or timing windows.
Access and Line-of-Sight Management	Alberta/BC	• Implement the measures included in the Traffic and Access Control Management Plan prepared for the Project (Appendix C of the Pipeline EPP). • Implement measures to reduce access (human and predator) along the right-of-way following construction. Measures may include but are not limited to planting tree seedlings and/or shrubs in select locations to facilitate rapid regeneration of natural vegetation, and blocking access entry points by mounding, rollback, boulder barriers, earth berms or locked gates. The locations of access control measures along the right-of-way will be determined in consideration of consultation with provincial regulatory authorities. • Where rollback and coarse woody debris are needed for access management, erosion control and habitat enhancement, ensure that a sufficient supply is set aside for this purpose during final clean-up. • Consider the following at the proposed crossing of roads, railways, other pipelines or watercourses: extend the length of an HDD or bored crossings where this crossing technique has been proposed to leave a vegetated screen and/or narrow the right-of-way width if feasible. • Use existing roads to access the pipeline right-of-way. Deactivate and reclaim any temporary roads that are no longer needed with native vegetation. Implement measures to reduce access (human and predator) along these temporary roads, as required. • Install educational signs as needed at selected locations.
Barriers to Wildlife Movement	Alberta/BC	• Conduct work as expeditiously as practical (*i.e.,* interval between front-end work activities such as grading and back-end activities such as clean-up) to reduce the length and duration of the open trench and to reduce potential barriers and hazards to wildlife. • Locate gaps in pipe to allow wildlife movement in places that also facilitate construction such as at slope changes, crossings (*i.e.,* watercourse, road, pipeline right-of-way, railway) and bends. The locations of the gaps should coincide with gaps in spoil, slash piles and snow windrows. The locations can be determined in the field by the Environmental Inspector. • Restore habitat connectivity by redistributing large-diameter slash (rollback) over select locations on the pipeline right-of-way (*e.g.*, where high levels of coarse woody debris occur prior to construction), to provide cover and facilitate movement of wildlife (*e.g.*, furbearers). Specific locations are to be determined in the field by the Environmental Inspector and Wildlife Resource Specialist in discussion with provincial regulatory authorities.

TABLE L-2 Cont'd

Concern	Concern	Concern
Wildlife Disturbance and Attraction of Wildlife During Construction	Alberta/BC	• Schedule clearing and construction activities to avoid sensitive wildlife timing windows wherever feasible. • Minimize traffic and prohibit recreational use of all-terrain vehicles or snowmobiles by construction personnel on the pipeline right-of-way and at facilities. • Prohibit personnel from having pets on the pipeline right-of-way and at facilities. • Prohibit personnel from feeding or harassing wildlife. • Obey speed limits along access roads and the right-of-way. • Ensure that food waste and industrial waste are disposed of properly. • Report any issues related to wildlife encountered during construction and operation to the Environmental Inspectors, who will report to the appropriate regulatory authorities where warranted. • Implement the measures in the Wildlife Conflict Management Plan to prevent human/wildlife conflict and wildlife mortality (Appendix C of the Pipeline EPPs).
Migratory Birds	Alberta/BC	• In Alberta, schedule clearing and construction activities outside of the migratory bird restricted activity period (RAP) of May 7 to August 20. Wetlands attractive to migratory birds should not be cleared/disturbed from April 20 to August 25 (Gregoire pers. comm.). In the event clearing or construction activities are scheduled during the migratory bird RAP, follow the measures for conducting migratory bird nest sweeps described below. • In BC, schedule clearing and construction activities outside the migratory bird breeding season of March 15 to August 15 (Wilson pers. comm.). In the event clearing or construction activities are scheduled during the migratory bird breeding season, follow measures for conducting migratory bird nest sweeps described below. • In simple habitat types where active nests are easier to locate (*i.e.,* previously cleared areas and open areas with sparse vegetation and few trees), a nest sweep may be completed within 7 days of activity that is scheduled to occur within the migratory bird RAP. Use non-intrusive methods to conduct an area search for evidence of nesting (*e.g.,* presence of singing birds, territorial males, alarm calls, distraction displays). In the event an active nest is found, it will be subject to site-specific mitigation measures (*i.e.,* clearly marked protective buffer around the nest and/or non-intrusive monitoring). • In complex habitats where active nests are more difficult to find (*e.g.,* forests), it is recommended that pre-clearing be conducted. If this is not feasible and activity is scheduled to occur within the migratory bird RAP, contact Environment Canada prior to activity to discuss the area to be cleared. Use non-intrusive methods to conduct an area search for evidence of nesting (*e.g.,* presence of singing birds, territorial males, alarm calls, distraction displays). In the event an active nest is found, it will be subject to site-specific mitigation measures (*i.e.,* clearly marked protective buffer around the nest and/or non-intrusive monitoring). • In BC, in the event that an active Williamson's sapsucker or Lewis's woodpecker nest tree is found within or adjacent to the Project Footprint, consult with BC MFLNRO to discuss practical options and mitigation strategies. • Consider implementing the following bird conservation strategies: for Lewis's woodpecker, retain cavity-bearing trees and snags as nesting habitat, initiate nest box programs in areas lacking cavities/snags, restore/expand riparian buffers (minimum 30m and >300m for at least 10% of stream length) where nests are found; for American white pelican, double-crested cormorant and Western grebe establish undisturbed buffer zones (100 m) around breeding colonies; for rusty blackbird maintain unharvested buffers of contiguous forest around bogs used for breeding; and for barn swallow avoid the use of pesticides to maintain invertebrate species (Environment Canada 2013c).
Key Wildlife and Biodiversity Zone	Alberta North Saskatchewan River: RK 32.7 to RK 34.1 for approximately 1.4 km North Saskatchewan River: RK 36.7 to RK 37.1 for approximately 0.4 km Athabasca River: various locations between RK 307.4 to RK 311.6 for approximately 3.8 km	• Schedule clearing, construction and clean-up activities outside the timing restriction of January 15 to April 30. All activities within 100 m of existing arterial all-weather roads can be initiated at any time provided ground conditions are favourable and may continue until adverse ground conditions are encountered (Government of Alberta 2013c). Consult with AESRD if construction activity is scheduled within this period to to discuss practical options and mitigation strategies. • Conduct work as expeditiously as practical (*i.e.,* interval between front-end work activities such as grading and back-end activities such as clean-up) to reduce the length and duration of the open trench and to reduce potential barriers and hazards to wildlife.

TABLE L-2 Cont'd

Concern	Concern	Concern
Special Access Zone	Alberta RK 286.8 to RK 292.6 (approximately 5.8 km) RK 329.0 to RK 339.4 (approximately 10.4 km)	• Use existing roads to access the pipeline right-of-way where practical. If new access is required, construct to minimal disturbance standards (Class V), unless the new access is less than 100 m to an existing arterial all-weather road, in which case, the new access can be developed using Class III to Class V roads (all-weather or dry tertiary; frozen; minimal disturbance) (Government of Alberta 2013c). If new access, which is attached to the existing arterial all-weather access road, is greater than 100 m in distance from the arterial all-weather access road, then access control is required to restrict unauthorized traffic at all stages of construction, operation, deactivation and reclamation of the road. The access control will be placed within 100 m distance from the start of the new access (Government of Alberta 2013c). • Avoid creating access routes as loops and design to dead-end (Government of Alberta 2013c). • Consult with AESRD on the use of rollback along the pipeline right-of-way within this Zone. • Revegetate any areas that were cleared with species compatible to the adjacent vegetation type. Do not seed with species that are palatable to wildlife (*i.e.*, legumes) (Government of Alberta 2013c).
Grizzly Bear Zone	Alberta RK 297.2 to RK 339.4 (approximately 42.2 km)	• Apply measures noted for Special Access Zones to limit new access. • All workers will receive Bear Awareness Training (Government of Alberta 2013c). • Coordinate access and new clearing requirements with other industrial users in the area to minimize human activity within grizzly bear habitat (Government of Alberta 2013c). • Delimb coniferous trees and leave limbs on-site, where practical, to provide a seed source (Government of Alberta 2013c). • Prohibit construction personnel from feeding or harassing wildlife. Dispose of food wastes and industrial waste properly. • Utilize multi-passenger vehicles for the transport of crews to and from the job sites, to the extent practicable, to reduce traffic during construction. • Follow the *Bear-Human Conflict Management Plan for Camps* provided in the *Integrated Standards and Guidelines* if a camp is located within grizzly bear habitat (Government of Alberta 2013c). • In the event an active grizzly bear den is found, contact AESRD to discuss mitigation strategies. Recommended setbacks are 750 m for high disturbance activities (*i.e.*, conventional pipelines) and 500 m for medium disturbance activities (*i.e.*, conventional pipeline parallel to a linear corridor) from October 1 to April 30 (Government of Alberta 2013c).
Trumpeter Swan Waterbodies/Water courses	Alberta Unnamed Lake (locally referred to as Lacy's Lake) at SW 22-53-18 W5M: approximately 400 m north of RK 242 Annabel Lake at 34-52-19 W5M: approximately 700 m south of RK 254 Unnamed waterbody at W 5-53-19 W5M: approximately 200 m north of RK 258	• Schedule clearing, construction and clean-up activities outside the timing restriction of April 1 to September 30 within 800 m of a trumpeter swan waterbody/watercourse. In the event activity is scheduled during this period and a breeding pair (with cygnets) is nesting on the waterbody, consult with AESRD to discuss practical options and mitigation strategies. • Avoid direct aerial overflights over identified trumpeter swan waterbodies/watercourses that have a breeding pair (with cygnets) from April 1 to September 30 (*e.g.*, low-level flights over the nest, circling the nest) (Government of Alberta 2013c).
Sensitive Raptor Range - Bald Eagle	Alberta RK 0.0 to RK 68.8 (approximately 68.8 km)	• Recommended setbacks from bald eagle nests include: for high disturbance activities (*i.e.,* conventional pipeline), a 1,000 m setback is recommended year-round; for medium disturbance activities (*i.e.,* conventional pipeline parallel to a linear corridor), a 1,000 m setback is recommended from March 15 to July 15 and a 100 m setback is recommended from July 16 to March 14 (Government of Alberta 2013c). • In the event an active bald eagle nest is found, consult with AESRD to discuss practical options and mitigation strategies.
Sharp-Tailed Grouse Lek	Alberta In Alberta, a provincially identified sharp-tailed grouse range occurs from RK 0.0 to RK 68.8 (approximately 68.8 km) BC	• In Alberta, implement a 500 m setback in the event an active sharp-tailed grouse lek is identified. Use noise reduction equipment to muffle or otherwise control noise so that operational noise does not exceed 49 decibels measured at 10 m from the source to the 500 m setback (Government of Alberta 2013c). In the event an active sharp-tailed grouse lek is found, consult with AESRD to discuss practical options and mitigation strategies. • In BC, avoid activity in the area of identified sharp-tailed grouse leks from April 1 to May 31 (Surgenor pers. comm.). Activities are not recommended within 400 m of a sharp-tailed grouse lek between April 1 and May 31 (BC MWLAP 2004a). In the event an active sharp-tailed grouse lek is identified, consult with BC MFLNRO to discuss practical options and mitigation strategies.

TABLE L-2 Cont'd

Concern	Concern	Concern
Protective Notations (PNT)	Alberta PNT 980061 at NW 13-53-6 W5M (approximately RK 118.1 to RK 118.9) PNT 870456 at NW 22-53-10 W5M (approximately RK 161.0 to RK 161.8)	• Consult with AESRD in regards to activity in PNT 980061 (Fragmented Land Pattern) and 980160 (Research Site Structure). • Maintain tree cover and minimize new clearing requirements in PNTs 870456 (Ungulate Winter Range) and 780290 (Fish and Wildlife Resource Management Area) by paralleling the existing TMPL right-of-way (Hobson pers. comm.) • Routing has avoided the long-toed salamander breeding ponds by 100 m in PNT 020232 (Rare and Endangered Species Habitat Protection Area for long-toed salamander). Traffic should be reduced within the area of the ponds in spring and early fall to reduce mortality during salamander breeding and dispersal periods (Wilkinson pers. comm.).
Mountain Caribou Range Includes Ungulate Winter Range U-3-004 (Modified Harvest Zone) for the Wells Gray Caribou Range	BC Wells Gray Caribou Range (various locations for approximately 30.7 km from RK 550.1 to RK 602.6; includes 4.3 km within UWR U-3-004) Groundhog Caribou Range (various locations for approximately 10.3 km from RK 629.8 to RK 649.4)	• Align route to parallel existing corridors (existing TMPL right-of-way, Highway 5, existing power line) to the extent feasible to reduce habitat disturbance. • Work with the appropriate regulatory authorities for deviation from the General Wildlife Measures set out in the Order for Wells Gray caribou Ungulate Winter Range (U-3-004). • Avoid activity in early to mid-winter within caribou range (*i.e.*, November 1 to January 15) (Surgenor pers. comm.), to the extent feasible. • Implement line-of-sight breaks every 500 m along segments not sharing a right-of-way boundary with another linear corridor such as a road or power line. Line-of-sight measures may include: bends in the right-of-way; doglegs at intersections with access roads; woody debris or earth berms; tree or shrub planting to create vegetation screens across the right-of-way; avoiding clearing on the right-of-way *(e.g.*, HDD or bored crossings of watercourses, roads or other rights-of-way). • Avoid creating early seral habitat that will provide forage for moose (*e.g.*, do not plant willow or red osier dogwood) (Surgenor pers. comm.). • Avoid creation of new access within caribou range where feasible. Use existing roads/linear corridors for access whenever practical (BC OGC 2013). Where practicable, avoid building roads within 100 m of an existing trail (Kamloops LRMP Mountain Caribou Subcommittee 2006). • Deactivate and reclaim all temporary construction access within caribou range (Kamloops LRMP Mountain Caribou Subcommittee 2006). • Coordinate any new access with all users and consider caribou management issues (*i.e.,* seasonal use of the road) (Kamloops LRMP Mountain Caribou Subcommittee 2006). • Minimize winter road use and, where feasible, coordinate with other activities such as winter logging (Kamloops LRMP Mountain Caribou Subcommittee 2006). • Conduct work expeditiously to maintain a tight construction spread (*i.e.,* interval between front-end work activities such as grading and back-end activities such as clean-up) to reduce the duration of the open trench and to reduce potential barriers and hazards to wildlife. • Locate gaps in pipe to facilitate wildlife movement in places that also facilitate construction such as at slope changes, crossings (*i.e.,* watercourse, road, pipeline right-of-way, railway) and bends. The locations of the gaps should coincide with gaps in spoil, slash piles and snow windrows. The locations can be determined in the field by the Environmental Inspector. • Where segments of the right-of-way require rollback for access management or erosion control, ensure sufficient timber is set aside for this purpose during final clean-up. • Implement minimum surface disturbance construction techniques that will facilitate natural revegetation in areas where grading or blasting is not required in areas of upland deciduous and mixedwood forests and in graminoid and shrub-dominated wetland communities. • Minimize the width of the pipeline right-of-way to the extent practical by utilizing shared workspace, avoiding clearing large diameter trees on the edge of the right-of-way; minimizing extra temporary workspace (*e.g.*, place log decks, storage areas, other temporary construction areas outside of UWR U-3-004). • Maintain root layer integrity on the right-of-way by clearing vegetation above ground level and restricting grubbing to the trench width. • Protect travel and work surfaces by packing snow (during winter) to protect soils and vegetation where practical. • Avoid using seed mixtures that will attract other ungulates (deer, moose) during reclamation (Hoekstra pers. comm.). • Implement measures to reduce access (human and predator) along the pipeline right-of-way following construction. Measures include using woody debris as rollback, mounding, planting trees and/or shrubs for visual screens, and rock piles or berms across the right-of-way. The locations of access control measures along the pipeline right-of-way will be determined in consideration of consultation with provincial regulatory authorities. • Consider the following at the proposed crossing of roads, other pipelines or watercourses: extend the length of HDD or bored crossings where this crossing method has been proposed to leave a vegetated screen for line-of-sight and/or narrow the right-of-way width if feasible. • Monitor the effectiveness of access control measures and reclamation during the Post-Construction Environmental Monitoring (PCEM). Implement remedial measures if warranted. Schedule remedial work outside of the period of early to mid-winter when caribou are more likely to be in the area.

TABLE L-2 Cont'd

Concern	Concern	Concern
Mountain Caribou Range Includes Ungulate Winter Range U-3-004 (Modified Harvest Zone) for the Wells Gray Caribou Range (cont'd)	See above	• Limit vegetation control along the right-of-way and allow natural regeneration during the operation phase to the extent feasible. • Limit operational access along the pipeline right-of-way within caribou range. • Report any sightings of caribou during construction and operation to Trans Mountain's Lead Environmental Inspector or Environmental Inspector(s).
Ungulate Winter Range for Mule Deer (U-3-003)	BC Various locations for approximately 36.7 km from RKP 891.6 to RK 969.6	• A timing window does not apply to this UWR (Surgenor pers. comm.). • Minimize the pipeline right-of-way width to the extent practical by utilizing shared workspace, avoid clearing large diameter trees on the edge of the right-of-way; minimizing extra temporary workspace (*e.g.*, placing log decks, storage areas, other temporary construction areas outside of the UWR). Maintain root layer integrity on the right-of-way by clearing vegetation above ground level and restricting grubbing to the extent feasible. Avoid creation of new access. Use existing roads/linear corridors for access wherever practical. Deactivate and reclaim all temporary access. Implement measures to reduce access (human and predator). Measures include using woody debris as rollback, and planting trees and/or shrubs at select locations. • Work with the appropriate regulatory authorities for deviation from the General Wildlife Measures set out in the Ungulate Winter Range Order.
Ungulate Winter Range for Mule Deer and Columbian Black-Tailed Deer (U-2-006)	BC Approximate 1.3 km segment from RK 1029.6 to RK 1030.9	• Work with the appropriate regulatory authorities to discuss the General Wildlife Measures set out in the Ungulate Winter Range Order. The measures may not be applicable to exploration, development and production activities when these activities have been authorized by the *Pipeline Act*.
Sowaqua Spotted Owl WHA 2-498 (Long-Term Owl Habitat Area)	BC Various locations for approximately 10.4 km from RK 1022.9 to RK 1038.2	• Align route to parallel existing corridors (*i.e.*, existing TMPL right-of-way, Highway 5) to the extent feasible to reduce habitat disturbance. • Do not clear timber, stumps, brush or other vegetation beyond the marked construction right-of-way boundaries. • Minimize the width of the pipeline right-of-way to the extent practical by utilizing shared workspace, avoid clearing large diameter trees on the edge of the right-of-way; minimizing extra temporary workspace (*e.g.*, placing log decks, storage areas, other temporary construction areas outside the Sowaqua Spotted Owl WHA). • Avoid clearing large wildlife trees/veteran trees and snags where feasible. Retain slow decaying tree species (*e.g.* cedar) where feasible (Blackburn *et al.* 2009). • Place large coarse woody debris (diameters greater than 50 cm in dry ecosystems and 75 cm in wet ecosystems). Utilize the largest coarse woody debris available where this is not available. Avoid breaking coarse woody debris into sections smaller than 10 m where feasible (Blackburn *et al.* 2009). • Avoid creation of new access, where feasible. Use existing roads/linear corridors for access whenever practical. Deactivate and reclaim all temporary construction access. • Do not use pesticides within the Sowaqua Spotted Owl WHA (BC MOE 2011b). • Use natural regeneration strategies in harvest openings (Blackburn *et al.* 2009). • Prepare a detailed Mitigation Plan in consultation with BC MFLNRO's Spotted Owl Recovery Coordinator. • Work with the appropriate regulatory authorities for deviation from the General Wildlife Measures set out in the Wildlife Habitat Area Order.

TABLE L-2 Cont'd

Concern	Concern	Concern
Important Bird Area	BC Douglas Lake Plateau (BC172) RK 850.6 to RK 865.4 (14.8 km) RK 885.8 to RK 888.8 (3.0 km) RK 897.6.0 to RK 898.2 (0.7 km)	• Schedule clearing and construction activities outside the migratory bird breeding season of March 15 to August 15 (Wilson pers. comm.). In the event clearing or construction activities are scheduled during the migratory bird breeding season, follow measures for conducting migratory bird nest sweeps described below. • In simple habitat types where active nests are easier to locate (*i.e.,* previously cleared areas and open areas with sparse vegetation and few trees), a nest sweep may be completed within 7 days of activity that is scheduled to occur within the migratory bird RAP. Use non-intrusive methods to conduct an area search for evidence of nesting (*e.g.,* presence of singing birds, territorial males, alarm calls, distraction displays). In the event an active nest is found, it will be subject to site-specific mitigation measures (*i.e.,* clearly marked protective buffer around the nest and/or non-intrusive monitoring). • In complex habitats where active nests are more difficult to find (*e.g.,* forests), it is recommended that pre-clearing be conducted. If this is not feasible and activity is scheduled to occur within the migratory bird RAP, contact Environment Canada prior to activity to discuss the area to be cleared. Use non-intrusive methods to conduct an area search for evidence of nesting (*e.g.,* presence of singing birds, territorial males, alarm calls, distraction displays). In the event an active nest is found, it will be subject to site-specific mitigation measures (*i.e.,* clearly marked protective buffer around the nest and/or non-intrusive monitoring). • Conduct species specific surveys to identify important wildlife features for species known to occur in the area (*e.g.*, sharp-tailed grouse leks, burrowing owl burrows, Lewis's woodpecker or Williamson's sapsucker nest). In the event these are found, consult with BC MFLNRO to discuss practical options and mitigation strategies.
	BC English Bay and Burrard Inlet (BC020) RK 1183.2 to RK 1183.6 (400 m)	• Schedule clearing and construction activities outside the migratory bird breeding season of March 15 to August 15 (Wilson pers. comm.). In the event clearing or construction activities are scheduled during the migratory bird breeding season, follow measures for conducting migratory bird nest sweeps described below. • In simple habitat types where active nests are easier to locate (*i.e.,* previously cleared areas and open areas with sparse vegetation and few trees), a nest sweep may be completed within 7 days of activity that is scheduled to occur within the migratory bird RAP. Use non-intrusive methods to conduct an area search for evidence of nesting (*e.g.,* presence of singing birds, territorial males, alarm calls, distraction displays). In the event an active nest is found, it will be subject to site-specific mitigation measures (*i.e.,* clearly marked protective buffer around the nest and/or non-intrusive monitoring). • In complex habitats where active nests are more difficult to find (*e.g.,* forests), it is recommended that pre-clearing be conducted. If this is not feasible and activity is scheduled to occur within the migratory bird RAP, contact Environment Canada prior to activity to discuss the area to be cleared. Use non-intrusive methods to conduct an area search for evidence of nesting (*e.g.,* presence of singing birds, territorial males, alarm calls, distraction displays). In the event an active nest is found, it will be subject to site-specific mitigation measures (*i.e.,* clearly marked protective buffer around the nest and/or non-intrusive monitoring). • Conduct species specific surveys to identify important wildlife features for species known to occur in the area (*e.g.*, bald eagle nests, great blue heron colonies). In the event these are found, consult with BC MFLNRO to discuss practical options and mitigation strategies.
Raptor Nest	Alberta/BC	• Schedule clearing and construction activities outside of sensitive time periods for raptors (provided below) to the extent feasible. In the event clearing is scheduled within these periods, in areas of suitable habitat, conduct raptor nest searches prior to clearing to locate active raptor nests. In the event an active raptor nest is discovered, consult with the appropriate regulatory authorities to discuss practical options and mitigation strategies. • In Alberta, implement the appropriate setback in the event an active nest of a sensitive raptor is found (*i.e.,* ferruginous hawk, bald eagle, golden eagle, prairie falcon, peregrine falcon). For high disturbance activities (i.e., conventional pipeline), a 1,000 m setback is recommended year-round. For medium disturbance activities (*i.e.,* conventional pipeline parallel to a linear corridor), a 1,000 m setback is recommended from March 15 to July 15 and a 100 m setback is recommended from July 16 to March 14 (Government of Alberta 2013c). All other raptor nests (*e.g.*, red-tailed hawk) have a recommended 100 m setback when they are active (Government of Alberta 2013c). • In BC, eagle, peregrine falcon, gyrfalcon, osprey and burrowing owl nests are protected year-round by the BC *Wildlife Act* and may not be cleared. The *Guidelines for Raptor Conservation* (BC MOE 2013a) provides information on sensitive breeding and nesting time periods and buffers for raptor nests according to their tolerance to human disturbance. These buffers range from 50 m to 500 m depending on the surrounding land use and species. During the breeding season, an additional 100 m "quiet" buffer is recommended. Clearly mark the appropriate buffers with fencing to prevent access to the nest. • If construction is unavoidable within the recommended year-round and breeding buffers, a Nest Management Plan addressing various mitigation (including nest monitoring during the breeding period) is recommended. • If construction activities require the removal of a raptor nest that is protected year-round under the BC *Wildlife Act* (*i.e.*, eagle, peregrine falcon, gyrfalcon, osprey and burrowing owl), Trans Mountain will work with the appropriate regulatory authorities to develop a Nest Removal Management and Compensation Plan. Upon confirmation the nest is inactive, nest removal should occur during the least risk window of August through December. When a nest is removed the installation of a replacement structure (*i.e.*, a platform on a pole or transplanted tree) should be erected in nearby suitable habitat (BC MOE 2013a).

TABLE L-2 Cont'd

Concern	Concern	Concern
Great Blue Heron Nesting Colony	Alberta/BC	• Schedule clearing and construction activities outside of sensitive time periods for great blue heron (provided below), to the extent feasible. In the event clearing is scheduled within these periods, in areas of suitable habitat, conduct nest searches during the breeding season and prior to clearing to locate nesting colonies. In the event an active colony is discovered, the appropriate buffer will be applied (provided below). • In Alberta, activities are not recommended within 1,000 m with the exception of Low and Medium impact activities (*i.e.*, conventional pipeline along existing linear disturbances) that may occur up to 100 m from a colony when construction occurs from September 1 and February 28 (Government of Alberta 2013c). • In BC, great blue heron nests are protected year-round under the BC *Wildlife Act*. The following are the recommended setbacks: 300 m (undeveloped), 200 m (rural), 60 m (urban) and a 200 m "quiet" buffer during the breeding season from the outer perimeter of all nesting trees. The least risk window is from September 1 to February 15 (BC MOE 2012a).
Stream-Dwelling Amphibian – Coastal Tailed Frog and Pacific Giant Salamander	BC Coastal tailed frog: RK 965.8 to RK 1117 Pacific giant salamander: RK 1067 to RK 1090	• Maintain a 30 m setback distance (core buffer) from streams identified as coastal tailed frog habitat, where disturbance is to be avoided to the extent feasible. Minimize disturbance within an additional 20 m buffer extending beyond the core buffer (BC MOE 2012), where feasible. • Maintain a 50 m setback distance (core buffer) from streams identified as Pacific giant salamander habitat, where disturbance is to be avoided to the extent feasible. Minimize disturbance within an additional 30 m buffer extending beyond the core buffer (BC MOE 2012), where feasible. • Place large coarse woody debris on the pipeline right-of-way after construction, from either the 30 m setback boundary of the streambank to 100 m distance from suitable (*i.e.,* known or likely to be occupied) streams for coastal tailed frog and Pacific giant salamander (BC MWLAP 2004a). • If a trenched stream crossing method is necessary, implement the following measures: • Use existing access to facilitate construction, where feasible. If no existing access is available, limit instream crossings to one vehicular/equipment crossing to install an appropriate temporary crossing to facilitate construction. Remove crossings following construction. • Limit riparian disturbance to the maximum extent feasible within 50 m of coastal tailed frog streams. Clear only the minimum workspace necessary to facilitate construction. Use hand clearing methods within 50 m of the stream. • Where slopes exceed 60%, riparian avoidance buffers should extend beyond the top of the ravine. • Clearly mark and/or fence off riparian buffers prior to clearing and construction. • Install and maintain appropriate erosion control measures to prevent sedimentation during and following construction. • Maintain stream flows throughout construction. • Following construction, reclaim disturbed riparian areas using best available techniques to encourage rapid regeneration of native riparian vegetation. Monitor and implement remedial measures, if warranted, to ensure riparian restoration is adequate. • Conduct an amphibian salvage prior to clearing and construction activities at known coastal tailed frog and Pacific giant salamander breeding locations. Adhere to the *Best Management Practices for Amphibian and Reptile Salvages in BC* (EDI Environmental Dynamics *et al. in prep*). Note that coastal tailed frog and Pacific giant salamander use the same stream year-round, therefore, this mitigation is applicable year-round. In the event that coastal tailed frogs and/or Pacific giant salamanders are identified on the pipeline right-of-way during construction, the following mitigation is recommended: • remove the frogs/salamanders to the closest suitable upstream habitat, if it is safe to do so; • ensure frogs/salamanders are not held for longer than necessary to move them to the closest suitable habitat; • ensure frogs/salamanders are not held for more than two to four hours under any circumstances; and • frogs/salamanders must be captured, held, transported and released humanely. • Use sediment control measures from *Standards and Best Practices for Instream Works* (BC MWLAP 2004a). • Review opportunities to enhance the habitat by planting/allowing native vegetation growth that provides a protective buffer along streams, and maintain stream habitat complexity (*i.e.*, a natural meandering channel with stabilized banks, and step-pool morphologies) (BC MWLAP 2004a).
Stream-Dwelling Amphibian – Coastal Tailed Frog and Pacific Giant Salamander (cont'd)	see above	

TABLE L-2 Cont'd

Concern	Concern	Concern
Amphibian Breeding Pond	Alberta/BC	• Schedule clearing and construction activities outside of the breeding and seasonal migration periods for amphibians, where feasible. In Alberta, this is generally mid-April to mid-June (Government of Alberta 2013c). In BC, this will vary depending on pipeline segment and can be from mid-April to mid-June (Hargreaves to Hope) and from February to late-July or August (Hope to Westridge) (Wind pers. comm.). • In Alberta, in the event that a western toad breeding pond is found, a year-round 100 m setback distance is recommended (Government of Alberta 2013c). • In Alberta, in the event a long-toed salamander breeding pond is found, a year-round 200 m setback distance (where new-cut is required) and a 100 m setback distance (when paralleling existing linear disturbance) is recommended (Government of Alberta 2013c). In reference to the long-toed salamander breeding pond at NW 33-49-26 W5M (RK 339.3) located approximately 30 m north of the Hinton Pump Station, AESRD will be consulted to discuss mitigation for both the proposed expansion of the pump station, as well as pipeline construction. For activity in the summer (breeding season), mitigation may include exclusion fencing, onsite monitors and relocation if warranted. • In BC, protect identified amphibian breeding ponds by implementing appropriate buffers (150 m undeveloped; 100 m rural; 30 m urban) (BC MOE 2012a). • A year-round 400 m federal setback distance is recommended for western toad breeding ponds and wintering sites (Environment Canada 2011). • If the proposed construction right-of-way is located within the recommended buffer, consult with the appropriate regulatory authorities to determine the appropriate mitigation measures. • Apply standard wetland construction and reclamation mitigation (*e.g.*, minimal disturbance, recontouring, reclamation, monitoring and remedial measures) to support habitat reclamation as needed. • Use snow packing and mats to avoid excessive soil compaction in the proximity of wetlands and watercourses. • Maintain natural hydrology of streams and wetlands during clearing, construction and clean-up activities. • Install fencing around wetlands for clearing and construction activities scheduled during the amphibian breeding period (spring), where warranted, to protect important habitat (BC MWLAP 2004d). • Install fencing along construction workspace near identified breeding ponds to prevent dispersing amphibians from entering the construction zone and limit vehicular activity in spring and early fall to reduce effects during the breeding and dispersal periods (Wilkinson pers. comm.). All fencing installed during clearing and construction activities should be removed once they are no longer necessary to prevent barriers to amphibian movement following construction. • Reclaim borrow pits and avoid creating small artificial ponds by avoiding construction during wet conditions that would create excessive soil rutting; grade ruts in construction access and on the right-of-way where rutting cannot be avoided. • Do not mow/brush vegetation within wetland riparian (fringe) areas during operation. • Conduct an amphibian salvage prior to clearing and construction activities at known amphibian breeding pond locations. Ensure the appropriate permit(s) is obtained and adhere to the *Best Management Practices for Amphibian and Reptile Salvages in BC* (EDI Environmental Dynamics *et al. in prep*). • If the proposed pipeline right-of-way is located within the recommended setback distance of an amphibian breeding pond, consult with the appropriate regulatory authorities to discuss practical options and mitigation strategies.
Pacific Water Shrew	BC – RKP 1064 to 1179 ; Burnaby to Westridge (RKP 0 to RKP 3.6)	• Where feasible, implement the following measures where Pacific water shrew are identified: a 100 m buffer from the Pacific water shrew habitat should be established and clearly marked and fenced off to prevent access; replant native vegetation (shrubs and trees) within 30 m of the stream or wetland to replace any cleared vegetation; and where replanting is not feasible, coarse woody debris should be placed within 30 m of the stream or wetland to provide cover and foraging habitat (Craig *et al.* 2010). • If Pacific water shrew are identified, a capture and release may be required to temporarily/permanently relocate individual shrews.

TABLE L-2 Cont'd

Concern	Concern	Concern
Oregon Forestsnail	BC RK 1043.7 to RK 1179; Burnaby to Westridge (RK 0 to RK 3.6)	• Avoid clearing during spring-early summer (March-June) when snails are most active on the surface and depositing eggs (BC MOE 2007). If clearing or construction occurs in spring, conduct a pre-construction survey in areas with high habitat suitability (*e.g.*, patches of stinging nettle, dense herbaceous vegetation with fringecup or other moisture-loving plants, riparian areas, or other suitable moist sites) in late March or early April to the end of June prior to vegetation clearing (BC MOE 2007). • If a snail is found, move it off the construction footprint. Install barrier fencing at the time of the survey to deflect movements of snails away from the construction footprint. Maintain the fencing until construction activities are complete (BC MOE 2007). • Restore riparian zones and natural drainage patterns as soon as practical after construction (BC MOE 2007). • Retain big leaf maples, especially large diameter trees, wherever feasible (BC MOE 2007). • Restrict heavy machinery and vehicles to the construction footprint (BC MOE 2007). • Clean machinery and boots prior to use to avoid introducing non-native species (BC MOE 2007). • Avoid compaction of soil, disturbance of herbaceous plants and removal of coarse woody debris (BC MOE 2007), to the extent practical. • Manage construction waste and pollutants to prevent contamination of snail habitat (BC MOE 2007). • During operations, retain coarse woody debris on the pipeline right-of-way, including large-diameter downed logs; limit vegetation control (mowing) to leave undisturbed patches of stinging nettle and other herbaceous vegetation where concentrations of snails or patches of high-quality habitat occur (BC MOE 2007). • If clearing of the right-of-way is needed for operations, use hand clearing methods and mechanical clearing rather than herbicides (BC MOE 2007).
Reptiles	BC	• In the event an active snake hibernacula is identified, implement a 150 m buffer (BC MOE 2012), and avoid activity during the period of April 15 to September 30 (BC MWLAP 2004d), to the extent feasible. • Consult with BC MFLNRO to determine the location and need for additional site-specific mitigation measures (*e.g.*, exclusion fencing for the open trench or along vehicle travel lanes) at identified locations where there is high potential for encountering snakes (*e.g.*, Lac du Bois Road [Grasslands Conservation Council of British Columbia 2009]). • All workers will receive education prior to commencing work, which will include best practices for avoiding snakes and appropriate protocols in the event a snake is detected at the work site. Refer to the Wildlife Conflict Management Plan in Appendix C of the Pipeline EPP.
Bats	Alberta/BC	• In Alberta, roosts and hibernation sites of northern long-eared bats have a year round 300 m setback from high disturbance activities; 100 m setback from medium disturbance activities and a 50 m setback from low disturbance activities. (Government of Alberta 2013c). • In BC, protect bat roosts from disturbance by humans and other sensory disturbances (BC MOE 2012a). Implement a 125 m buffer from bat hibernacula (from October 1 to April 30 or maternity roost (from May 1 to August 31) (BC MWLAP 2004a). Consult with BC MFLNRO where disturbance of a hibernacula or maternity roost is unavoidable to discuss practical options and mitigation strategies. • Do not blast, remove rock or talus, or construct new roads in the area surrounding a hibernacula or maternity roost unless there is no other practical option. Consult with BC MFLNRO to discuss alternate mitigation (BC MWLAP 2004a). • Schedule blasting that may occur within 1 km of Keen's long-eared myotis maternity roosts and hibernacula, to occur outside the period from October 1 to May 31 (BC MWLAP 2004a). Consider applying this best practice to other bat species.
Mammal Dens	Alberta/BC	• Contact provincial regulatory authorities to discuss the appropriate mitigation in the event an active bear den is discovered on or near the work site. Mitigation may include establishing protective buffers, monitoring the den and/or modifying the construction schedule to avoid activity until the den is no longer active. • In Alberta, in the event an active mammal den is found, a 100 m setback is recommended (Government of Alberta 2013c). A setback of 750 m for high disturbance activities (i.e., conventional pipelines) and 500 m for medium disturbance activities (i.e., conventional pipeline parallel to a linear corridor) from October 1 to April 30, is recommended in the event an active grizzly bear den is discovered (Government of Alberta 2013c). • In BC, a setback of 50 m from active bear dens is recommended (BC OGC 2013).

TABLE L-2 Cont'd

Concern	Concern	Concern
Mineral Licks	Alberta/BC	• Implement a 100 m setback in the event a mineral lick is identified (Government of Alberta 2013c, BC OGC 2013). In the event that shifting/narrowing the pipeline right-of-way is not feasible to maintain the minimum setback from a mineral lick, consult with AESRD or BC MFLNRO to discuss practical options and mitigation strategies. • Maintain the integrity of trails to mineral licks and do not isolate from nearby escape cover (*e.g.*, dense forest) (BC MWLAP 2004a). • Avoid activities (*i.e.*, clearing, construction, helicopter overflights) near mineral licks during critical periods (May to November) (BC MWLAP 2004a), to the extent feasible. • Deactivate access roads as soon as practical (BC MWLAP 2004a). • Leave a gap in set-up pipe within the area of the mineral lick to allow wildlife to access the mineral lick. The locations of the gaps in strung pipe should coincide with gaps in strippings, spoil, snow and rollback windrows.
Beaver Dams/Lodges	Alberta/BC	• Notify DFO 14 days prior to beaver dam removal and ensure that the removals are conducted in accordance with conditions of DFO's Alberta Operational Statement for Beaver Dam Removal (Fisheries and Oceans Canada 2007). • In BC, in the event that beaver dams or lodges will be disturbed, submit a notification to the appropriate regional Habitat Officer of the BC MFLNRO at least 45 days prior to beaver dam removal, as per Section 40 of the *Water Regulation*. Following this notification, obtain a Ministry of Natural Resource Operations Wildlife Sundry Permit to remove a beaver dam. Standards and best practices for beaver dam removal identified in the BC *Standards and Best Practices for Instream Works* (BC MWLAP 2004a) will be applied.
Species with Special Conservation Status	Alberta/BC	• In the event that a species with special conservation status is observed during construction, the appropriate regulatory authorities will be contacted to determine if additional mitigation measures are warranted. • Implement the Wildlife Species of Concern Discovery Contingency Plan in the event that wildlife species of concern are identified during construction.

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX M

HERITAGE RESOURCES (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for key areas of archaeological potential along the Project's proposed pipeline corridor. Any sites of archaeological potential encountered with corresponding resource site-specific mitigation measures are provided in Table M-1. Any sites of palaeontological potential encountered with corresponding resource site-specific mitigation measures are provided in Table M-2 to be included prior to construction.

Refer to the Heritage Resources Technical Report for further details regarding sites of archaeological and palaeontological potential encountered and coinciding mitigation recommendations.

TABLE M-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR SITES OF ARCHAEOLOGICAL POTENTIAL WITHIN THE PIPELINE CORRIDOR

Alignment Sheet	Start RK	End RK	Archaeological Site by Borden Designation [Temporary Site Number]	Feature	Potential Mitigation Measures
3	2.94	7.77	HS81799; HS81800	Heritage site	• Avoid the site by amending the development footprint, these sites will be clearly marked using fencing or flagging; • Mitigate the site by the collection of artifacts, map, photographic documentation and completion of an Archaeological Site Inventory Form; • Have present a qualified archaeologist or palaeontologist to monitor the salvage of topsoil, grading and/or trenching operations; • Install geotextile and swamp mat(s) to protect the site if on extra temporary workspace or an access road; and • Conduct an excavation to retrieve heritage information and establish an adequate record of the site according to applicable provincial heritage resources guidelines.
3	2.94	7.77	HS81808; HS81809	Heritage site	
4	7.77	11.10	[HS20]	Heritage site	
11	36.72	41.78	[HS21]	Heritage site	
16	59.83	64.48	[SI01]	Heritage site	
18	69.23	73.51	[SI03]	Heritage site	
18	69.23	73.51	[SI04]	Heritage site	
22	87.15	91.35	[SI05]	Heritage site	
23	91.35	95.31	[HS01]	Heritage site	
28	110.54	115.18	[HS06]	Heritage site	
28	110.54	115.18	[HS01]	Heritage site	
28	110.54	115.18	[HS08]	Heritage site	
28	110.54	115.18	[HS04]	Heritage site	
28	110.54	115.18	[HS07]	Heritage site	
28	110.54	115.18	[HS02]	Heritage site	
28	110.54	115.18	[HS03]	Heritage site	
28	110.54	115.18	[HS02-07]	Heritage site	
28	110.54	115.18	[HS05]	Heritage site	
34	136.39	141.19	FjPs-4	Heritage site	
34	136.39	141.19	FjPs-4	Heritage site	
40	164.40	168.69	[S01-A]	Heritage site	
40	164.40	168.69	[S01-B]	Heritage site	
43	177.69	182.38	[HS01-02]	Heritage site	
43	177.69	182.38	[HS01]	Heritage site	
46	191.32	195.70	[HS01]	Heritage site	
51	213.732	218.10	[HS-7]	Heritage site	
51	213.732	218.10	[HS-10]	Heritage site	
51	213.732	218.10	[HS-07]	Heritage site	
51	213.732	218.10	[HS-11]	Heritage site	

TABLE M-1 Cont'd

Alignment Sheet	Start RK	End RK	Archaeological Site by Borden Designation [Temporary Site Number]	Feature	Potential Mitigation Measures
52	218.10	222.70	[HS-06]	Heritage site	• Avoid the site by amending the development footprint, these sites will be clearly marked using fencing or flagging; • Mitigate the site by the collection of artifacts, map, photographic documentation and completion of an Archaeological Site Inventory Form; • Have present a qualified archaeologist or palaeontologist to monitor the salvage of topsoil, grading and/or trenching operations; • Install geotextile and swamp mat(s) to protect the site if on extra temporary workspace or an access road; and • Conduct an excavation to retrieve heritage information and establish an adequate record of the site according to applicable provincial heritage resources guidelines.
56	236.62	241.23	[HS05]	Heritage site	
56	236.62	241.23	[HS05]	Heritage site	
63	267.71	272.49	FjQf-2	Heritage site	
72	310.51	314.31	[HS Railroad]	Heritage site	
74	319.14	323.80	[C2S1]	Heritage site	
74	319.14	323.80	[HS02]	Heritage site	
75	323.80	328.70	[HS03]	Heritage site	
75	323.80	328.70	[HS04]	Heritage site	
75	323.80	328.70	[HS02]	Heritage site	
75	323.80	328.70	[HS03]	Heritage site	
78	337.24	339.44	FhQk-2	Heritage site	
119	612.62	615.07	[SI-2MK]	Heritage site	
203-204	897.77	904.12	[CMT 1]	Heritage site	

Note: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

TABLE M-2

RESOURCE-SPECIFIC MITIGATION MEASURES FOR SITES OF PALAEONTOLOGICAL POTENTIAL WITHIN THE PIPELINE CORRIDOR

Start (RK)	End (RK)	Legal Location	Palaeontological Site	Feature	Potential Mitigation

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX N

SOCIO-ECONOMIC AND AGRICULTURE (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for various land and resource use features and issues along the Project's proposed pipeline corridor in Alberta and BC. The various land and resource use features encountered with corresponding resource site-specific mitigation measures are provided in Table N-1.

Refer to the Socio-Economic Technical Report for further details regarding various land and resource use features encountered and coinciding mitigation recommendations.

TABLE N-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR LAND AND RESOURCE USE FEATURES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start RK	End RK	Legal Location (LSD/PNG)	Agriculture Type	Feature	Potential Mitigation Measures
107.18	107.43	13-18-053-04 W5M	Livestock	Beef Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
109.59	109.88	16-14-053-05 W5M to 15-14-053-05 W5M	Plant-based	Field Nursery	See Appendix C – Agricultural Management Plan; ensure production systems are effectively re-established.
215.11	215.36	04-29-053-15 W5M to 01-30-053-15 W5M	Livestock	Beef Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
506.95	507.60	a-042-L/083-D-14 to c-031-L/083-D-14	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
510.68	510.91	b-019-K/083-D-14 to c-009-K/083-D-14	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
511.69	512.73	a-009-K/083-D-14 to a-098-F/083-D-14	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
531.85	532.02	a-011-C/083-D-14	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
687.38	688.01	b-003-J/082-M-12 to d-094-G/082-M-12	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
700.07	703.40	d-001-F/082-M-12 to c-004-F/082-M-12	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
708.99	709.36	a-011-E/082-M-12 to c-011-E/082-M-12	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
714.11	715.15	b-045-E/082-M-12 to b-056-E/082-M-12	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
718.09	718.79	a-079-E/082-M-12 to c-079-E/082-M-12	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
719.04	720.26	d-080-E/082-M-12 to d-071-H/092-P-09	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
729.93	730.17	d-029-H/092-P-09 to c-029-H/092-P-09	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
734.46	737.02	a-081-B/092-P-09 to d-074-B/092-P-09	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
749.03	749.66	d-078-J/092-P-08 to b-078-J/092-P-08	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
750.40	753.76	b-068-J/092-P-08 to d-028-J/092-P-08	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
758.49	760.06	a-087-G/092-P-08 to c-066-G/092-P-08	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
764.59	765.02	b-025-G/092-P-08 to c-015-G/092-P-08	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
768.19	768.34	a-085-B/092-P-08	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
768.34	768.52	a-085-B/092-P-08	Livestock	Beef Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
815.45	816.73	d-001-K/092-I-16 to d-092-F/092-I-16	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
818.76	819.36	c-072-F/092-I-16 to c-062-F/092-I-16	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
819.36	819.87	c-062-F/092-I-16 to b-062-F/092-I-16	Livestock	Beef Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
824.74	825.28	c-025-F/092-I-16 to a-026-F/092-I-16	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
912.00	912.26	b-079-I/092-I-02 to a-080-I/092-I-02	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
923.46	926.77	a-088-G/092-I-02 to b-059-G/092-I-02	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
928.09	928.28	d-040-G/092-I-02	Livestock	Beef Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
929.71	930.38	a-021-F/092-I-02 to d-011-F/092-I-02	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
932.89	933.01	d-093-C/092-I-02 to a-093-C/092-I-02	Livestock	Equestrian Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
946.34	948.32	d-002-D/092-I-02 to c-083-L/092-H-15	Plant-based	Irrigated forage/alfalfa	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.

TABLE N-1 Cont'd

Start RK	End RK	Legal Location (LSD/PNG)	Agriculture Type	Feature	Potential Mitigation Measures
1058.79	1060.43	d-099-A/092-H-05 to d-090-A/092-H-05	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1060.43	1060.89	d-090-A/092-H-05 to b-090-A/092-H-05	Livestock	Dairy Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1081.04	1081.54	c-011-K/092-H-04 to d-012-K/092-H-04	Plant-based	Display Gardens	Provide an appropriate period of notification to allow for the relocation of production.
1082.61	1084.65	a-013-K/092-H-04 to a-005-K/092-H-04	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1084.65	1084.74	a-005-K/092-H-04	Livestock	Other Livestock Facilities	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1084.74	1087.18	a-005-K/092-H-04 to b-097-F/092-H-04	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1087.18	1087.26	b-097-F/092-H-04 to a-098-F/092-H-04	Livestock	Dairy Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1087.26	1087.45	a-098-F/092-H-04	Plant-based	Mixed berry fields	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1087.45	1090.41	a-098-F/092-H-04 to d-071-E/092-H-04	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1090.41	1090.50	d-071-E/092-H-04	Livestock	Dairy Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1090.50	1090.68	d-071-E/092-H-04 to a-071-E/092-H-04	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1090.68	1090.77	a-071-E/092-H-04	Livestock	Other livestock facilities	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1090.77	1095.52	a-071-E/092-H-04 to c-045-E/092-H-04	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1098.98	1099.29	d-039-E/092-H-04 to b-039-E/092-H-04	Plant-based	Raspberries	See Appendix C – Agricultural Management Plan; ensure production systems are effectively re-established.
1100.34	1100.61	c-030-E/092-H-04 to d-021-H/092-G-01	Plant-based	Raspberries	See Appendix C – Agricultural Management Plan; ensure production systems are effectively re-established.
1100.78	1101.04	d-021-H/092-G-01	Plant-based	Container Nursery	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1101.69	1101.82	a-022-H/092-G-01	Livestock	Poultry Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production.
1103.08	1103.19	b-012-H/092-G-01	Plant-based	Hazelnuts	See Appendix C – Agricultural Management Plan; ensure production systems are effectively re-established.
1103.35	1103.48	c-002-H/092-G-01 to d-003-H/092-G-01	Livestock	Equestrian Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1103.48	1103.65	d-003-H/092-G-01	Livestock	Equestrian Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1103.86	1104.03	a-003-H/092-G-01	Plant-based	Field Nursery	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1104.16	1104.38	b-003-H/092-G-01	Livestock	Poultry Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production.
1105.00	1105.08	d-094-A/092-G-01	Livestock	Poultry Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production.
1105.08	1105.14	d-094-A/092-G-01 to b-094-A/092-G-01	Plant-based	Blueberries	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1105.79	1106.02	b-094-A/092-G-01 to a-095-A/092-G-01	Organic	Organic crops confirmed	See Appendix C – Agricultural Management Plan; ensure the diligent implementation of Organic Land construction mitigation measures.
1106.71	1106.83	b-095-A/092-G-01 to a-096-A/092-G-01	Organic	Organic crops confirmed	See Appendix C – Agricultural Management Plan; ensure the diligent implementation of Organic Land construction mitigation measures.
1107.43	1107.55	b-096-A/092-G-01	Plant-based	Blueberries	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1107.55	1108.03	b-096-A/092-G-01 to d-087-A/092-G-01	Livestock	Equestrian Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1110.11	1110.54	c-089-A/092-G-01 to a-090-A/092-G-01	Plant-based	Blueberries	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1110.54	1111.25	a-090-A/092-G-01 to b-090-A/092-G-01	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1111.25	1111.79	b-090-A/092-G-01 to a-081-B/092-G-01	Plant-based	Turf	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1114.50	1114.58	d-074-B/092-G-01 to c-074-B/092-G-01	Plant-based	Blueberries	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1121.38	1122.03	a-091-C/092-G-01 to a-092-C/092-G-01	Plant-based	Container Nursery	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1121.75	1122.03	b-091-C/092-G-01 to a-092-C/092-G-01	Plant-based	Blueberries	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1122.03	1122.44	a-092-C/092-G-01 to d-092-C/092-G-01	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1122.44	1122.72	d-092-C/092-G-01 to c-092-C/092-G-01	Plant-based	Blueberries	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.

TABLE N-1 Cont'd

Start RK	End RK	Legal Location (LSD/PNG)	Agriculture Type	Feature	Potential Mitigation Measures
1122.72	1123.86	c-092-C/092-G-01 to b-003-F/092-G-01	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1123.86	1124.83	b-003-F/092-G-01 to c-004-F/092-G-01	Plant-based	Blueberries	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1124.83	1125.70	c-004-F/092-G-01 to b-015-F/092-G-01	Plant-based	Forage/corn	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification.
1125.70	1126.15	b-015-F/092-G-01 to a-016-F/092-G-01	Plant-based	Field Nursery	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1126.15	1126.30	a-016-F/092-G-01	Plant-based	Container Nursery	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1126.30	1126.50	a-016-F/092-G-01 to c-093-A/092-G-01	Plant-based	Blueberries	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.
1131.14	1131.82	a-031-E/092-G-01 to b-031-E/092-G-01	Plant-based	Container Nursery	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1132.61	1133.02	c-032-E/092-G-01 to d-033-E/092-G-01	Plant-based	Container Nursery	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1134.35	1134.99	b-044-E/092-G-01 to a-045-E/092-G-01	Livestock	Poultry Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production.
1140.58	1140.76	a-061-H/092-G-02	Plant-based	Container Nursery	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1144.94	1145.04	c-075-H/092-G-02	Plant-based	Turf	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification to allow for the relocation of production; ensure production systems are effectively re-established.
1149.79	1149.95	a-009-I/092-G-02 to d--009-I/092-G-02	Livestock	Equestrian Facility	See Appendix C – Agricultural Management Plan; provide an appropriate period of notification; ensure production systems are effectively re-established.

Note: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX O

AIR QUALITY (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for various air quality features and issues along the Project's proposed pipeline corridor in Alberta and BC.

The various air quality features encountered with corresponding resource site-specific mitigation measures are provided in Table O-1 to be included prior to construction.

Refer to the Air Quality Technical Report for further details regarding various air quality features encountered and coinciding mitigation recommendations.

TABLE O-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR AIR QUALITY FEATURES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start (RK)	End (RK)	Legal Location	Feature	Issue	Description	Potential Mitigation

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX P

NOISE (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for various noise features and issues along the Project's proposed pipeline corridor in Alberta and BC. The various noise features encountered with corresponding resource site-specific mitigation measures are provided in Table P-1 to be included prior to construction.

Refer to the Noise Technical Report for further details regarding noise features encountered and coinciding mitigation recommendations.

TABLE P-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR NOISE FEATURES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

Start (RK)	End (RK)	Legal Location	Feature	Issue	Description	Potential Mitigation

Notes: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX Q

TRADITIONAL LAND USE (RESOURCE-SPECIFIC MITIGATION)

Resource-specific mitigation measures have been identified for traditional land use along the Project's proposed pipeline corridor in Alberta. The traditional land use features encountered with corresponding resource site-specific mitigation measures are provided in Table Q-1.

Refer to the Traditional Land Use Technical Report for further details regarding traditional resources and resource use features encountered and coinciding mitigation recommendations.

TABLE Q-1

RESOURCE-SPECIFIC MITIGATION MEASURES FOR TRADITIONAL LAND AND RESOURCE USE FEATURES ENCOUNTERED WITHIN THE PIPELINE CORRIDOR

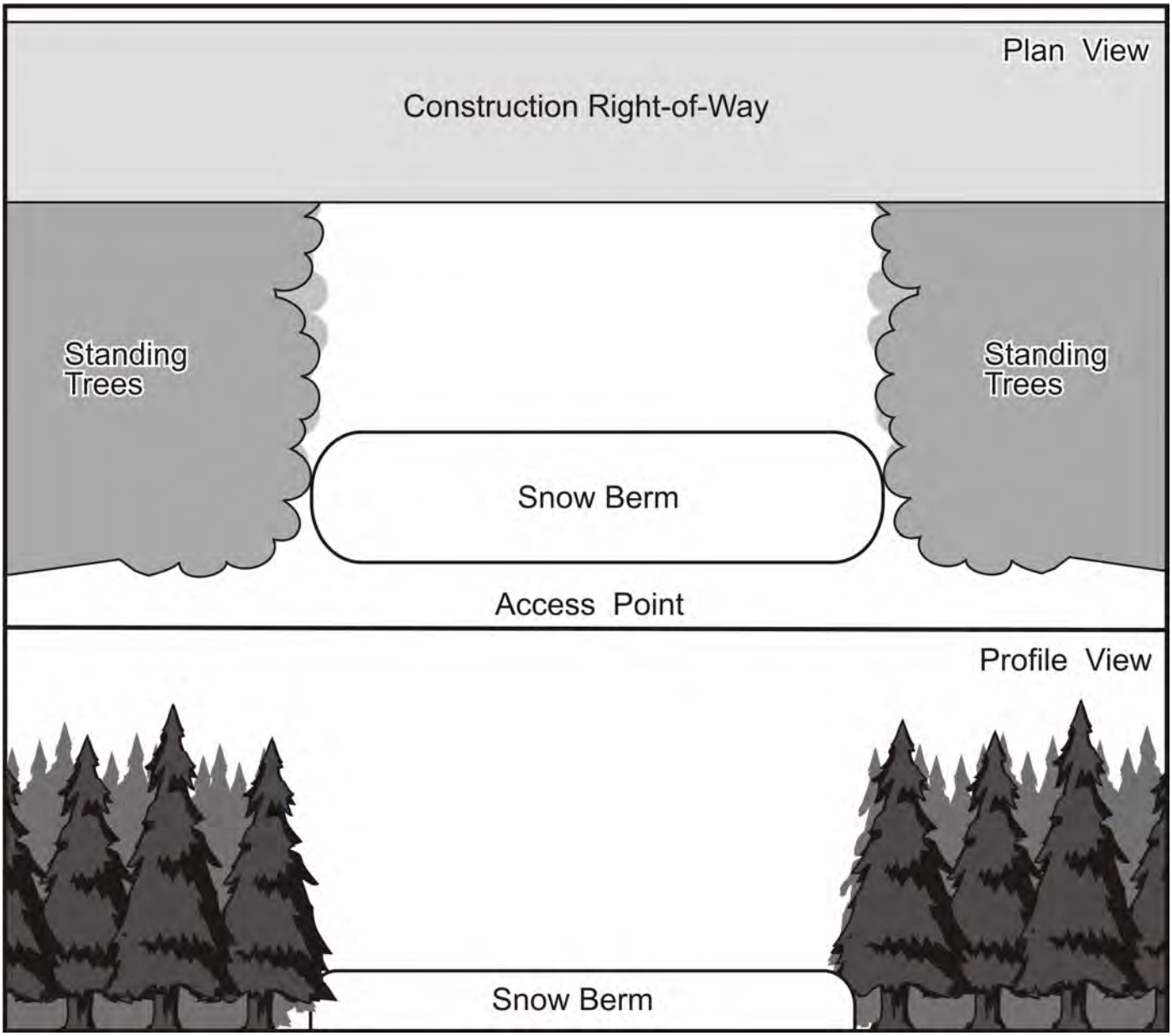
Start RK	End RK	Legal Location (LSD)	Feature	Potential Mitigation Measures
40.48	40.48	4-20-52-25 W4M	TLU Site	Avoidance
118.57	118.57	12-13-53-6 W5M	TLU Site	Plant harvesting
141.84	141.84	12-22-53-8 W5M	TLU Site	Avoidance
174.22	174.22	11-29-53-11 W5M	TLU Site	Avoidance
175.88	175.88	11-30-31-11 W5M	TLU Site	Plant harvesting
205.27	205.27	9-19-53-14 W5M	TLU Site	Plant harvesting
205.69	205.69	10-19-53-14 W5M	TLU Site	Plant harvesting
334.20	335.00	9-15-20-26 W5M	TLU Site	Avoidance

Note: Information presented within the Resource-specific Mitigation Table is provided for the current 150 m wide corridor. When a construction right-of-way is chosen (to be located within the corridor) for the Project, only information pertaining to those features remaining within the boundaries of the construction right-of-way will be retained within the Resource-specific Mitigation Table for reference during construction.

APPENDIX R

DRAWINGS

LIST OF DRAWINGS

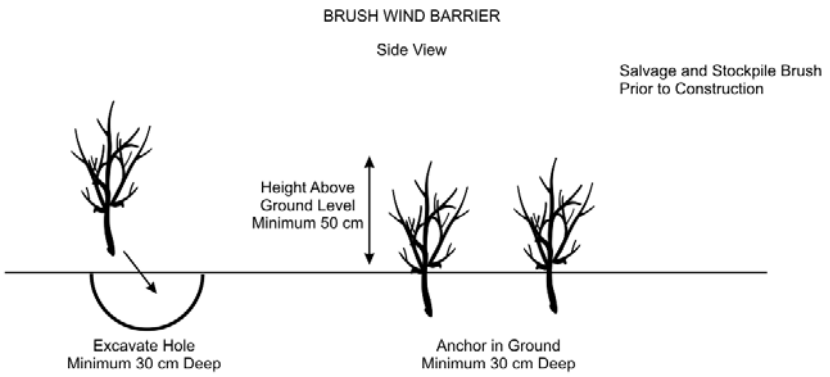


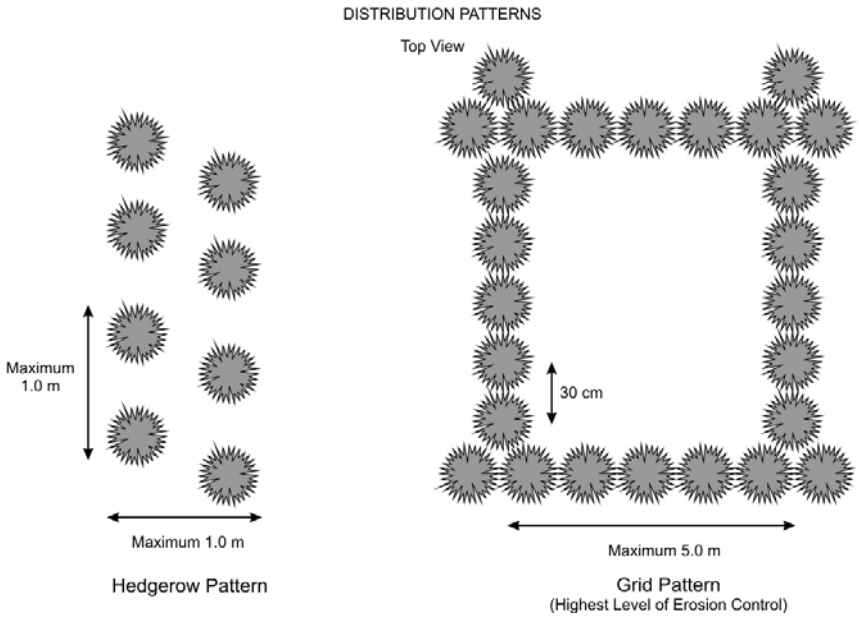
Representation Only

Notes:

1. Construct snow berm 3+ m high across access points to the construction right-of-way.
2. Do not locate berm in drainages or depressions.
3. Do not locate berm across wildlife trails.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	ACCESS CONTROL – FROZEN		
	7894	December 2013	Drawing 1





CRITERIA FOR IMPLEMENTATION

A brush wind barrier may be installed at highly exposed sites where soils may be difficult to stabilize.

Notes:

1. Aboveground stems of shrubs and trees (slash) will be salvaged during clearing and stockpiled.
2. Brush will be applied by hand or machine and will be securely anchored to the ground. Clumps of 5 to 10 stems will be placed into the soil to a minimum depth of 30 cm and will protrude upwards from the ground surface for a minimum height of 50 cm.
3. Brush stem clumps will be spaced in a random pattern a maximum of 1 m apart. Alternatively, the brush wind barrier will be installed in a hedgerow, grid pattern for the highest level of wind erosion control for exposed windblown ridges where the erosion hazard is severe. The stems will be laid in dense, continuous rows. The grid rows will be placed a maximum of 5 m apart.
4. Stems of the brush wind barriers are not expected to regrow.

Adapted from: AXYS Environmental Consulting Ltd. and David Walker & Associates (1998)

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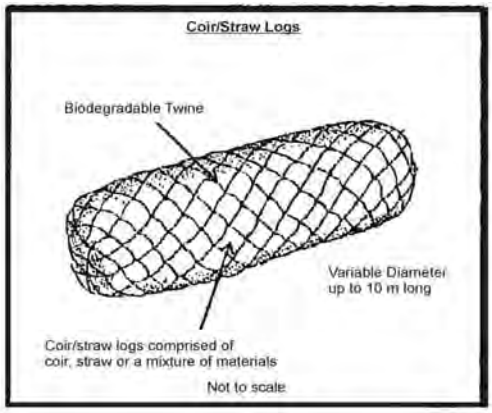
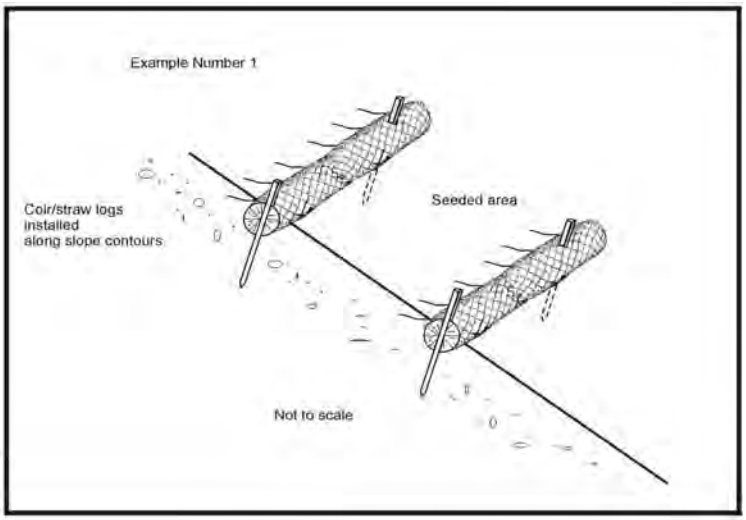
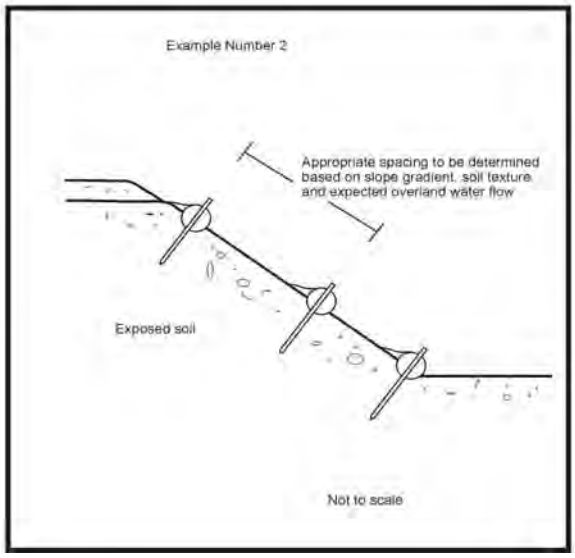
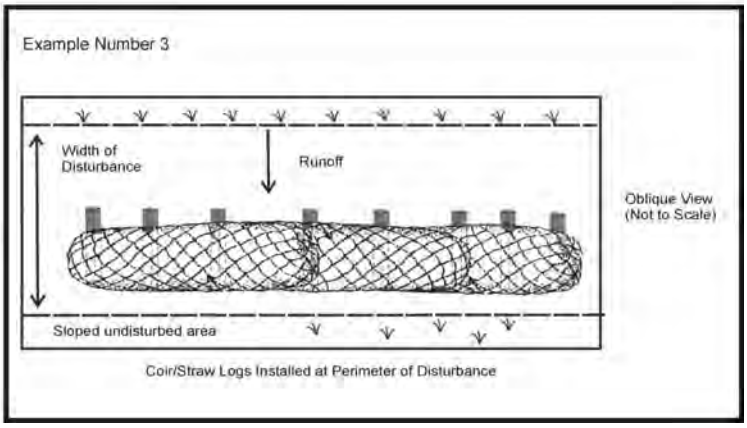
	BRUSH WIND BARRIER		
	7894	December 2013	Drawing 2









Notes:

1. Proper placement and design is critical and qualified specialists should be involved.
2. Install coir/straw logs in a shallow trench (~5-7.5 cm (2"-3") deep), perpendicular to the direction of flow and across the entire width of the disturbance. Each end of the coir/staw log should be turned slightly up slope to help retain water and prevent flow along the outside of the coir/straw log.
3. Each coir/straw log should be secured into the ground by wooded stakes spaced every 0.9-1.2 m (3'-4') across the length of the log. Stakes should be approximately 45 – 60 cm (18"-24") in length and should be driven through the centre of the coir/straw log and into the ground with approximately 5 cm (2") remaining above the coir/straw log. Stakes installed at each end of the coir/straw log should be placed approximately 5-15 cm (2"-6") from the outer edge of the log.
4. When joining two coir/straw logs together, either tightly abut both ends or overlap each log approximately 15 cm (6").
5. Store, move and install when dry.
6. Coir/straw logs may be seeded or dormant cuttings may be inserted.
7. Typical spacing is indicated below.

Slope Gradient (°)	Typical Spacing (approximate m (ft))
≥1:1	1.5 m (5')
2:1<1:1	3.0 m (10')
>4:1<2:1	5.2 m (17')
6:1-4:1	7.6 m (25')
<6:1	15.0 m (50')

Adapted from CAPP *et al.* (2005)

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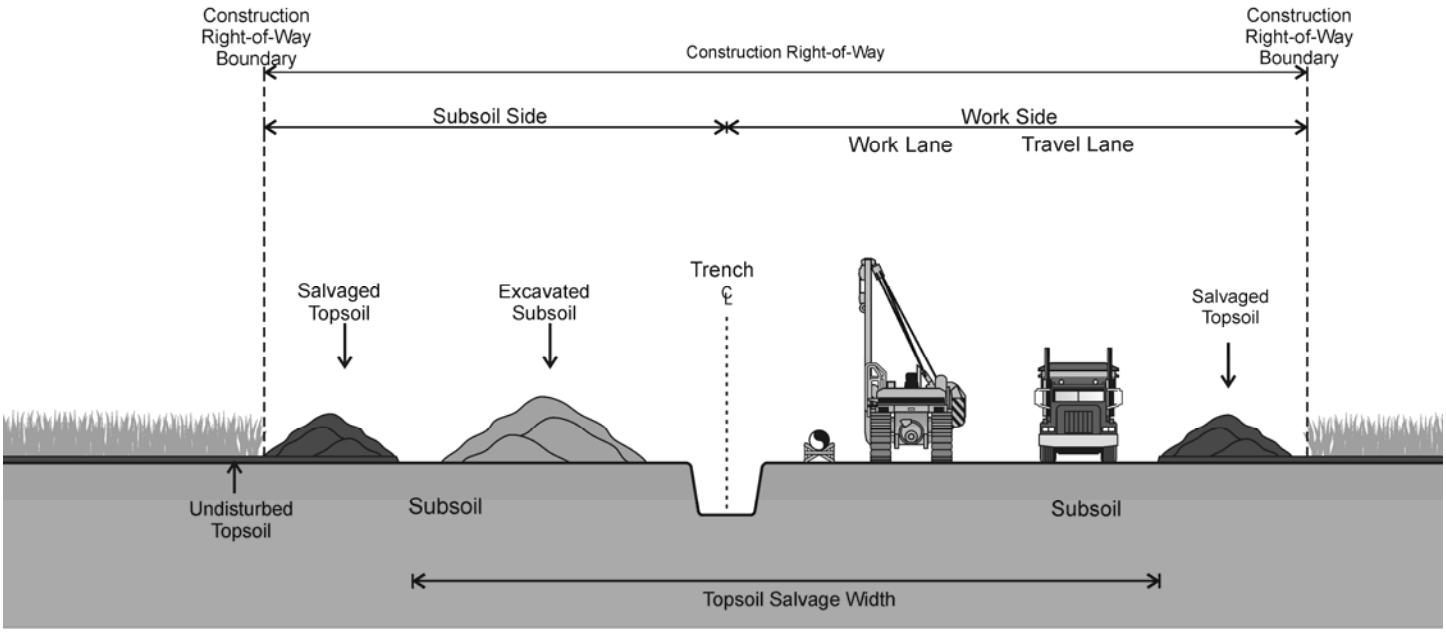
	COIR/STRAW LOG INSTALLATION		
	7894	December 2013	Drawing 3



Profile
(Not to Scale)

Representation Only

Activity:	**Notes:**
1. Salvage and Stockpile Topsoil/root zone material/Root Zone Material	- Salvage topsoil/root zone material from over the proposed trench, subsoil storage and work areas during non-frozen conditions. Topsoil/root zone material storage on both sides of the construction right-of-way adjacent to the salvaged area, as shown is preferred, however, storage of all salvaged topsoil/root zone material on one side of the construction right-of-way is also acceptable. - Salvage topsoil/root zone material to colour change, plow layer, as shown on the Environmental Alignment Sheets or as recommended by Trans Mountain's Environmental Inspector(s). - Apply tackifier if erosion of topsoil/root zone material piles becomes evident. - Leave breaks in the topsoil/root zone material windrow at obvious drainages.
2. Excavate Trench and Stockpile	- Maintain a separation between topsoil/root zone material and subsoil windrows. - Store subsoil at least 1 m (3 feet) from the edge of the trench.
3. Backfill Subsoil	- Backfill the trench. Crown the trench to allow for settlement. Avoid excessive trench crown height by feathering subsoil over the salvaged portion of the construction right-of-way, if warranted. Leave breaks in the crown at obvious drainages. - Avoid mixing excavated subsoil with topsoil/root zone material. - Rip compacted subsoils, if present, prior to topsoil/root zone material replacement. - Break-up subsoil if very lumpy prior to topsoil/root zone material replacement. - Pick stones and debris from the trench area equivalent to the surrounding subsoil.
4. Replace Topsoil/Root Zone Material and Clean-up	- Replace topsoil/root zone material over areas of the construction right-of-way where topsoil/root zone material salvage was conducted. - Cultivate disturbed area of the construction right-of-way. - Pick stones and debris equivalent to the surrounding topsoil/root zone material. - Revegetate the construction right-of-way with an appropriate seed mix and apply erosion control as necessary.

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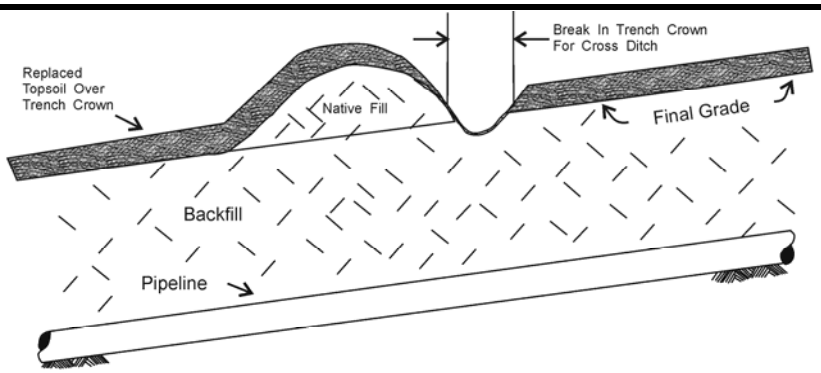
TRANS MOUNTAIN EXPANSION PROJECT

TRANSMOUNTAIN

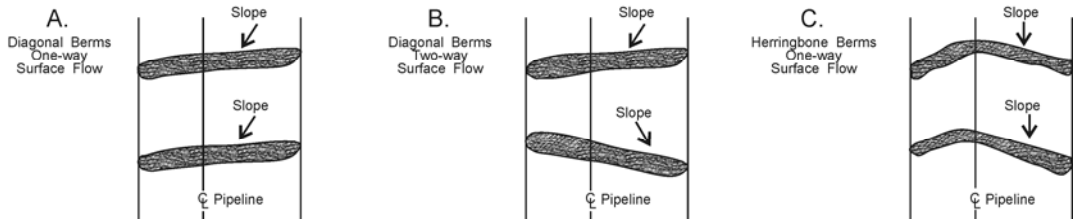
CONVENTIONAL RIGHT-OF-WAY CONFIGURATION

7894	December 2013	Drawing 4

Profile
(Not to Scale)



Plan View
(Not to Scale)



Notes:

Representation Only

1. Install diversion berm and cross ditch on moderate and steep slopes on non-cultivated lands to divert surface water off the construction right-of-way. Install berms immediately downslope of trench breakers to collect seepage forced to the surface.
2. Skew berm across the construction right-of-way at downhill gradient of 5-10%.
3. Construct diversion berm of compacted native subsoils where extensive disturbance of the sod layer has occurred. Diversion berms should be constructed of timbers, imported logs or sandbags if disturbance of the sod layer is limited. Avoid use of organic material. Where native material is highly erodible, protect upslope of berm and base of cross ditch by burying a geotextile liner approximately 20 cm below the surface or armour upslope face of berm with earth-filled sand bags.
4. Typical diversion berm height and widths are approximately 0.75 m for summer construction and 1.0 m for winter construction. Trans Mountain shall inspect berms after heavy rains and the first spring following construction; replace or restore berms, if warranted.
5. Tie berms into existing berms on adjacent rights-of-way, where applicable.
6. Leave a break in trench crown immediately upslope of diagonal berm and cross ditch to allow passage of water across the construction right-of-way.
7. Use diagonal berms where direction of slope and surface water movement is oblique to construction right-of-way.
8. Use herringbone berm and cross ditch where direction of slope and surface water movement is parallel to construction right-of-way so runoff does not cross ditchline.
9. Determine location and direction of berm based on local topography and drainage patterns. Typical diversion berm spacing is indicated below.

Slope Gradient (° ;%)	Typical Spacing (m) Erosion Hazard*		
	High	Medium	Low
<7; <12	30-45	45-60	60 or more
7; 12	25	38	51
8; 14	22	33	44
9; 16	19	29	38
11; 19	16	24	32
14; 25	12	18	24
18; 33	9	14	18
27; 50	6	9	12

* High = fine sand and silts; medium = clays and coarse sands; low = rock or gravel.

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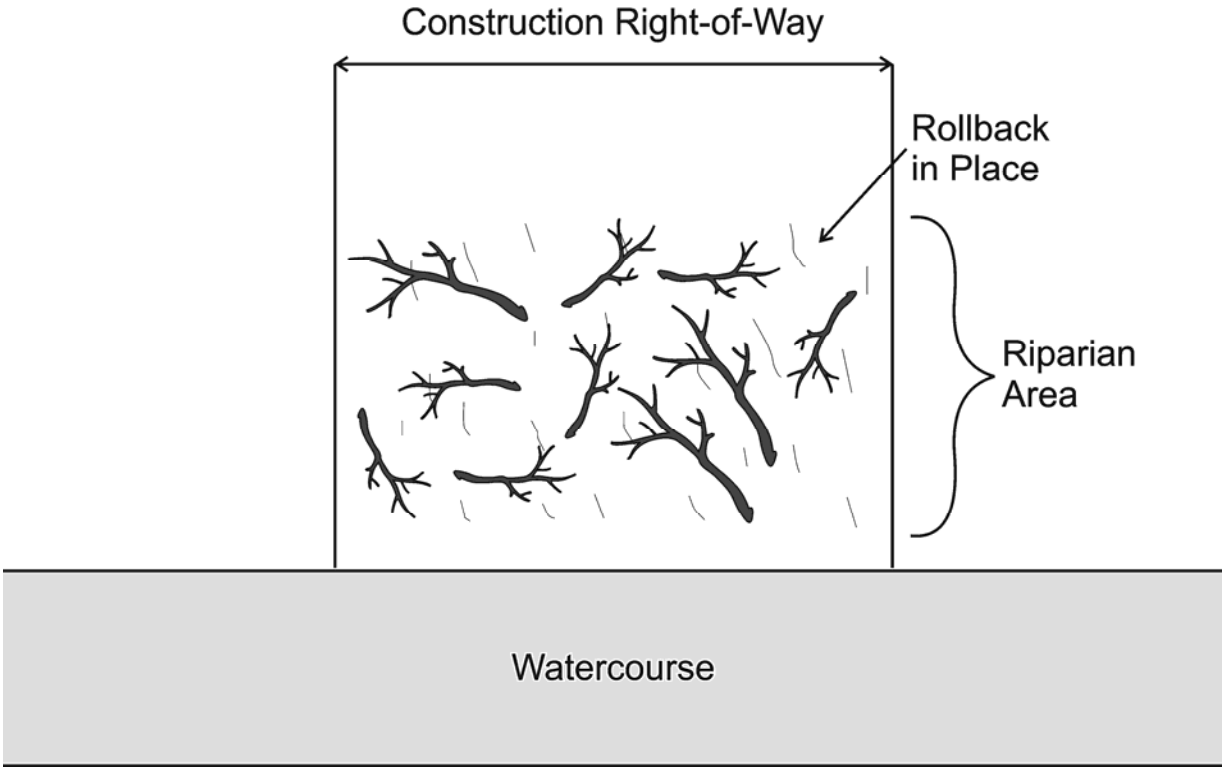
TRANS MOUNTAIN EXPANSION PROJECT

TRANSMOUNTAIN

CROSS DITCHES AND DIVERSION BERMS

7894	December 2013	Drawing 5



Representation Only

Criteria for Implementation

Slash and non-merchantable timber will be salvaged and stored for use in riparian areas during reclamation as outlined in the Aquatic Resource-specific Mitigation Table (see Appendix I) and as determined by the Environmental Inspector at the time of construction.

Notes:

1. The Environment Inspector(s) and Lead Environmental Inspector in consultation with the with Construction Manager, will plan for the salvage and storage of rollback materials based on the potential for soil erosion by water and desiccation of establishing vegetation by wind.
2. Rollback slash and non-merchantible timber to provide microsites and promote the reestablishment of woody vegetation at wind exposed sites and to reduce the potential for overland water flow and sedimentation of waterbodies..
3. Salvage slash and non-merchatable timber with a diameter no less than 10 cm [4 inches] for rollback.
4. Store material for rollback along the edges of the construction right-of-way, or in natural clearings.
5. Do not walk down rollback.

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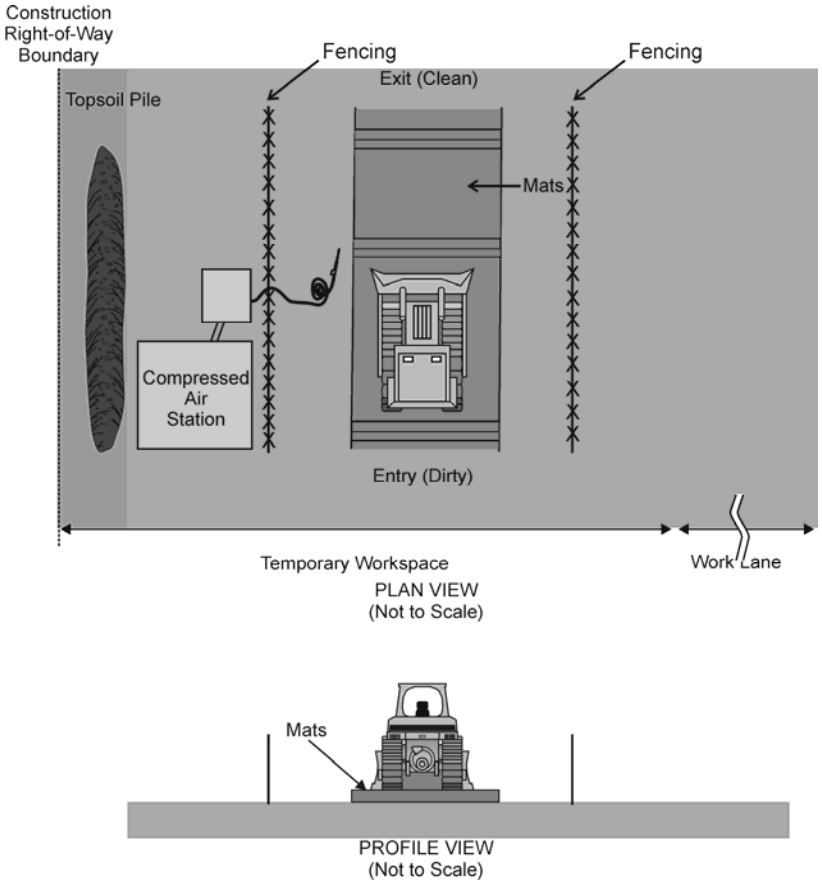
	EROSION CONTROL – ROLLBACK IN RIPARIAN AREAS		
	7894	December 2013	Drawing 6

COMPRESSED AIR STATIONS

Cleaning stations using compressed air in conjunction with manual track cleaning may be set up during construction (nonfrozen or frozen soil conditions) where other weed or disease control measures are determined to be insufficient. Cleaning station locations will be established at strategic locations with identified weed or disease concerns and as determined by Trans Mountain's Environmental Inspector(s), in consultation with Trans Mountain's Construction Manager, prior to commencement of construction in the area. Cleaning requirements will apply to all construction equipment involved in clearing, grubbing, topsoil handling or grading operations.

The diagram below is an example of how a dry cleaning station may be constructed. Final design should be determined by the Construction Manager or designate, in consultation with the Environmental Inspector(s), once locations have been determined.

During periods of high wind, the use of compressed air cleaning stations may not be appropriate. Alternative options (*e.g.*, shovel and broom, secondary containment with tarps, high pressure washing) should be discussed with the Trans Mountain Environmental Inspector, if warranted.



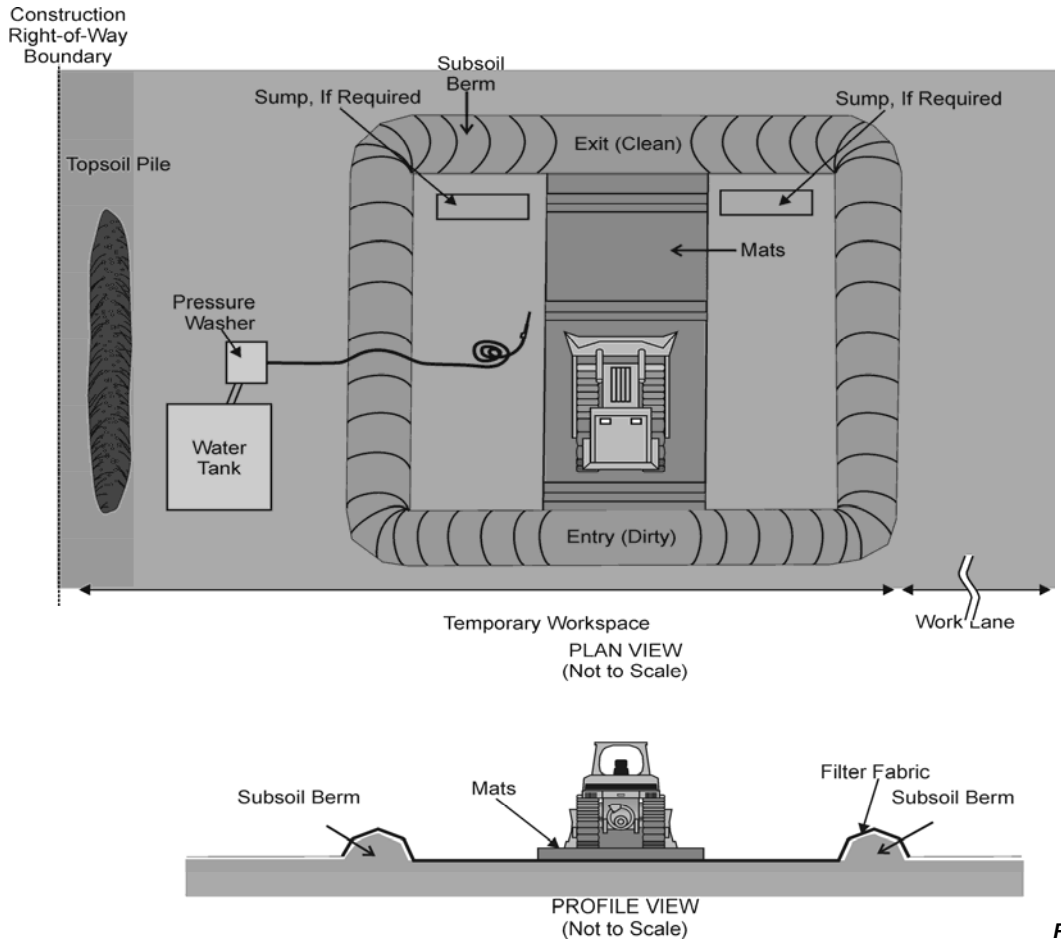
Representation Only

Notes:

1. Construct the dry type cleaning station (compressed air and manual track cleaning) at an approved location by salvaging topsoil throughout the station and stockpiling it as shown on the plan.
2. Cleaning shall be carried out under the supervision and to the satisfaction of the Environmental Inspector(s).
3. Use ropes or fencing material to designate the area where the cleaning is to occur.
4. Ensure that the size of the station is adequate to accommodate the maximum size of equipment.
5. Stockpile contaminated material.
6. Remove any soils contaminated by petroleum-based or other undesirable materials from cleaning stations to an approved facility, in accordance with applicable requirements.
7. Replace topsoil/root zone material and reclaim the area.
8. Conduct post-construction monitoring at cleaning station locations. Implement remedial weed management, if warranted.

HIGH PRESSURE WASH STATIONS

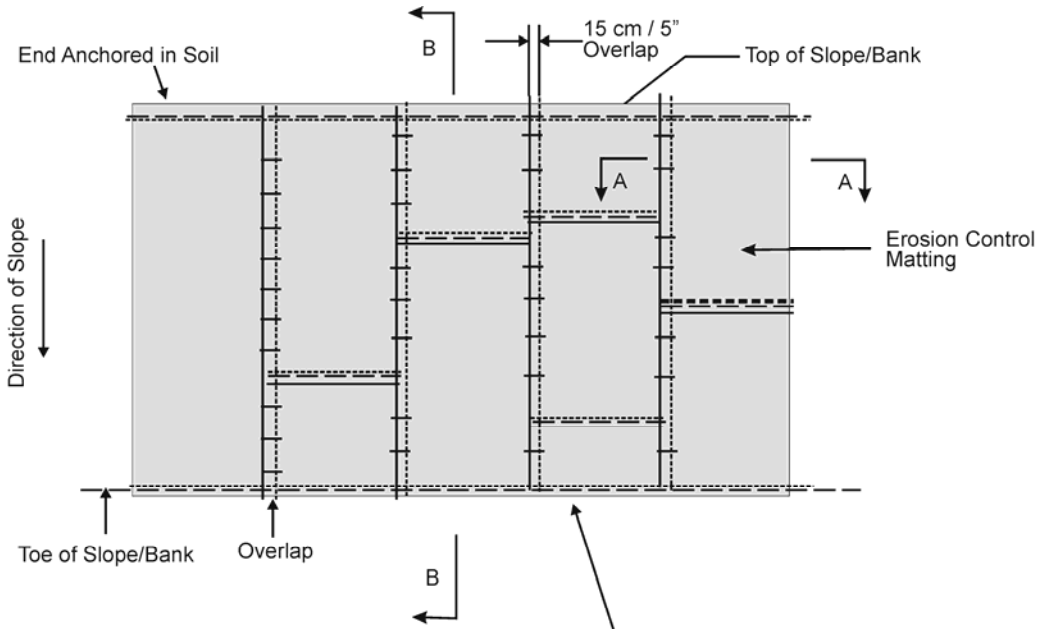
Weed cleaning stations using high pressure water for cleaning soil from construction equipment, may be set-up during construction (nonfrozen soil conditions) where track cleaning by hand and other weed control measures are determined to be insufficient. Cleaning station locations will be determined by Trans Mountain's Environmental Inspector(s) prior to the commencement of construction in the area. Cleaning requirements apply to all construction equipment involved in clearing, grubbing, topsoil handling or grading operations. Final design should be determined by the Trans Mountain's Construction Manager or designate, in consultation with the Environmental Inspector(s), once a location has been determined.



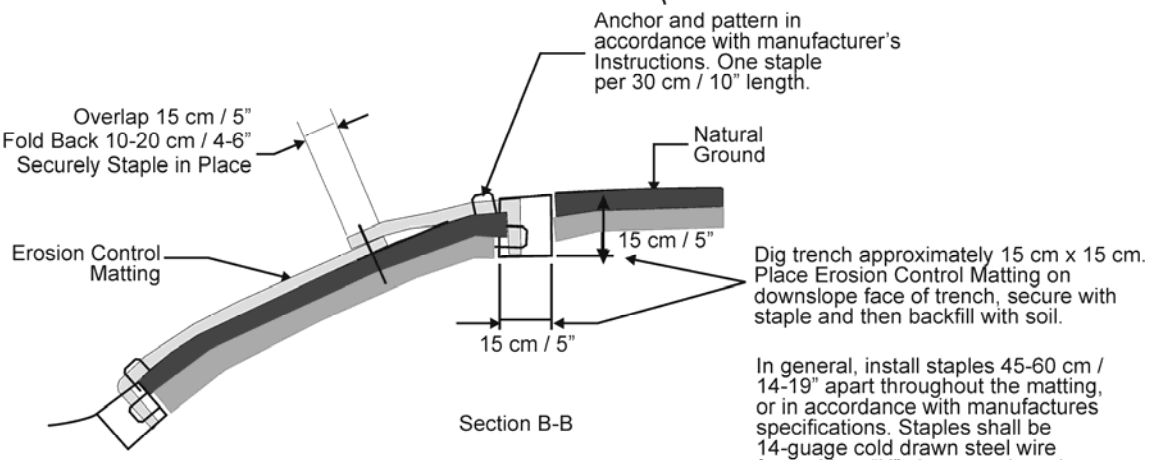
Representation Only

Notes:

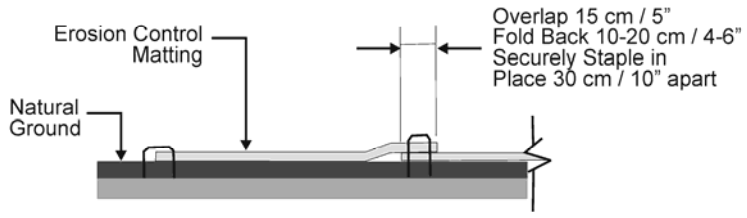
1. During nonfrozen soil conditions, construct the high-pressure water cleaning station at an approved location by salvaging topsoil/root zone material and constructing containment berms out of subsoil.
2. Do not allow water used for cleaning to enter any waterbody or ditch.
3. Ensure that the size of the station is adequate to accommodate the maximum size of equipment.
4. Equipment is to consistently enter at one end and exit at another.
5. Clean the mats between each piece of equipment entering the station.
6. Stockpile contaminated materials.
7. Remove any soils contaminated by petroleum-based or other undesirable materials from cleaning stations in accordance with applicable requirements.
8. Backfill the depression with bermed material.
9. Replace topsoil/root zone material and reclaim the area.
10. Conduct post-construction monitoring at cleaning station locations. Implement remedial weed management, if warranted.



Plan View
(Not to Scale)



Section B-B



Section A-A

Note: When used at streambanks, erosion control matting should be secured to the bank using willow cuttings rather than staples.

Representation Only

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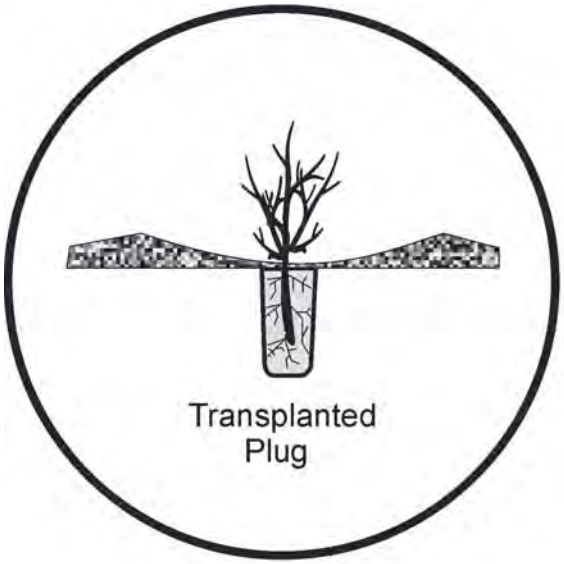
	EROSION CONTROL MATTING/BLANKET		
	7894	December 2013	Drawing 8



Plant Material Selection

Use appropriate woody plant species identified growing within or adjacent to the proposed crossing and approved by the Reclamation Resource Specialist.

Purchase or contract propagate rooted stock plants using locally collected plant material.

All collection and salvage of woody plant material from public and private lands will be conducted following approval by the appropriate land owner/manager.

Contract Propagated or Purchased Plug Grown Plants

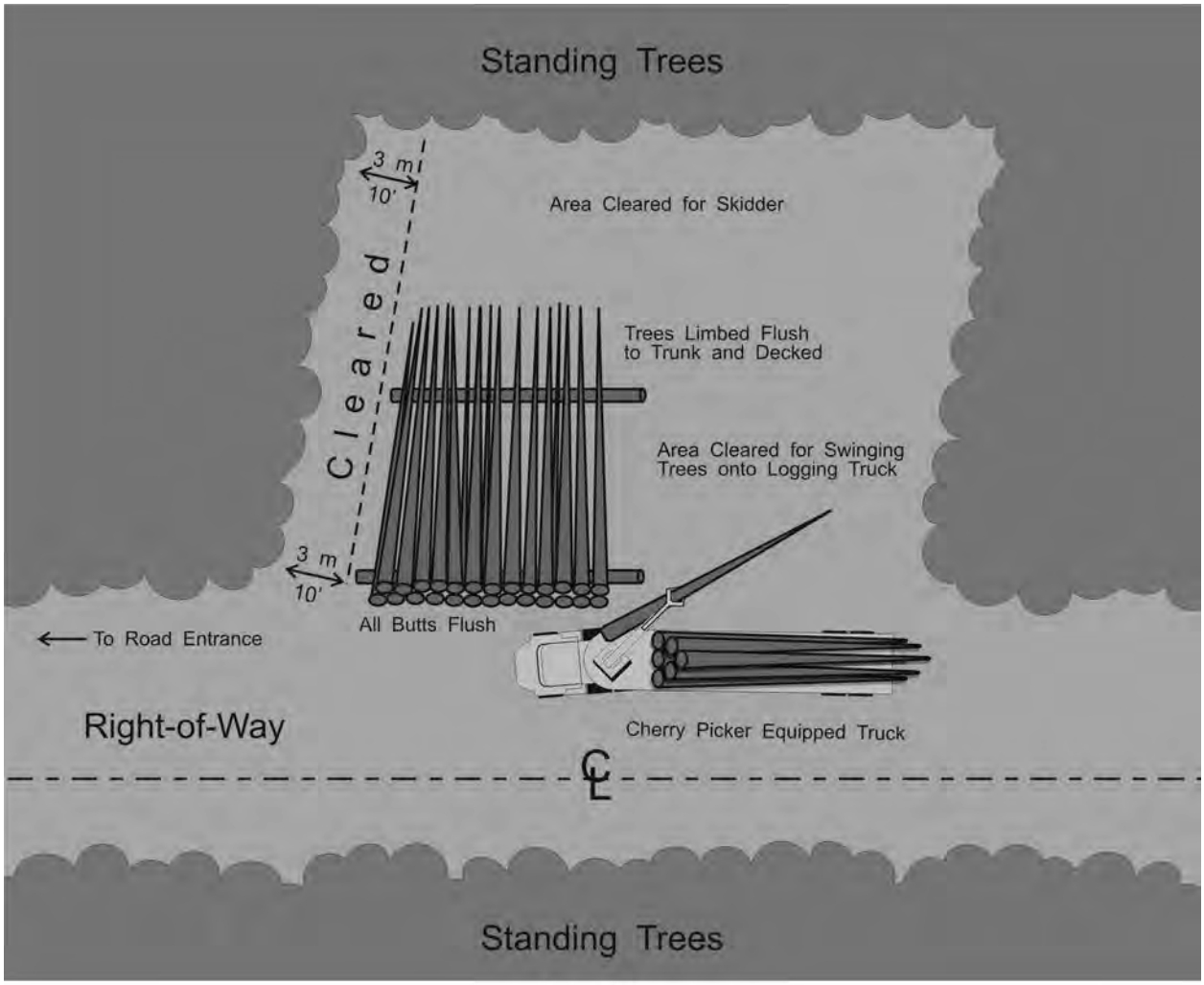
Plant material will be collected from locations on or adjacent to the construction right-of-way, or as close to the planned watercourse or wetland crossing as is practical from within the same Natural Subregion/BGC Zone.

1. Through site vegetation surveys and recommendations provided by a Reclamation Resource Specialist, plant species that are suited to growing conditions at the site will be chosen.
2. Plant material including stem and root cuttings and/or seeds will be collected by qualified personnel in the season determined by the propagator.
3. Boxed, cellophane wrapped plants will be delivered to the site(s) or stored at a suitable location as close to the planting site as is possible, ensuring plant quality is maintained through the planting period.

Installation of Plants

4. Using standardized silviculture equipment and techniques, install rooted woody plants in the riparian area on the construction right-of-way singularly and/or in random groupings that emulate the composition and natural variability of adjacent off construction right-of-way vegetation.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	ROOTED STOCK SELECTION AND INSTALLATION		
	7894	December 2013	Drawing 9



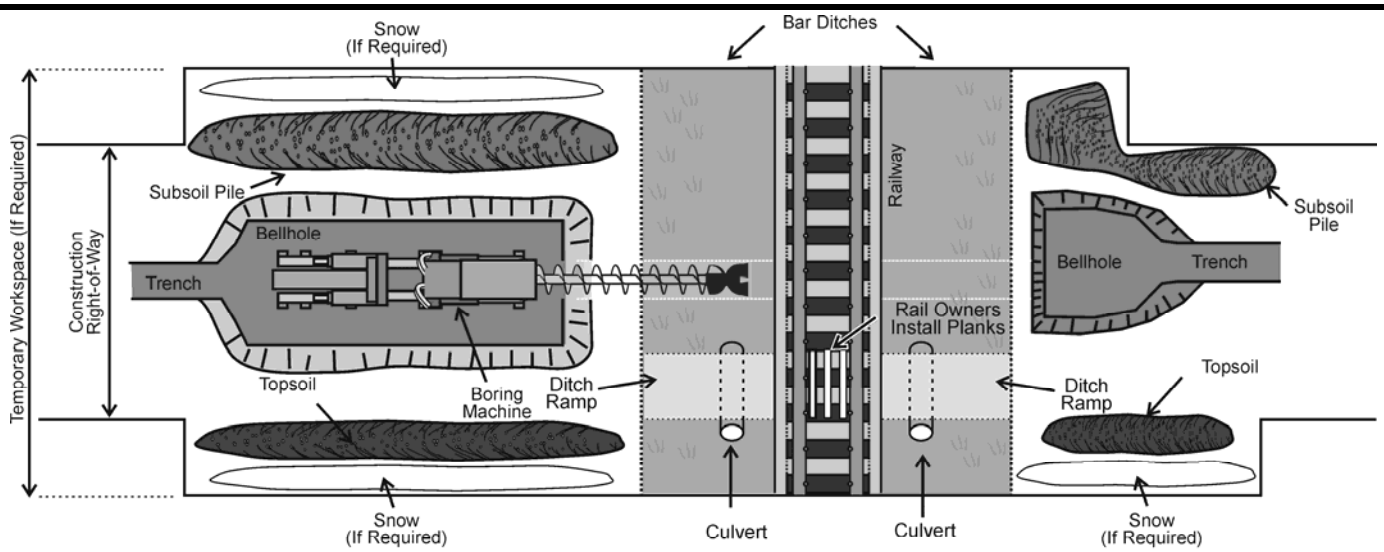
Plan View
(Not to Scale)

Representation Only

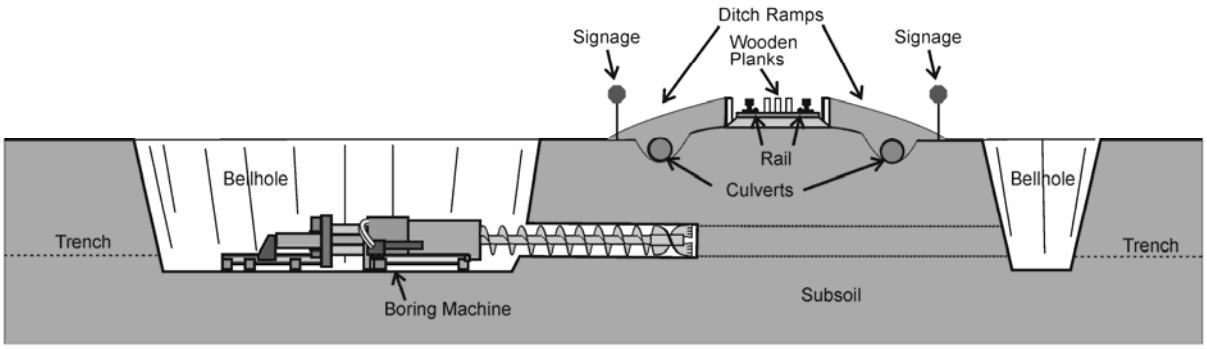
Implementation:

1. Salvage progressively, if feasible. Salvage merchantable timber as specified by the appropriate regulatory authority and Trans Mountain's Environmental Manager(s).
2. Wherever practical, locate deck site(s) in previously disturbed areas, natural clearings, seismic line intersections and other areas which do not require clearing. Avoid grading. Do not salvage root zone material at deck sites unless the area will be used for other activities (*e.g.*, burning debris piles, etc.). Do not establish log decks within a watercourse or wetland buffer zone, on existing access roads, and/or pipelines.
3. On a new clearing, locate log deck site(s) on areas of level terrain, where feasible, and in merchantable timber stands to limit the loss of merchantable timber, where practical. Maintain maximum skidding distances of 400 m between log deck locations to avoid damage to ground and timber. Ensure log skidding and hauling shall only be conducted during dry or frozen conditions.
4. Request logging operators begin hauling timber as early as practical during construction, preferably after grading but before stringing and trenching. Where no existing log deck sites are available, haul timber to a suitable and approved location. If warranted, obtain additional workspace approvals to establish log decks adjacent to the construction right-of-way. Regulatory approvals for log deck locations may be required from applicable agencies.
5. Ensure the butt ends of piled tree lengths are flush. Do not top skid. Face all butts to the construction corridor or direction of haul. Decks must be clean with no sticks, branches, plastic, metal, tangled stems, standing trees or roots.
6. Do not doze merchantable timber. Stack merchantable timber at the log deck in a manner that is accessible to hauling trucks.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	LOG DECKING		
	7894	December 2013	Drawing 10



Plan View
(Not to Scale)



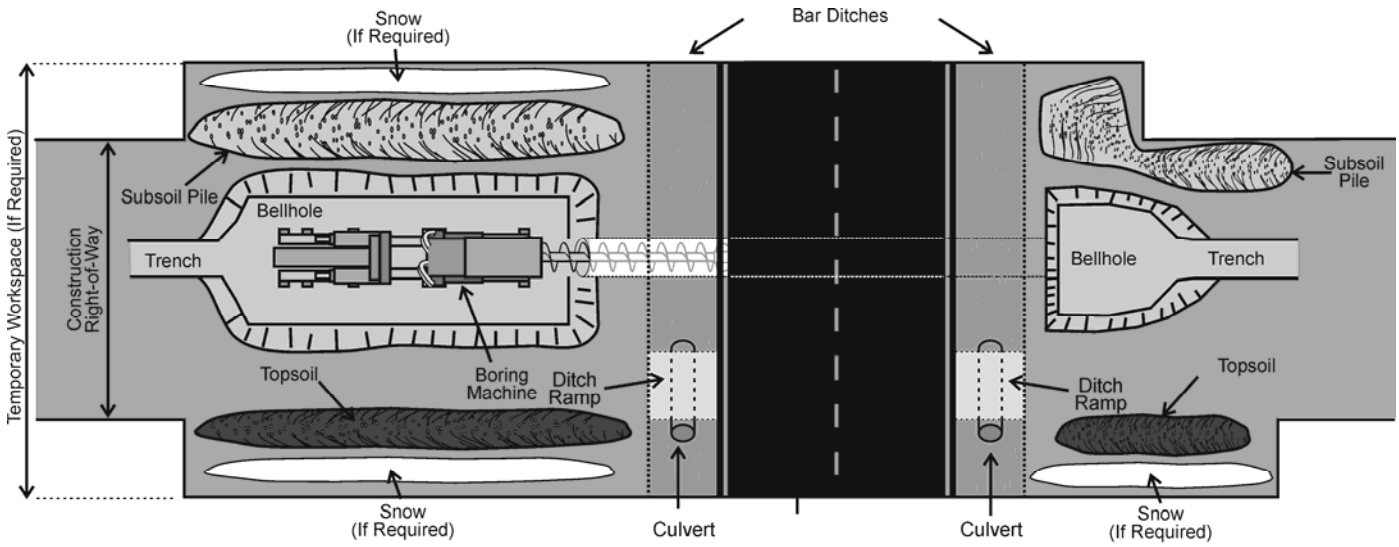
Profile
(Not to Scale)

Representation Only

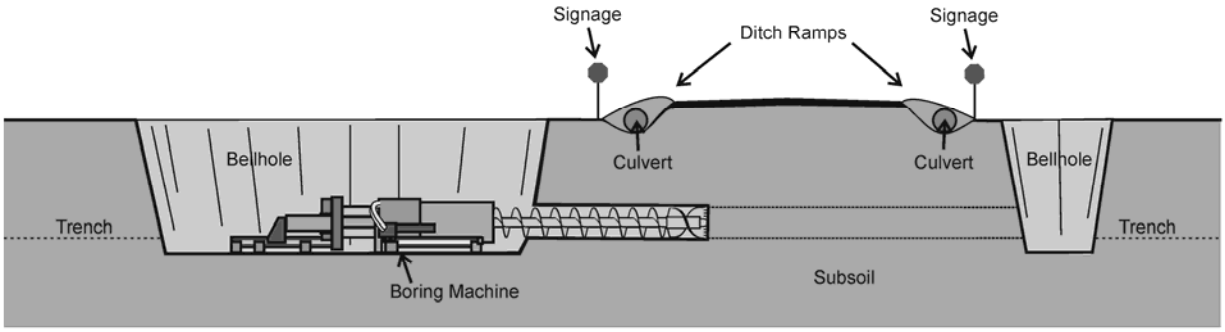
Notes:

1. Remove snow from work area prior to topsoil/root zone material salvage and store on construction right-of-way. Maintain adequate separation between snow and soil piles to avoid admixing.
2. Salvage topsoil/root zone material from the bellhole, bar ditch ramps, subsoil storage area and the work/travel lane on cultivated and poorly-sodded lands during non-frozen conditions. On well-sodded lands, restrict topsoil/root zone material salvage to the general bellhole area and store subsoil on sod. During frozen conditions on all land uses, only salvage topsoil/root zone material from the bar ditch ramps and the area to be excavated.
3. Install subsoil ditch ramps and, in consultation with the railway owner, wooden planks across the railway tracks. The railway owner may choose to install the vehicle crossing.
4. Excavate bellhole. Store subsoil on the opposite side of the construction right-of-way from topsoil/root zone material or adjacent to topsoil/root zone material maintaining adequate separation to avoid admixing topsoil/root zone material and subsoil and snow.
5. Dewater the bellholes onto stable, well vegetated land, where approved, or pump water to a tank truck and dispose of at an approved facility.
6. Leave a crown to allow for subsidence, where approved.
7. Remove ditch ramps and signage.
8. Replace topsoil/root zone material.
9. Reseed and fertilize as appropriate.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	MATERIALS HANDLING AT RAIL BORES		
	7894	December 2013	Drawing 11



Plan View
(Not to Scale)



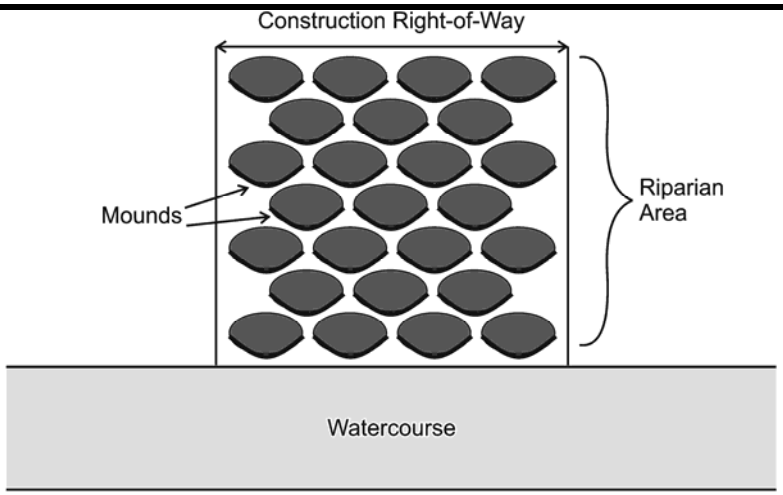
Profile
(Not to Scale)

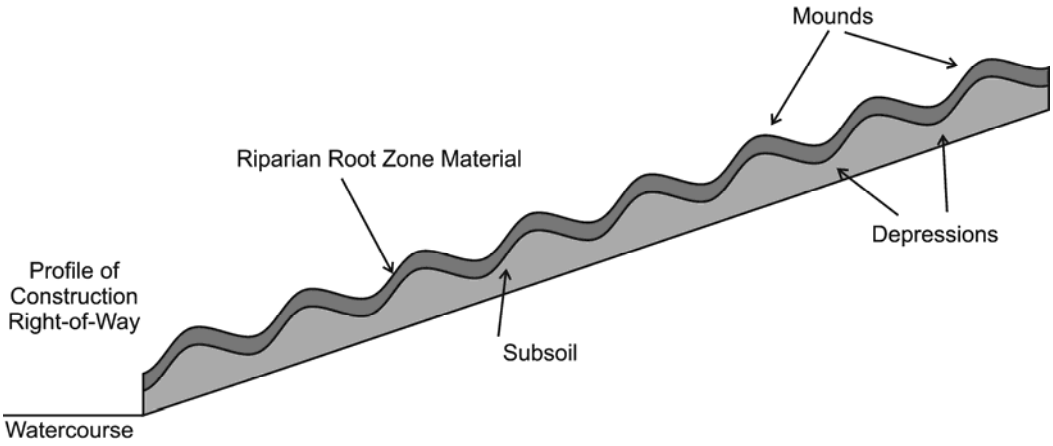
Representation Only

Notes:

1. Acquire and mark additional temporary workspace, if required.
2. Remove snow from work area prior to topsoil/root zone material salvage and store on construction right-of-way. Maintain adequate separation between snow and soil piles to avoid admixing.
3. Salvage topsoil/root zone material from the bellhole, bar ditch ramps, subsoil storage area and the work/travel lane on cultivated lands and poorly-sodded lands during non-frozen conditions. On well-sodded lands, restrict topsoil/root zone material salvage to the general bellhole area and store subsoil on sod. During frozen conditions on all land uses, only salvage topsoil/root zone material from the bar ditch ramps and the area to be excavated.
4. Install subsoil ditch ramps, in consultation with the road authority.
5. Excavate bellhole. Store subsoil on opposite side of the construction right-of-way from topsoil/root zone material or adjacent to topsoil/root zone material maintaining adequate separation to avoid admixing topsoil/root zone material and subsoil and snow.
6. After completion of pipe tie-ins, backfill and compact. Leave a crown to allow for subsidence, if warranted.
7. Remove ditch ramps.
8. Replace topsoil/root zone material.
9. Reseed and fertilize as appropriate.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	MATERIALS HANDLING AT ROAD BORES		
	7894	December 2013	Drawing 12





Representation Only

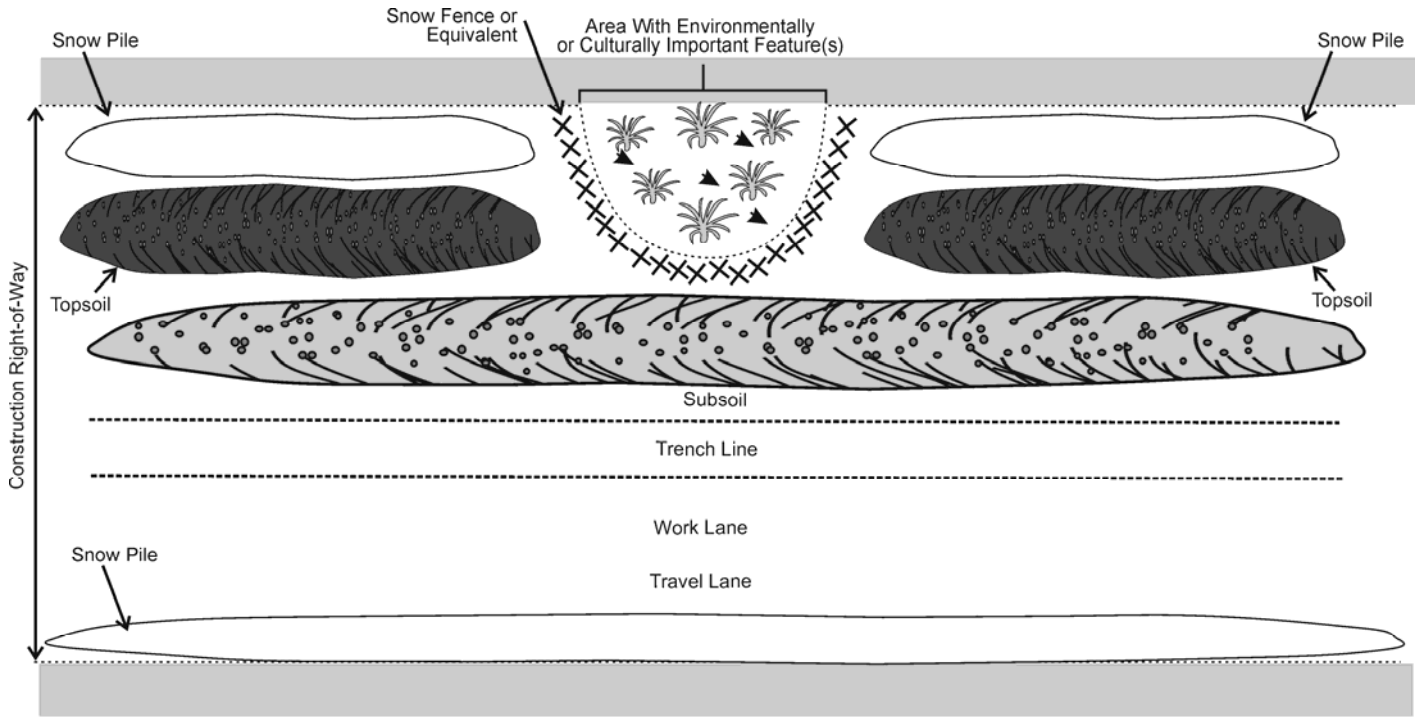
Criteria for Implementation

Mounding may be used to create niches for the protection of establishing woody vegetation from desiccating winds and to reduce the potential for overland water flow and the sedimentation of waterbodies. Mounding will be implemented as outlined in the Aquatic Resource-specific Mitigation Table (see Appendix I) and as determined by the Environmental Inspector at the time of construction.

Notes:

1. Use the bucket of a hoe to create depressions and mounds across the width of the construction right-of-way in riparian areas during clean-up.
2. Create the depressions and mounds in the subsoil before replacing riparian root zone material.
3. Add rollback where warranted (*i.e.*, areas with moderat to high potential for desiccating wind or overland water flow). See Drawing Erosion Control – Rollback in Riparian Areas

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	MOUNDING IN RIPARIAN AREAS		
	7894	December 2013	Drawing 13



Plan View
(Not to Scale)

Representation Only

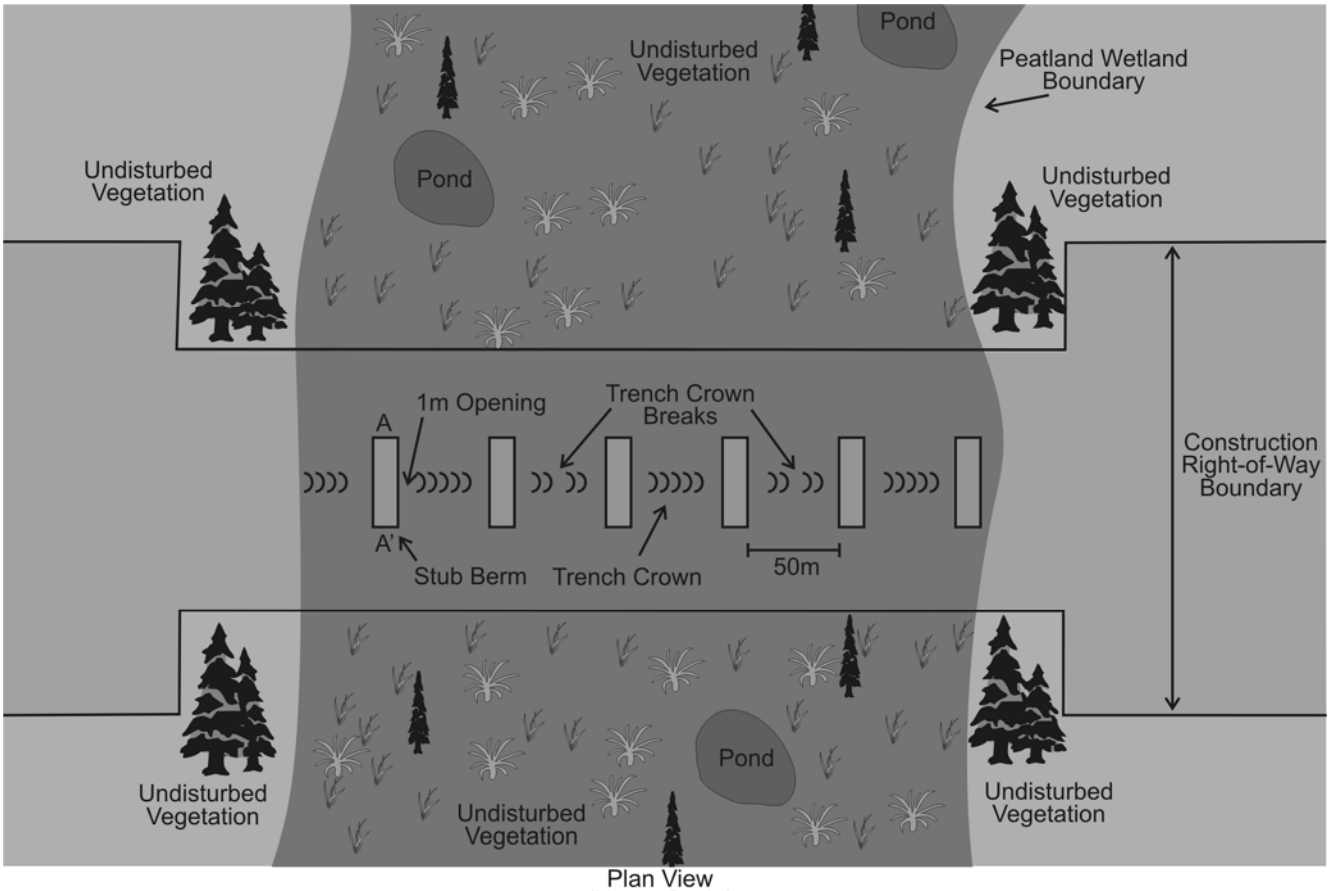
Criteria for Implementation:

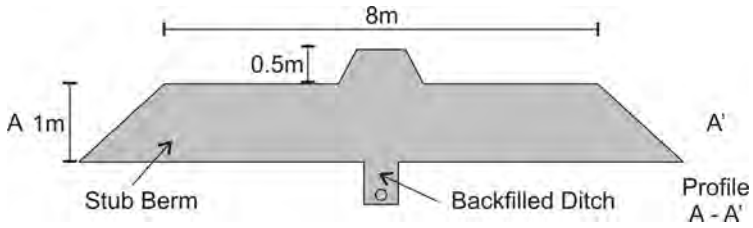
The width of the construction right-of-way will be narrowed to avoid site-specific features such as archaeological sites, rare plants, sensitive ecological communities and site-specific wildlife habitat. The specific features will be fenced or otherwise protected throughout the duration of construction.

Notes:

1. Identify and stake or flag the boundaries of the feature to be protected prior to commencement of surveying activities where it encroaches on the construction right-of-way. Ensure the specific feature is flagged with the appropriate colour of flagging for the resource to be protected.
2. Clearly post signs prohibiting workers or equipment from entering the fenced area.
3. Where narrowing on the work side or subsoil side is sufficient to protect the feature, minimize the workspace to as narrow an area as safely feasible.
4. Where further narrowing is necessary, develop site-specific plans to complete construction through the area while protecting the feature.
5. Maintain fencing and barriers until all construction and reclamation activities are completed.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	NARROW DOWN FENCING		
	7894	December 2013	Drawing 14





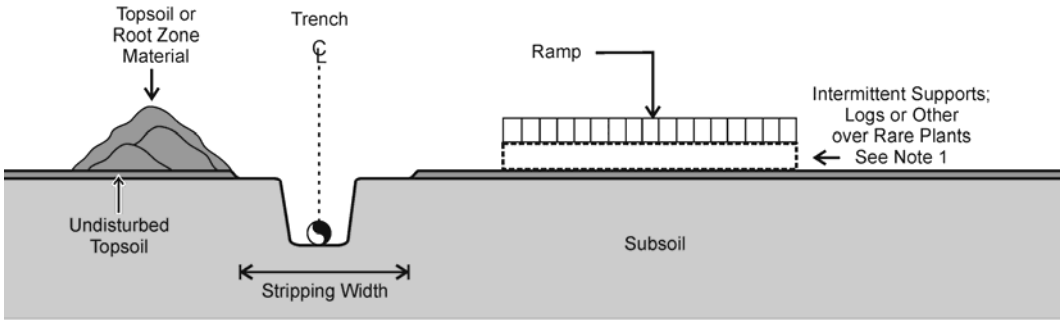
Representation Only

Notes:

1. Leave a low trench crown (< 20 cm) in peatland wetlands during backfill and ensure breaks are left in the trench crown every 50 m to 80 m to allow cross drainage. The trench crown should be high enough to limit potential for subsidence but low and gradually contoured enough that the soil moisture regime is not greatly different to what exists immediately adjacent.
2. During clean-up, construct stub berms using mineral soil. Install stub berms at 50 m intervals, perpendicular to the pipeline ditch, along the peatland wetland. Create 1 m openings in the trench crown on either side of the stub berms to allow the flow of water across the ditch line.
3. Stub berms will be approximately 8 m in length and will increase in height from 1 m to 1.5 m where they cross the pipeline ditch.

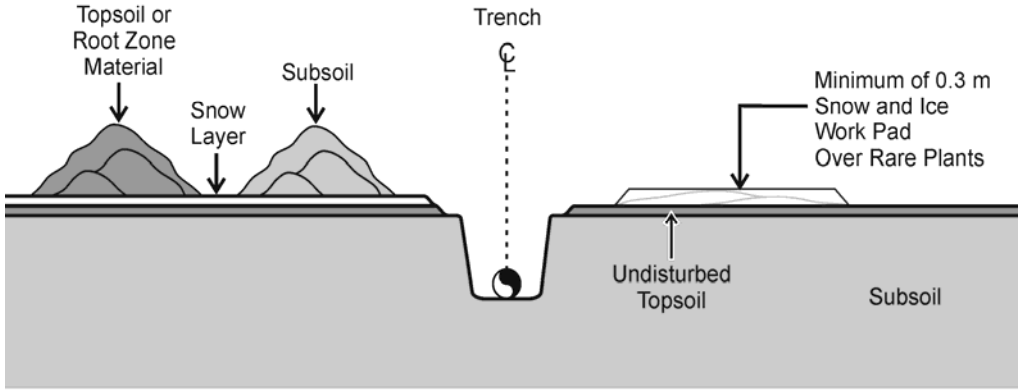
tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	PEATLAND WETLAND – STUB BERMS		
	7894	December 2013	Drawing 15

NONFROZEN CONDITIONS:



Profile
(Not to Scale)

FROZEN CONDITIONS:



Profile
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Notes:

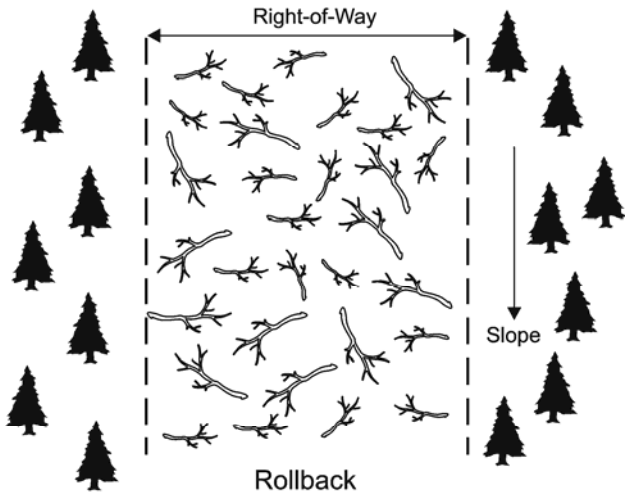
Nonfrozen Conditions

1. Place ramps on support structures (logs or other). Support structures will be spaced approximately 2 to 3 m along the length of the ramp. Ramps may be required on work side and subsoil side, as warranted, to protect the rare plant population or community.
2. Salvage topsoil/root zone material from the trench area (a minimum of 4-6 m).
3. Haul trench subsoil along the right-of-way away from the rare plant site, where necessary.

Frozen Conditions

4. When there is adequate snow, build a snow and ice work pad on the work side to a minimum of 0.3 m high. Build a snow and ice work pad on the subsoil side as warranted, to protect the rare plant population or community. During frozen conditions, without adequate snow to build a pad, use the above specifications to build a ramp.
5. Salvage topsoil/rootzone material from the trench area (a minimum of 4-6 m).
6. Monitor the integrity and effectiveness of the work pad by watching for rutting and cracking to the extent that the ground below the pad may become disturbed. Should this condition occur, temporarily suspend traffic and either reinforce the snow/ice work pad or install a ramp.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	RARE PLANT RAMP PROTECTION		
	7894	December 2013	Drawing 16



Plan View
(Not to Scale)

CRITERIA FOR IMPLEMENTATION

Slash and nonsalvageable timber may be used as rollback for erosion control where available and acceptable to the appropriate authority, as well as at strategic locations along the right-of-way for access control. Specific locations will be determined by Trans Mountain's Environmental Inspector(s) at the time of clearing. Do not use Douglas-fir for rollback.

Notes:

1. Retain slash and nonsalvageable timber, where required, for use as rollback.

2. Larger diameter slash (*e.g.,* 10 cm in diameter or larger) should be used for rollback intended for riparian area access control, plant micro-sites establishment or as soil erosion control.

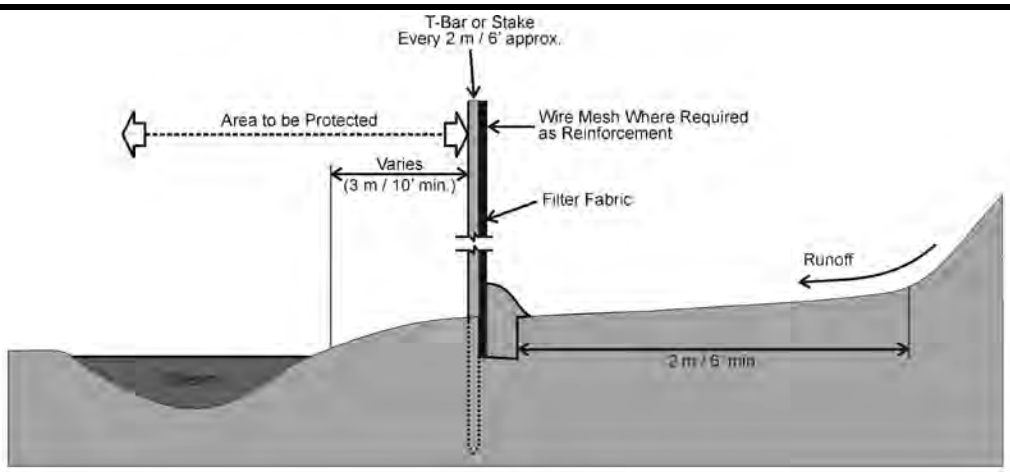
3. The amount of timber retained for use as rollback will be determined by Trans Mountain's Construction Supervisor(s) in consultation with Trans Mountain's Environmental Inspector(s) and the appropriate authority. Store material for rollback along the edges of the right-of-way.

4. Walk down rollback with a dozer on steep slopes, if safe to do so.

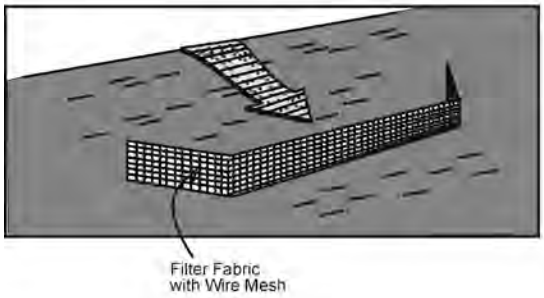
5. Spread slash and nonsalvageable timber evenly over the right-of-way where access is a concern. Do not walk down rollback.

6. Leave gaps in the rollback at obvious wildlife trails.

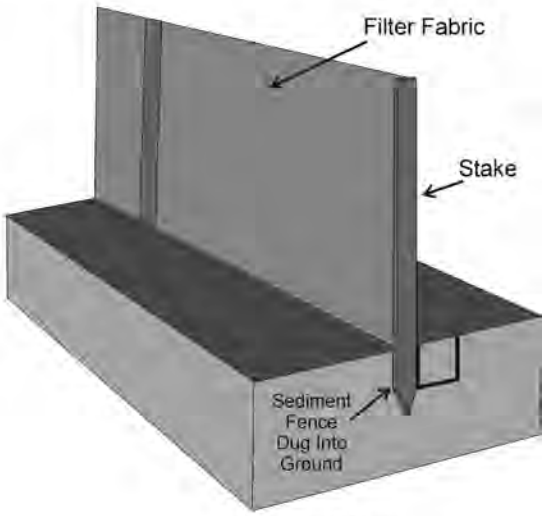
tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	ROLLBACK		
	7894	December 2013	Drawing 17



Profile View
(Not to Scale)



Oblique View
(Not to Scale)



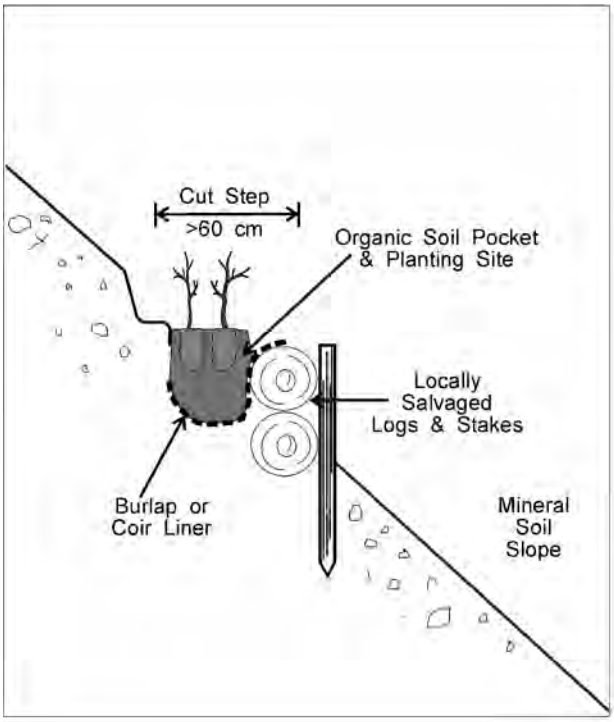
Oblique View
(Not to Scale)

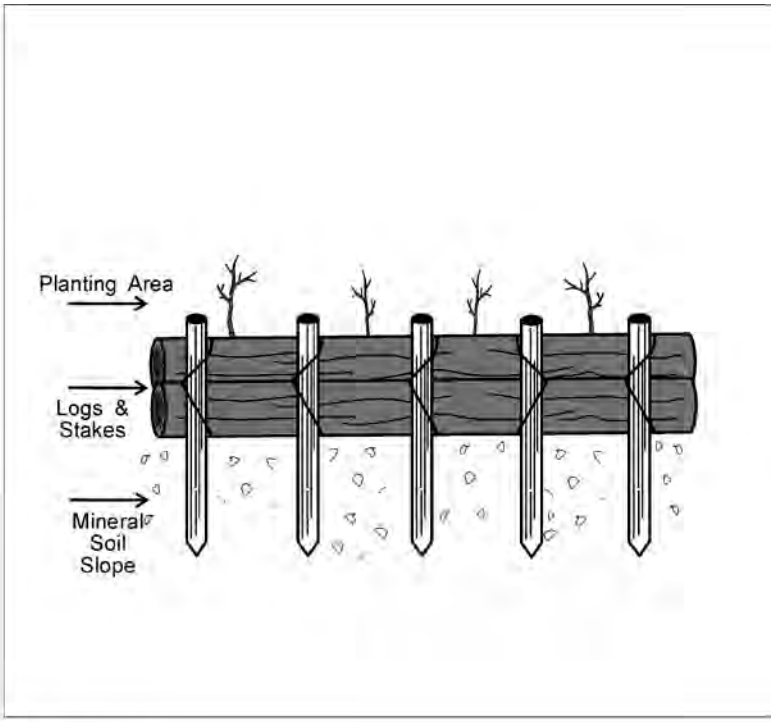
Representation Only

Notes:

1. Watercourses that have moderate to high sensitivity of fish habitat and/or have steep approach slopes at the proposed crossings may need sediment fences during construction, as determined by Trans Mountain's Environmental Inspector(s).
2. Install sediment fences at the base of approach slopes to watercourses prior to clearing and grading using the method and materials above or other approved designs.
3. Ensure sediment fence is keyed into the substrate. Excavate a narrow trench, place the base of the sediment fence in the trench and place the fill back into the trench, securing the sediment fence in place.
4. Place sediment fences a minimum 2 m (6 feet), if feasible, from the toe of the slope in order to increase ponding volume.
5. Maintain sediment fences in place at the base of the approach slopes until revegetation of the construction right-of-way is complete.
6. In areas with frequent traffic, install two or more sediment fences in a staggered and overlapped configuration to allow vehicle passage without removal or opening of the sediment fence.
7. Ensure that sediment fences, if removed or damaged, are reinstalled or repaired prior to the end of the work day.
8. Install sediment fences, where warranted, to eliminate the flow of sediment from clean subsoil piles and disturbed areas into nearby wetlands.
9. Remove any sediment fences around wetlands that remain after the disturbed area is revegetated and the area is stable.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	SEDIMENT FENCE		
	7894	December 2013	Drawing 18



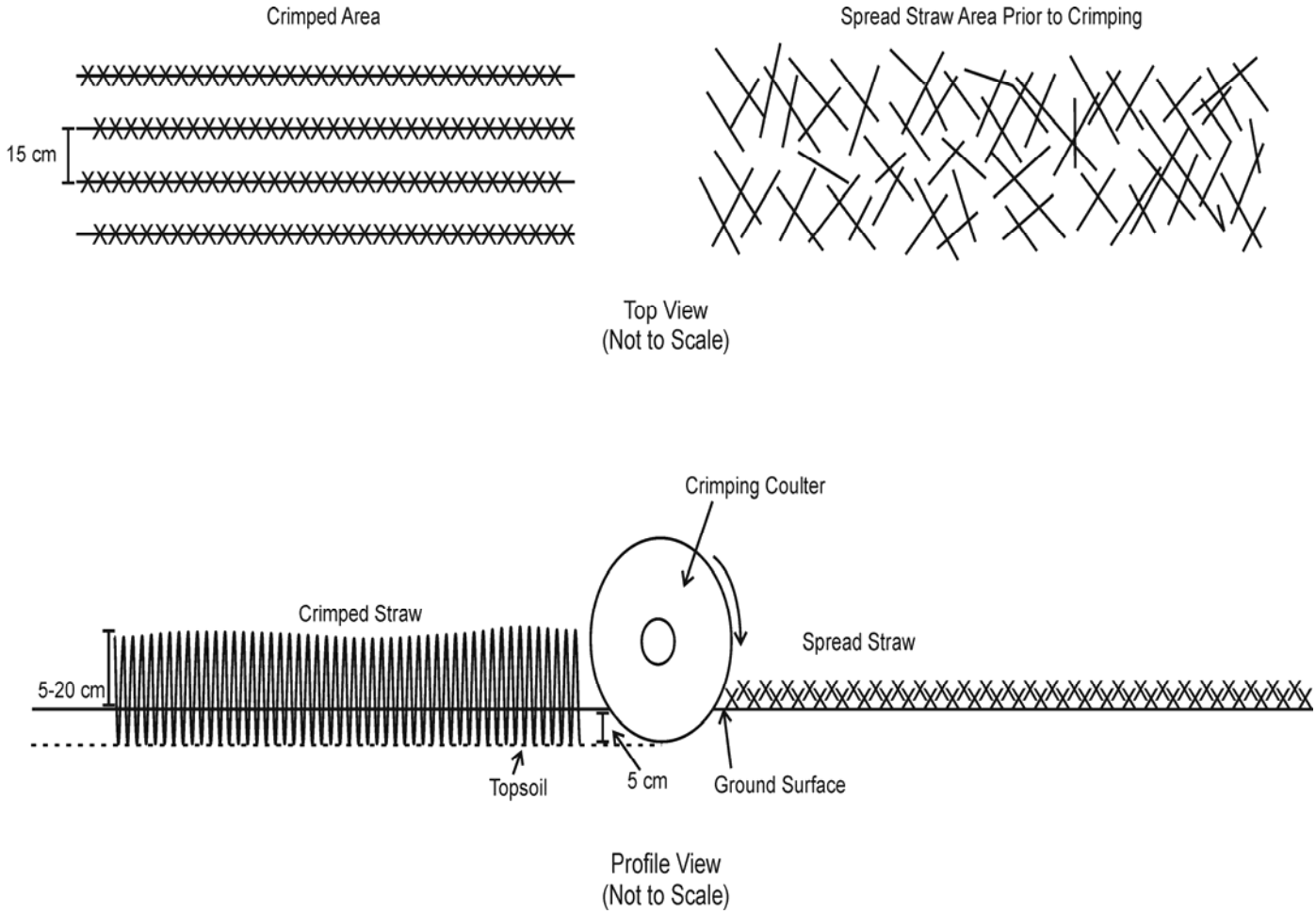


(Not to Scale)

At sites where erosion is a concern and where shrub plantings are required for reclamation, locally salvaged logs may be used to secure slopes and provide planting sites.

1. Sites where staked logs are to be installed will be selected by Trans Mountain's Environmental Inspector(s). When possible, sites will be selected prior to clearing and suitable local logs will be salvaged and stockpiled for later use.
2. Install staked logs during clean-up or reclamation phase. Where possible, use a backhoe to cut a step into the slope and push in a line of wood stakes. Note: take all necessary safety measures when working in proximity to pipeline.
3. With a qualified chainsaw operator, select and cut to fit suitable logs for horizontals. If necessary, the logs may be secured to the stakes using biodegradable rope.
4. Create a pocket behind the horizontally staked logs. The pocket can be used to install live shrub stakes and backfilled with topsoil/root zone material.
5. Where the planting pocket is required for rooted plugs or salvaged plantings, line the pocket with biodegradable fabric (burlap or coir). Bring the fabric over the top log. Fill the lined pocket with topsoil/root zone material or duff and tamp down. Install plants in pockets as directed by Trans Mountain's Environmental Inspector(s).

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	STAKED LOGS/LOG CRIBWALL FOR EROSION CONTROL		
	7894	December 2013	Drawing 19

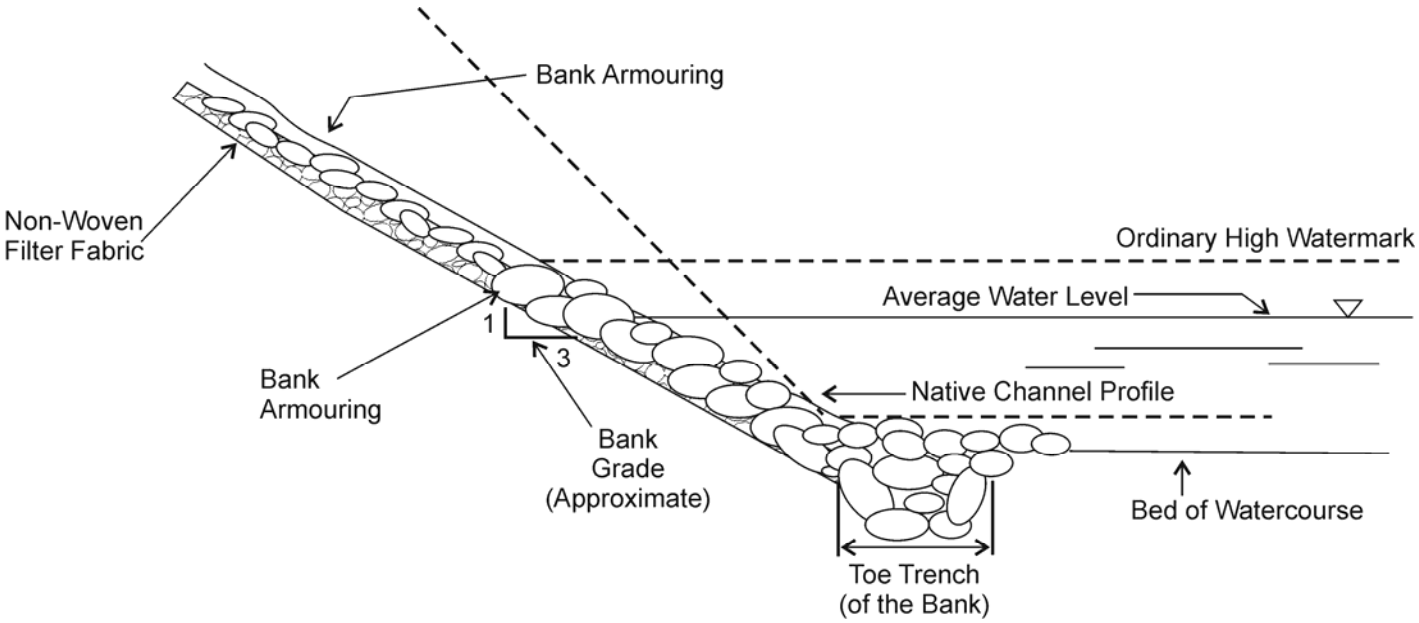


Notes:

Straw is to be crimped into the soil to an approximate depth of 5 cm and the crimped materials should stand vertically 5-20 cm out of the ground in rows spaced approximately 15 cm apart.

Seeding activities will precede straw crimping activities.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	STRAW CRIMPING		
	7894	December 2013	Drawing 20



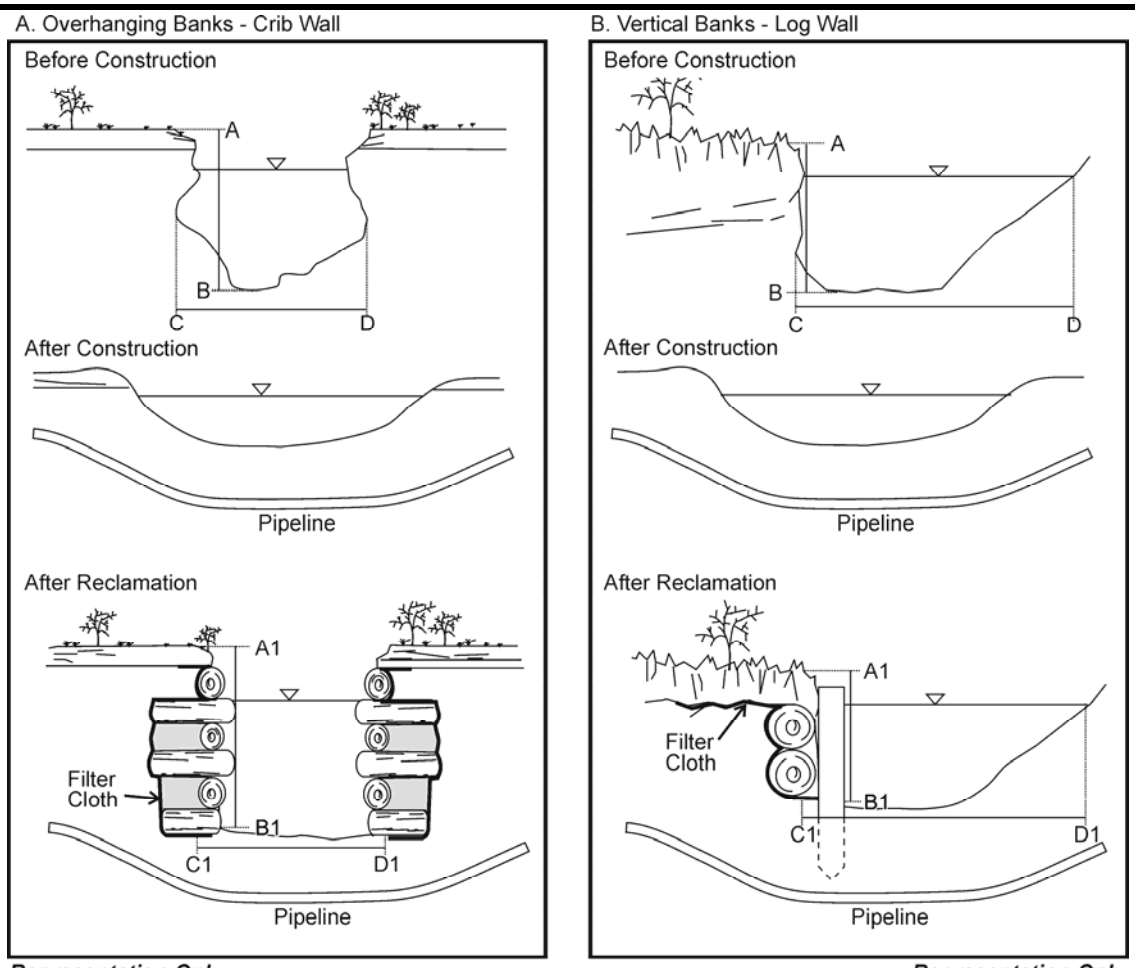
Profile
(Not to Scale)

Notes:

1. Proper placement and design is critical and qualified specialists (*i.e.*, hydrotechnical engineers) should be involved.
2. Remove all stumps, organic matter and work material, and grade/prepare banks to a maximum slope as directed by a geotechnical engineer (≥ 45^{o}).
3. Construct toe trench to key in bottom of armour protection into the bed and bank of the watercourse bank or adopt thickened toe option.
4. Install non-woven filter fabric or gravel filter layer at the ordinary high water level and above where cobble or riprap bank armouring will be implemented.
5. Place cleaned cobble or riprap on slope to be protected such that a well-interlocked, smooth layer is produced.
6. Key in up and downstream ends of the armoured bank in a manner such that it will not be outflanked.
7. Cobble/riprap should extend 0.5 m (min) above design flood level. If design flood level is above the top of the bank, cobble/riprap should be placed to the top of the bank.
8. Cobble/riprap should be flush with bank adjacent to the right-of-way.
9. Cobble/riprap placement should not compromise bed elevation.

Adapted from CAPP *et al.* (2005).

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	STREAMBANK PROTECTION – COBBLE OR RIPRAP ARMOURING		
	7894	December 2013	Drawing 21



Representation Only ***Representation Only***

Profile View
(Not to Scale)

Notes:

1. Install overhanging bank cribwalls as directed by Trans Mountain's EI(s).
2. Proper placement and design is critical and qualified specialists should be involved.
3. Install log overhang greater than 30 cm.
4. Install native timber (coniferous, where possible).
5. Compare crossing with adjacent undisturbed up and downstream locations to ensure A1-B1 is not less than A-B.
6. Compare crossing with adjacent undisturbed up and downstream locations to ensure C1-D1 is not greater than C-D.
7. Backfill with coarse, non-erodible material.
8. Replace subsoil and topsoil/root zone material.
9. Transplant native vegetation. Sow appropriate seed mix.
10. Live willows may be laid perpendicularly to streamflow within and projecting from the cribwall above the water line. This will create a live cribwall.

Adapted from CAPP *et al.* (2005)

Notes:

1. Install vertical bank logwalls as directed by Trans Mountain's EI(s).
2. Proper placement and design is critical and qualified specialists should be involved.
3. Install pressure treated vertical posts three times the length of exposed height.
4. Utilize native timber or lumber for horizontal structure.
5. Compare crossing with adjacent undisturbed up and downstream locations to ensure A1-B1 is not less than A-B.
6. Compare crossing with adjacent undisturbed up and downstream locations to ensure C1-D1 is not greater than C-D.
7. Anchor posts as required.
8. Backfill with coarse, non-erodible material.
9. Replace subsoil and topsoil/root zone material.
10. Transplant native vegetation. Sow approved seed mix.
11. Live willows may be laid perpendicularly to streamflow within and projecting from the cribwall above the water line. This will create a live cribwall.

ENVIRONMENTAL CONSULTANTS

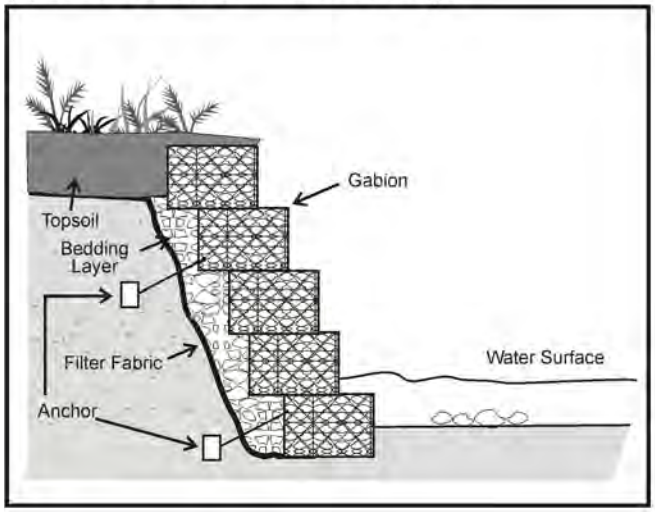
TRANS MOUNTAIN EXPANSION PROJECT

TRANSMOUNTAIN

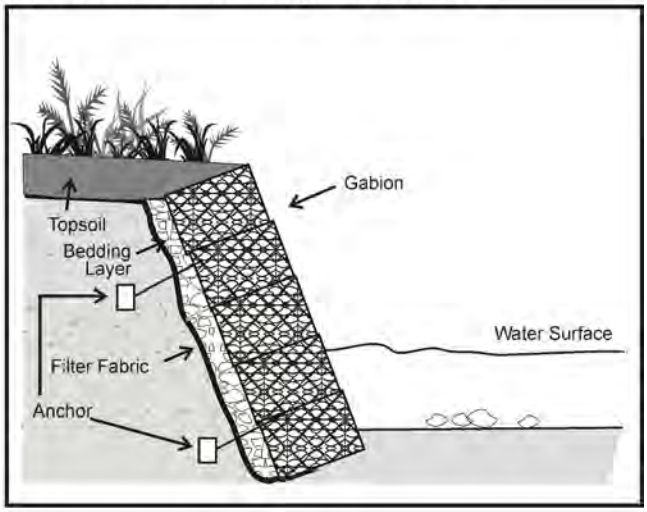
STREAMBANK PROTECTION – CRIBWALLS

7894	December 2013	Drawing 22

(A) Gabions Offset to Maintain Bank Slope



(B) Gabions Installed Flat Against Streambank



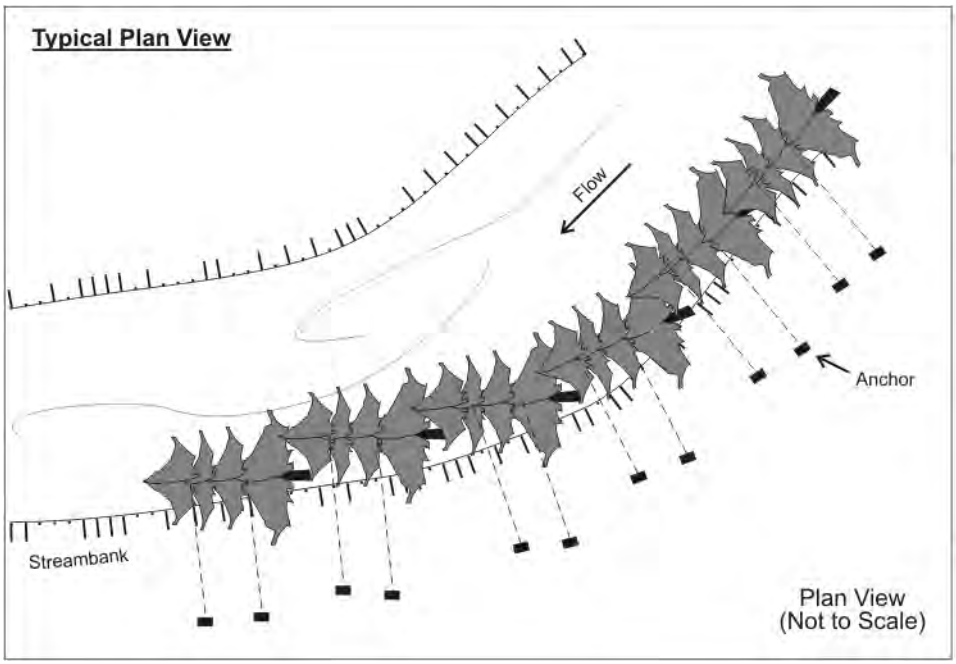
Profile
(Not to Scale)

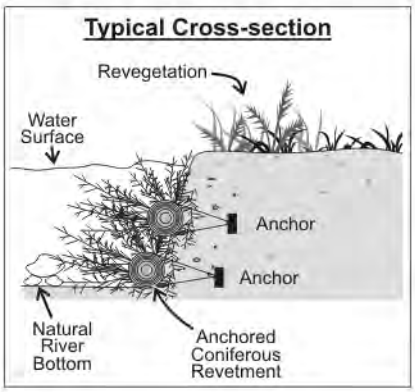
Notes:

1. Proper placement and design is critical and qualified specialists should be involved.
2. Gabions can be installed on slopes that exceed 1.5:1. Installation flat to slope is preferred on high banks.
3. Gabions should be installed to a height of about 1 m above the normal high water level.
4. Care should be taken not to restrict stream channel capacity, particularly on smaller watercourses.
5. A key trench is to be excavated along the toe of the bank to a point below anticipated scour depth. Place filter fabric and a bedding layer of coarse gravel on excavated slope as gabions are installed.
6. Gabions should be tied together with heavy gauge wire and anchored into the banks at the up and downstream ends.
7. Fill gabion baskets in layers with angular rock larger than the mesh openings. Close and tie down the first row and repeat. Backfill behind baskets and cap with topsoil.

Adapted from CAPP *et al.* (2005)

tera ENVIRONMENTAL CONSULTANTS	TRANS MOUNTAIN EXPANSION PROJECT TRANSMOUNTAIN		
	STREAMBANK PROTECTION – GABION BASKETS		
	7894	December 2013	Drawing 23





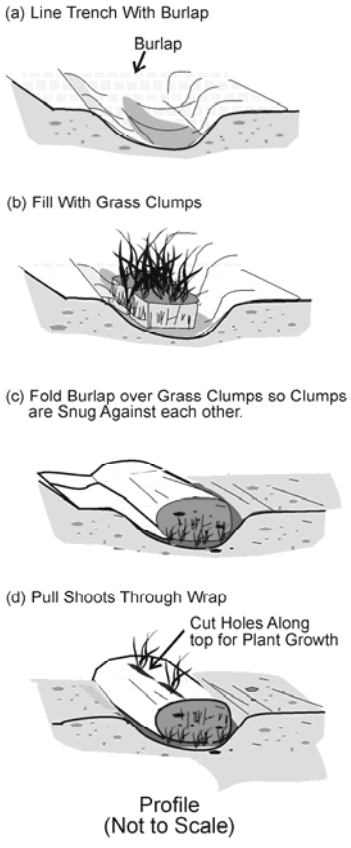
Notes:

1. Proper placement and design is critical and qualified specialists should be involved.
2. Select only good, sound, straight coniferous trees with adequate branches and a minimum length of 10 m.
3. Do not trim any branches and handle with care. Leave root ball intact if possible and transport the trees to the site with a minimum of handling to reduce damage to the branches. To the extent practical, remove soil material from the rootball before placing the tree instream. Place the trees lengthwise along or across the eroding bank to be protected beginning at the downstream end with the tips of the trees pointed in the downstream direction.
4. Begin assembly of the tree revetment at the downstream end and place tie back cable on the tree butt (largest end). Attach the cable to a suitable deadman or large armour rock with a drilled hole. Bury the anchor securely in the adjacent bank.
5. Place the butt of the next tree one-half the length of the previous tree or less upstream along the bank, so there is an overlap of the trees. If possible, cable the trees together in addition to cabling to an anchor buried in the bank.
6. Rock armour may be added along the toe of the slope, beneath the trees to reinforce the level of protection provided.
7. Maintenance, consisting of replacing severely damaged trees, will extend the life span.
8. Coniferous tree revetments also may be used as instream cover.

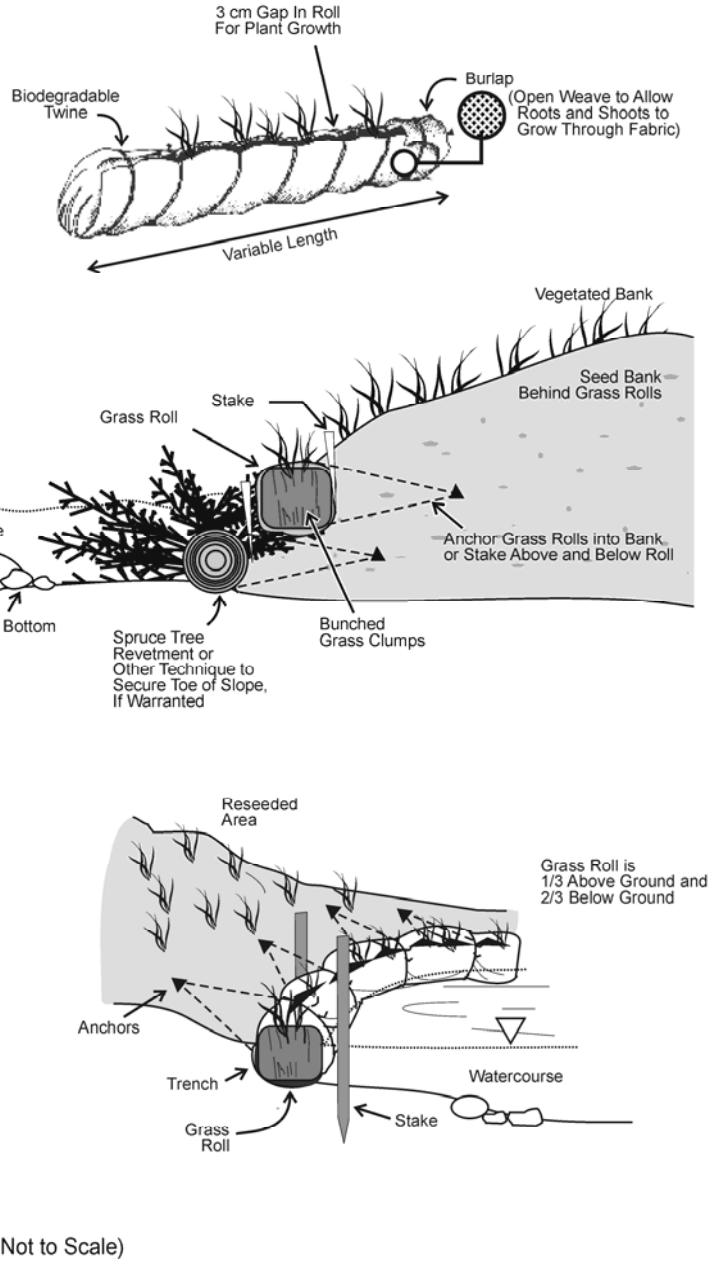
Adapted from CAPP *et al.* (2005)

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	STREAMBANK PROTECTION – CONIFEROUS TREE REVETMENT		
	7894	December 2013	Drawing 24

Preparation



Implementation

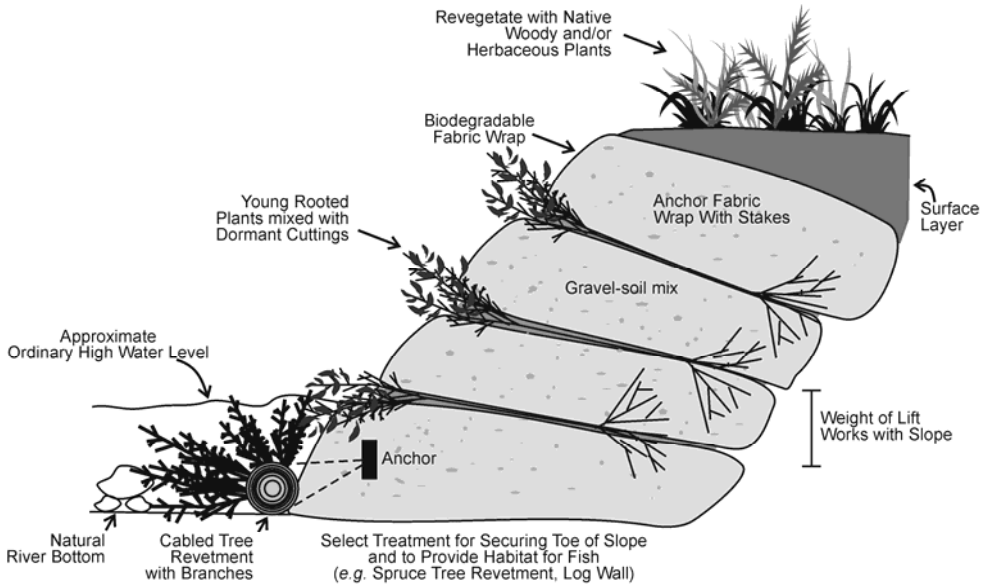


Notes:

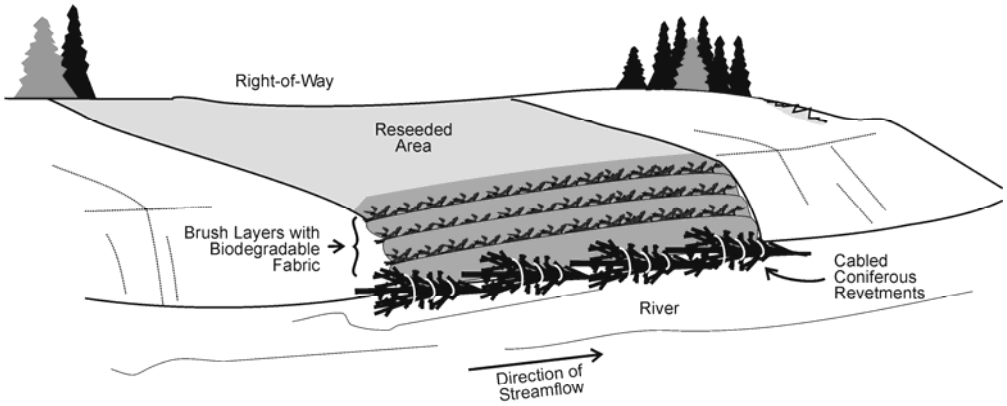
1. Proper placement and design is critical and qualified aquatics or reclamation resource specialists should be involved.
2. Excavate a shallow trench along the ordinary high level watermark parallel to the toe of the bank and line with burlap.
3. Install sod in the middle of the roll and wrap with burlap covers. Tie with twine and cut slits to expose sections of sod.
4. Stake or anchor firmly, ensuring up and downstream ends are secured to prevent washing out.

Adapted from CAPP *et al.* (2005)

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	STREAMBANK PROTECTION – GRASS ROLL		
	7894	December 2013	Drawing 25



Profile
(Not to Scale)



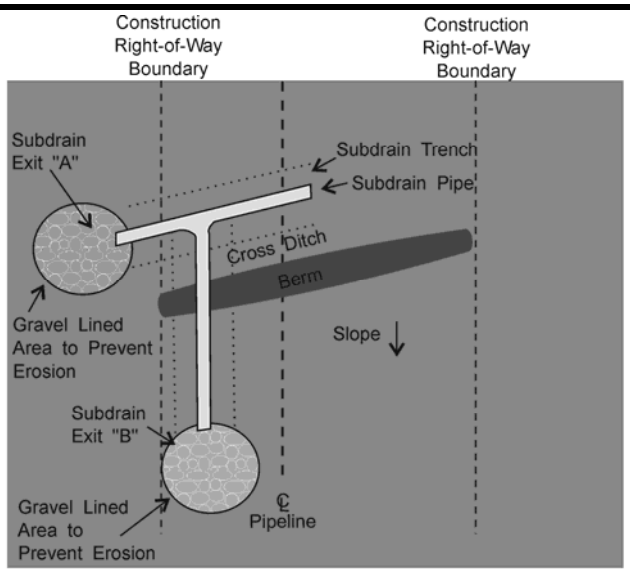
Oblique View
(Not to Scale)

Notes:

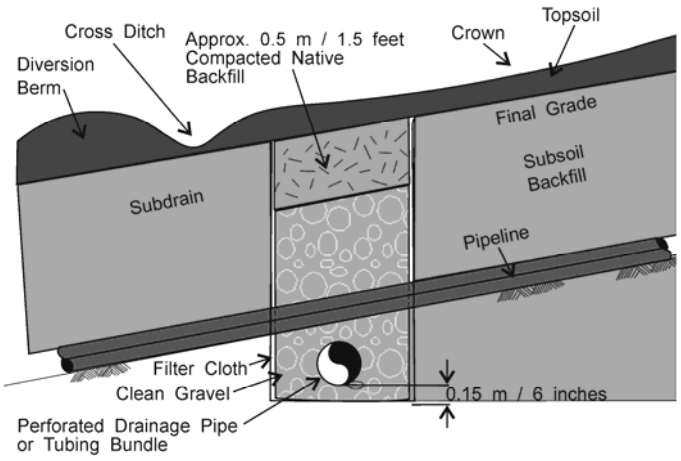
1. Proper placement and design is critical and qualified specialists should be involved.
2. Secure the toe of the slope with appropriate technique (coniferous tree revetments, log wall, riprap, etc.).
3. Begin layering at the bottom of slope with first hedge/brush layer situated at the approximate ordinary high water level or lower. Select plant species suitable for site conditions.
4. To establish banks, install layers of soil filled biodegradable fabric (coir or equivalent) wraps. To make each layer, roll out the fabric parallel with the bank with one-third into the bank and two-thirds out (streamside). Form a step of soil approximately 30-40 cm (1-1.3 feet) high over the bank side fabric. Fold the stream side fabric over the soil step and firm into place.
5. Arrange locally salvaged live shrubs with roots (alder, rose ssp., etc.) with live stake material (willow, poplar, red osier dogwood) over the fabric wrap at 20 stems per metre, incorporate topsoil and firm into place.
6. Continue building layers of fabric soil wraps and live shrubs until original bank height is reached.
7. Use only dormant live shrub material. Keep transplants moist and install as soon as feasible following salvage. A mixture of plant species can mimic adjacent undisturbed vegetation.

Adapted from CAPP *et al.* (2005)

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	STREAMBANK PROTECTION – HEDGE/BRUSH LAYERING		
	7894	December 2013	Drawing 26



Plan View
(Not to Scale)



Profile View
(Not to Scale)

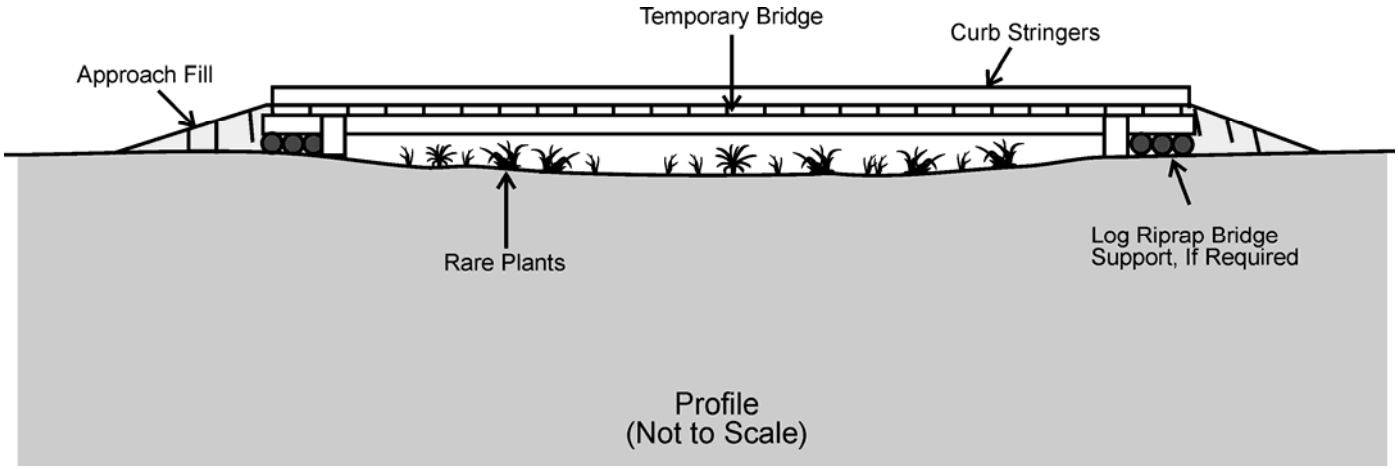
Representation Only

Notes:

1. Install subdrains to divert shallow groundwater flow away from the pipeline and improve slope stability.
2. Clean gravel and a filter cloth ditch liner permit drainage aiding in retention of backfill.
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 the construction 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, rip-rap or vegetation.
4. Skew cross drain 5° off horizontal to ensure sufficient drainage.
5. A geotechnical engineer should be consulted for the detailed site-specific drain design and the incorporation of the trench breaker.

Adapted from CAPP *et al.* (2005)

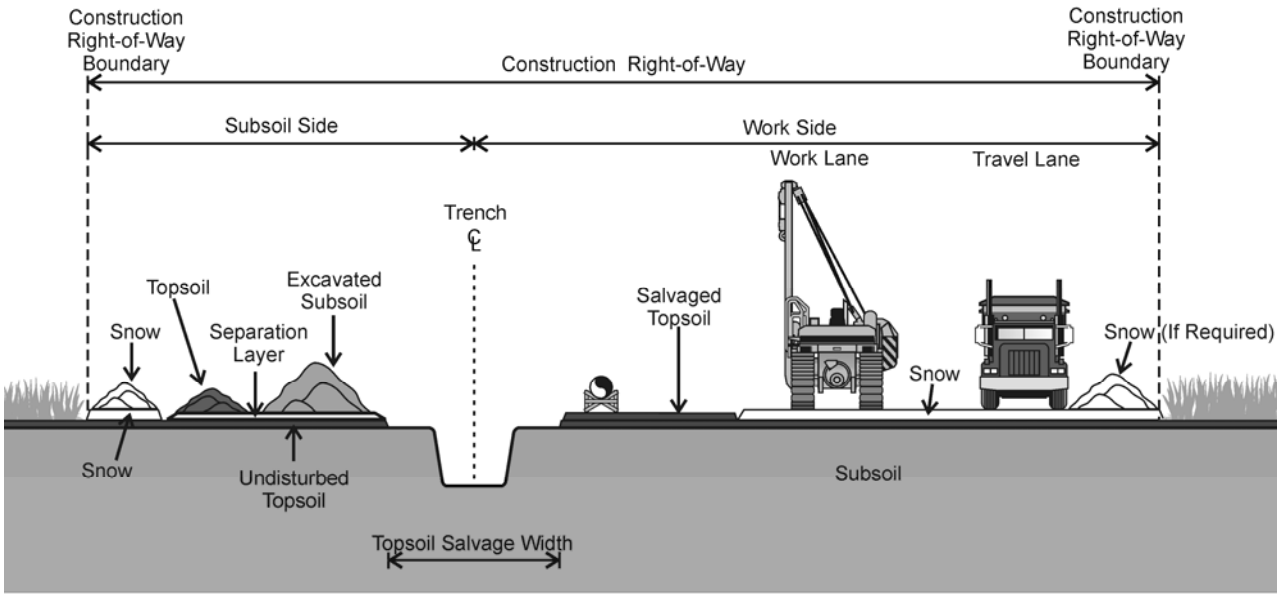
tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	SUBDRAINS		
	7894	December 2013	Drawing 27



Notes:

1. Install a temporary bridge (*e.g.,* log, pre-fabricated span) to allow vehicles to cross over rare plants. Bridge length is generally limited to areas less than 30 m in length.
2. Utilize approach fills rather than cuts to minimize ground disturbance. Use a geotextile liner to prevent fine material accumulating onto rare plants.
3. Install curb stringers of logs or plywood to ensure that fill material does not spill onto surrounding area, if required.
4. Notify Trans Mountain's Environmental Inspector(s) prior to removal of bridge. Remove bridge at completion of final clean-up. Remove support structures and approach fills. Fence and flag the rare plant population.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TEMPORARY BRIDGE/RARE PLANTS		
	7894	December 2013	Drawing 28



Profile
(Not to Scale)

Representation Only

Activity:	**Notes:**
1. Salvage and Stockpile Topsoil/Root Zone Material	- Remove snow from work area prior to topsoil/root zone material salvage and store on construction right-of-way. Maintain adequate separation between snow and soil piles to avoid admixing. - Conduct blade width topsoil/root zone material salvage on well-sodded hay land, tame pasture, tree/shrub, tree/shrub-pasture during non-frozen soil conditions and consider using on all land uses during frozen soil conditions. - Use equipment capable of accurately separating topsoil/root zone material from subsoil when salvaging topsoil/root zone material during frozen soil conditions. - Salvage topsoil/root zone material from an appropriate width centred over the trench line as shown on the Environmental Alignment Sheets or as recommended by Trans Mountain's Environmental Inspector(s). Area salvaged should be sufficiently wide to accommodate the track of a ditcher or excavator. Increase topsoil/root zone material salvaging width at locations where trench sloughing may occur; stockpile topsoil/root zone material a greater distance from the trench at these sites. - Salvage topsoil/root zone material to color change, plow layer, as shown on the Environmental Alignment Sheets or as recommended by Trans Mountain's Environmental Inspector(s). - Stockpile topsoil/root zone material on work side and flatten to allow set-up of pipe. Windrowing of salvaged topsoil/root zone material on the subsoil side or work side edge is also acceptable. - Leave breaks in the topsoil/root zone material windrow at obvious drainage courses. - Maintain a separation between the snow piles, topsoil/root zone material piles/windrows and subsoil piles/windrows.
2. Excavate Trench and Stockpile	- Excavate the trench and windrow subsoil material. Store subsoil at least 1 m from the edge of the trench. - Maintain a separation layer where excavated subsoil is stored above undisturbed topsoil/root zone material.
3. Backfill Trench	- Backfill the trench. Avoid mixing subsoil with snow and/or topsoil/root zone material when backfilling. Avoid scalping the sod layer. - Crown the trench to allow for settlement. Avoid excessive trench crown height by feathering subsoil over the salvaged portion of the construction right-of-way, if warranted. Leave breaks in the crown at obvious drainages. - Pick stones and debris from the trench area equivalent to the surrounding subsoil.
4. Replace Topsoil/Root Zone Material and Clean-up	- Replace topsoil/root zone material over areas of the construction right-of-way where topsoil/root zone material salvage was conducted. Avoid scalping sod layer. - Cultivate the disturbed part of the construction right-of-way. - Pick stones equivalent to the surrounding topsoil/root zone material. - Revegetate with an appropriate seed mix and apply erosion control as necessary.

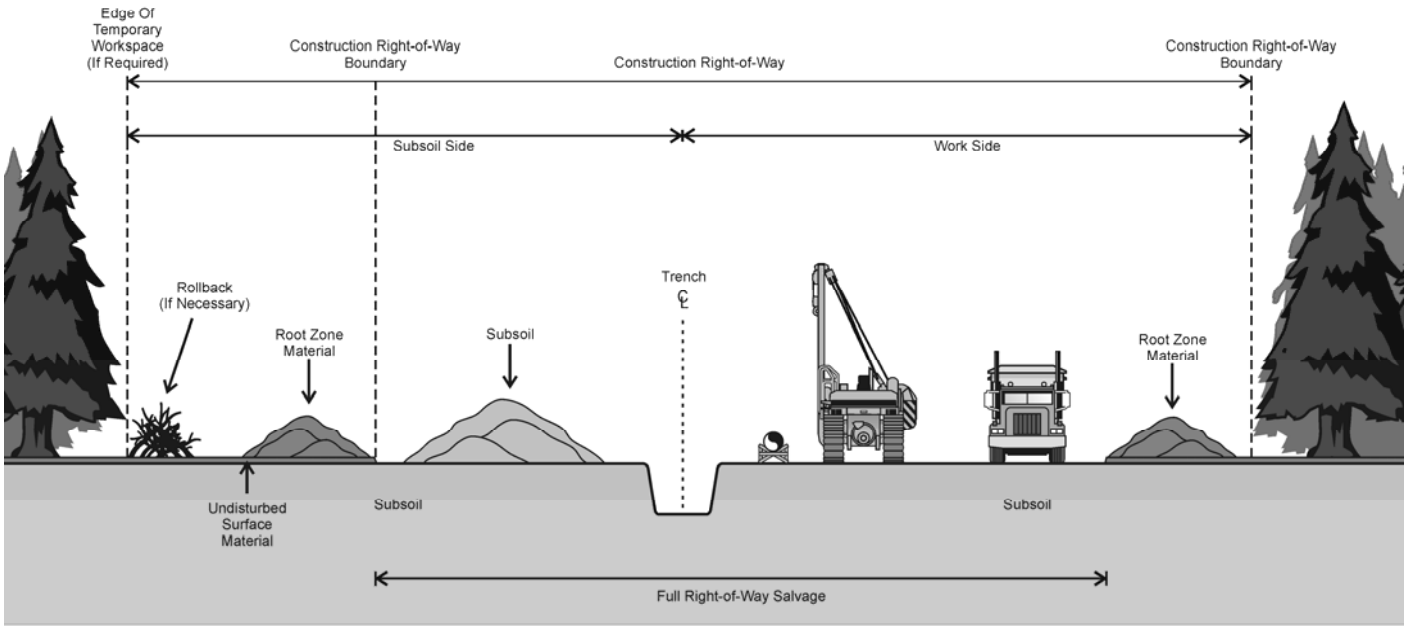
ENVIRONMENTAL CONSULTANTS

TRANS MOUNTAIN EXPANSION PROJECT

TRANSMOUNTAIN

TOPSOIL OR ROOT ZONE MATERIAL SALVAGE – BLADE WIDTH/FROZEN

7894	December 2013	Drawing 29



Profile
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Representation Only

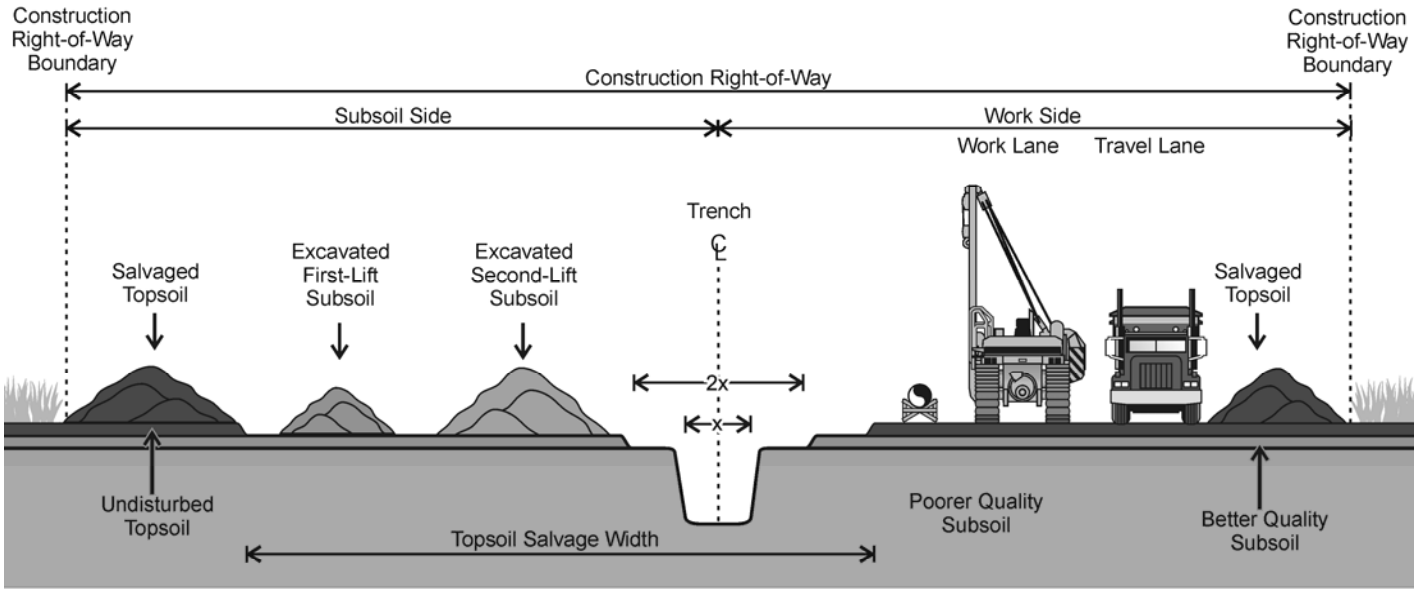
Notes:

1. Salvage topsoil/root zone material to depths as indicated on the Environmental Alignment Sheets, from over the trench, subsoil storage and work area, during non-frozen conditions.
2. Store topsoil/root zone material on both sides of the construction right-of-way adjacent to the stripped area as needed.
3. Leave breaks in topsoil/root zone material piles, subsoil, rollback and snow piles at obvious drainage courses and wildlife trail crossings.
4. Excavate trench and place subsoil on stripped area of subsoil side.
5. Maintain ditch plugs at locations corresponding to breaks in material piles.

Note: Root zone material and subsoil pile storage locations may vary depending on the site-specific conditions.

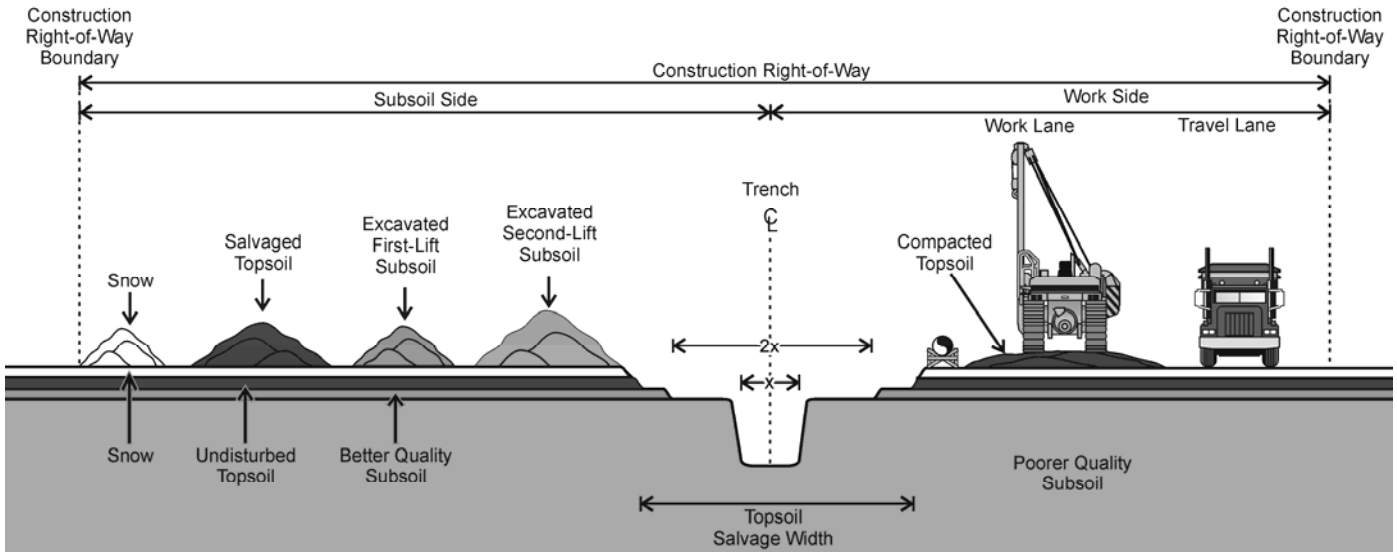
tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TOPSOIL OR ROOT ZONE MATERIAL SALVAGE IN FOREST – FULL RIGHT-OF-WAY		
	7894	December 2013	Drawing 30

Profile A – Non-frozen



Profile View
(Not to Scale)

Profile B – Frozen

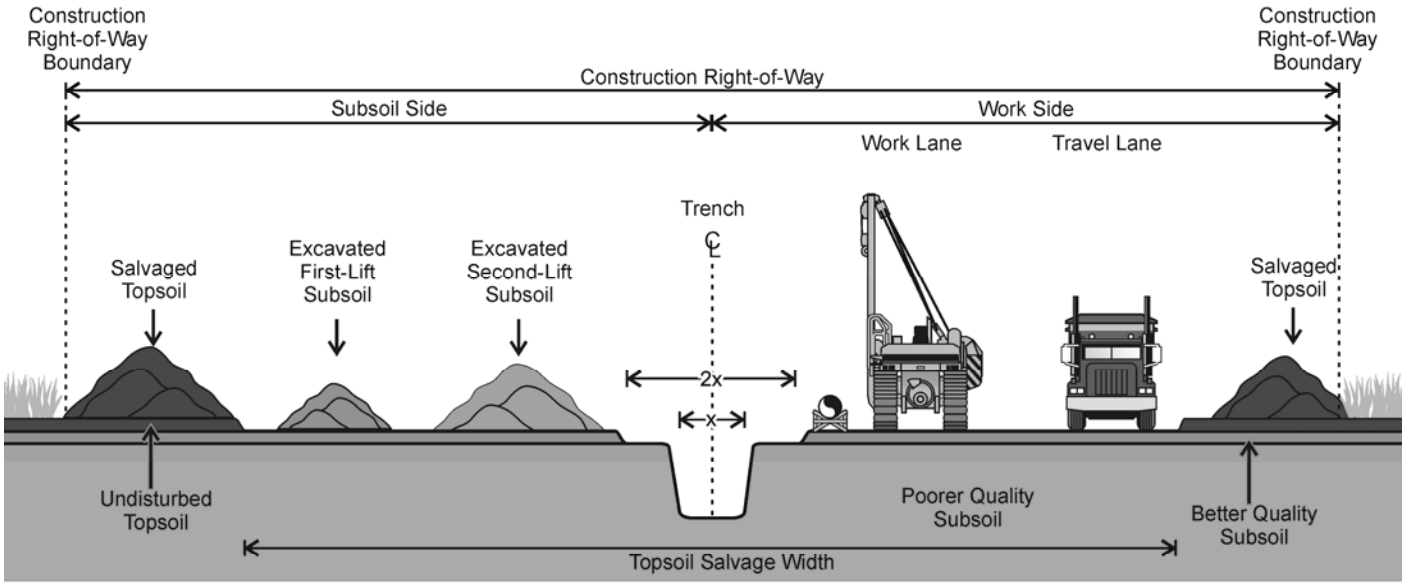


Representation Only

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TOPSOIL OR ROOT ZONE MATERIAL SALVAGE – THREE-LIFT SOILS HANDLING ON CULTIVATED LAND		
	7894	December 2013	Drawing 31 Page 1 of 2

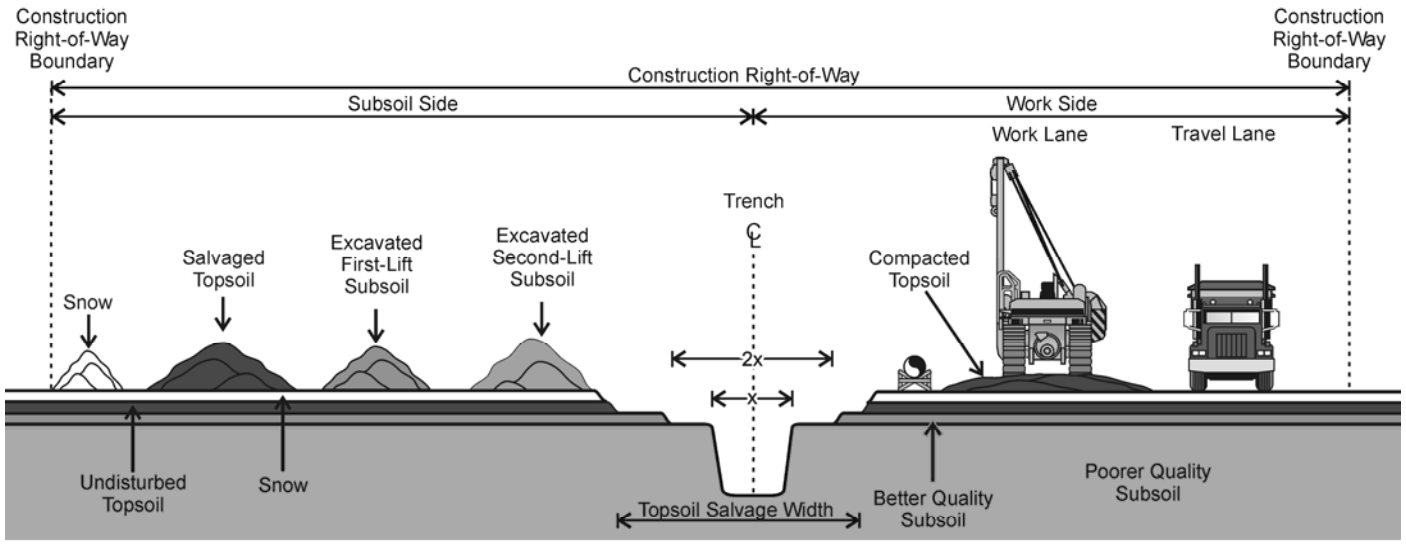
Activity:	Notes:
1. Salvage and Stockpile Topsoil/Root Zone Material	- Salvage and stockpile topsoil/root zone material and subsoil first-lift as shown above during non-frozen conditions (Profile A) and, if warranted, during frozen conditions (Profile B). - Use equipment capable of accurately separating topsoil/root zone material from subsoil when salvaging topsoil/root zone material during frozen conditions. - Storing all topsoil/root zone material on the work side or the subsoil side is an acceptable practice provided that mixing with subsoil is prevented. - Topsoil/root zone material may be flattened and stored under the worklane if it is found to be too far to stockpile the topsoil/root zone material on the edge of the construction right-of-way during frozen conditions.
2. Excavate Trench and Stockpile	- Excavate first-lift of subsoil to the depth indicated on the Environmental Alignment Sheets or as recommended by the Trans Mountain's Environmental Inspector and stockpile as shown above. Note: a dozer may be needed to move this subsoil to allow room for windrowing and subsequent backfilling of the second subsoil lift. - The width of the upper subsoil lift (subsoil first-lift) should be twice the width of the lower trench. - Excavate the remainder of subsoil and stockpile. - Maintain a separation between the topsoil/root zone material and the subsoil windrows and also between the subsoil piles. - Store subsoil at least 1 m from the edge of the trench. - Maintain a separation layer where excavated subsoil is stored above undisturbed topsoil/root zone material.
3. Backfill Trench	- Return second-lift of trench subsoil to the trench and compact. Scalp upper subsoil base under second lift of trench subsoil during backfilling during non-frozen conditions to ensure that all second lift subsoil is returned to the trench. - Return first-lift of subsoil to the trench and compact. Avoid mixing upper subsoil with topsoil/root zone material during backfill during non-frozen conditions and with snow and topsoil/root zone material during frozen conditions. - Pick stones and debris from the trench area equivalent to the surrounding subsoil.
4. Replace Topsoil/Root Zone Material and Clean-Up	- Replace topsoil/root zone material over areas of the construction right-of-way where topsoil/root zone material salvage was conducted. - Cultivate disturbed area of the construction right-of-way. - Pick stones and debris equivalent to the surrounding topsoil/root zone material.

Profile A – Non-frozen



Profile
Not to Scale

Profile B – Frozen



Profile
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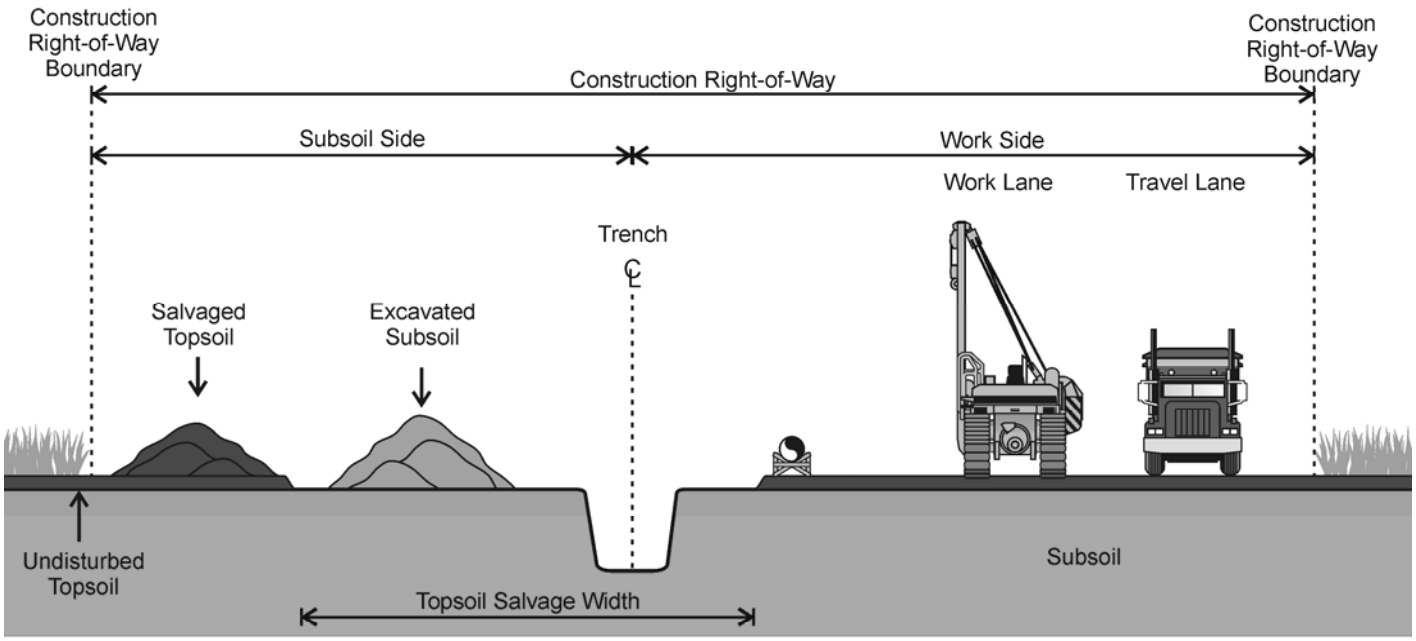
Representation Only

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TOPSOIL OR ROOT ZONE MATERIAL SALVAGE – THREE-LIFT SOILS HANDLING ON WELL-SODDED LAND		
	7894	December 2013	Drawing 32 Page 1 of 2

Activity:	Notes:
1. Salvage and Stockpile Topsoil/Root Zone Material	- Salvage and stockpile topsoil/root zone material and subsoil first-lift as shown above. Profile A is to be employed during non-frozen conditions; Profile B, during frozen conditions. - During frozen conditions, storing all topsoil/root zone material on the work side or the subsoil side is an acceptable practice provided that mixing with subsoil is prevented. - Topsoil/root zone material may be flattened and stored under the worklane if it is found to be too far to stockpile the topsoil/root zone material on the edge of the construction right-of-way during frozen conditions. - Use equipment capable of accurately separating topsoil/root zone material from subsoil when salvaging topsoil/root zone material during frozen conditions.
2. Excavate Trench and Stockpile	- Excavate first-lift of subsoil to the depth indicated on the Environmental Alignment Sheets or as recommended by Trans Mountain's Environmental Inspector and stockpile as shown above. Note: a dozer may be needed to move this subsoil to allow room for windrowing and subsequent backfilling of the second subsoil lift. - The width of the upper subsoil lift (subsoil first-lift) should be twice the width of the lower trench. - Excavate the remainder of subsoil and stockpile as shown above. - Maintain a separation between the topsoil/root zone material and the subsoil windrows, and also between the subsoil piles. - Store subsoil at least 1 m from the edge of the trench. - Maintain a separation layer where excavated subsoil is stored above undisturbed topsoil/root zone material.
3. Backfill Trench	- Return second-lift of trench subsoil to the trench and compact. Scalp upper subsoil base under second-lift of trench subsoil during backfilling during non-frozen conditions to ensure that all second-lift subsoil is returned to the trench. - Return first-lift of subsoil to the trench and compact. Avoid mixing upper subsoil with topsoil/root zone material during backfill during non-frozen conditions and snow with topsoil/root zone material during frozen conditions. - Pick stones and debris from the trench area equivalent to the surrounding subsoil.
4. Replace Topsoil/Root Zone Material and Clean-Up	- Replace topsoil/root zone material over areas of the construction right-of-way where topsoil/root zone material salvage was conducted. - Pick stones and debris equivalent to the surrounding topsoil/root zone material. - Revegetate the construction right-of-way with an appropriate seed mix and apply erosion control as necessary.



Profile View
(Not to Scale)

Representation Only

Activity:	**Notes**:
1. Salvage and Stockpile Topsoil/Root Zone Material	- Conduct trench and subsoil pile area topsoil/root zone material salvage during non-frozen conditions on cultivated, poorly-sodded hay and tame pasture lands. - Store topsoil/root zone material on edge of subsoil side of the construction right-of-way. Storing topsoil/root zone material on the work side and flattening it down to set pipe on is acceptable provided there is no mixing. - Leave breaks in the topsoil/root zone material windrow at obvious drainage courses.
2. Excavate Trench and Stockpile	- Maintain separation between the topsoil/root zone material and subsoil windrows/piles. - Store subsoil at least 1 m from the edge of the trench.
3. Backfill Trench	- Backfill the trench. Crown the trench to allow for settlement. Avoid excessive trench crown height by feathering subsoil over the salvaged portion of the construction right-of-way, if warranted. Leave breaks in the crown at obvious drainages. - Avoid mixing excavated subsoil with topsoil/root zone material. - Pick stones and debris equivalent to the surrounding subsoil.
4. Replace Topsoil/Root Zone Material and Clean-up	- Rip compacted subsoils, if present, prior to topsoil/root zone material replacement. - Replace topsoil/root zone material over areas of the construction right-of-way where topsoil/root zone material salvage was conducted. - Cultivate disturbed area of the construction right-of-way. - Revegetate the construction right-of-way with an appropriate seed mix and apply erosion control as necessary.

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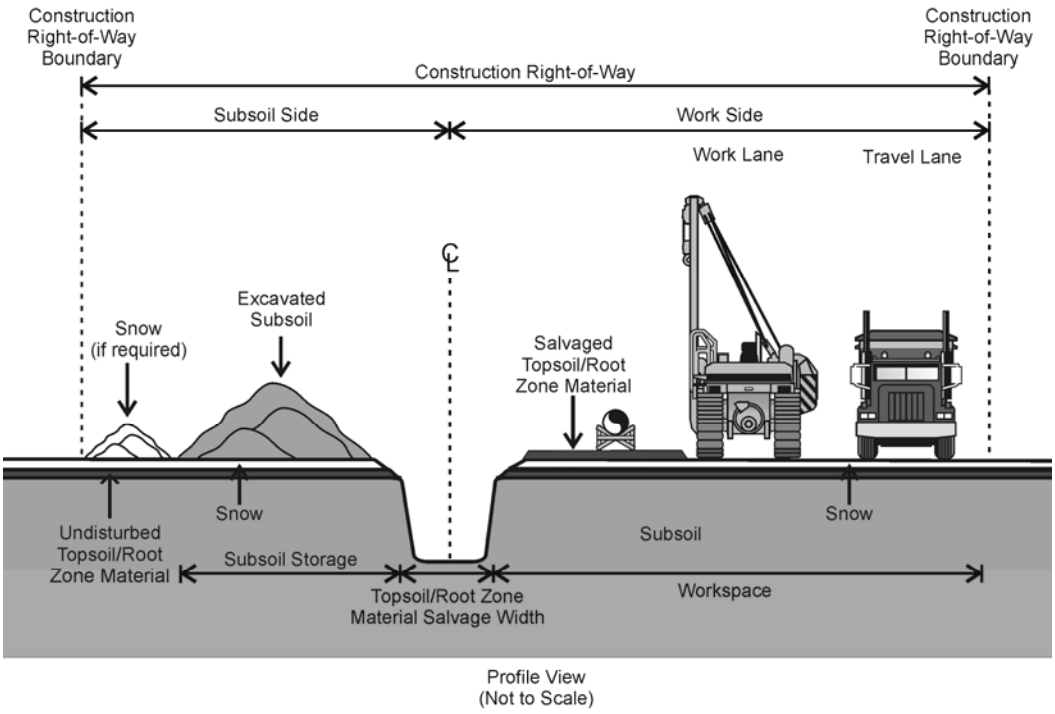
TRANS MOUNTAIN EXPANSION PROJECT

TRANSMOUNTAIN

TOPSOIL OR ROOT ZONE MATERIAL SALVAGE - TRENCH AND SPOIL AREA

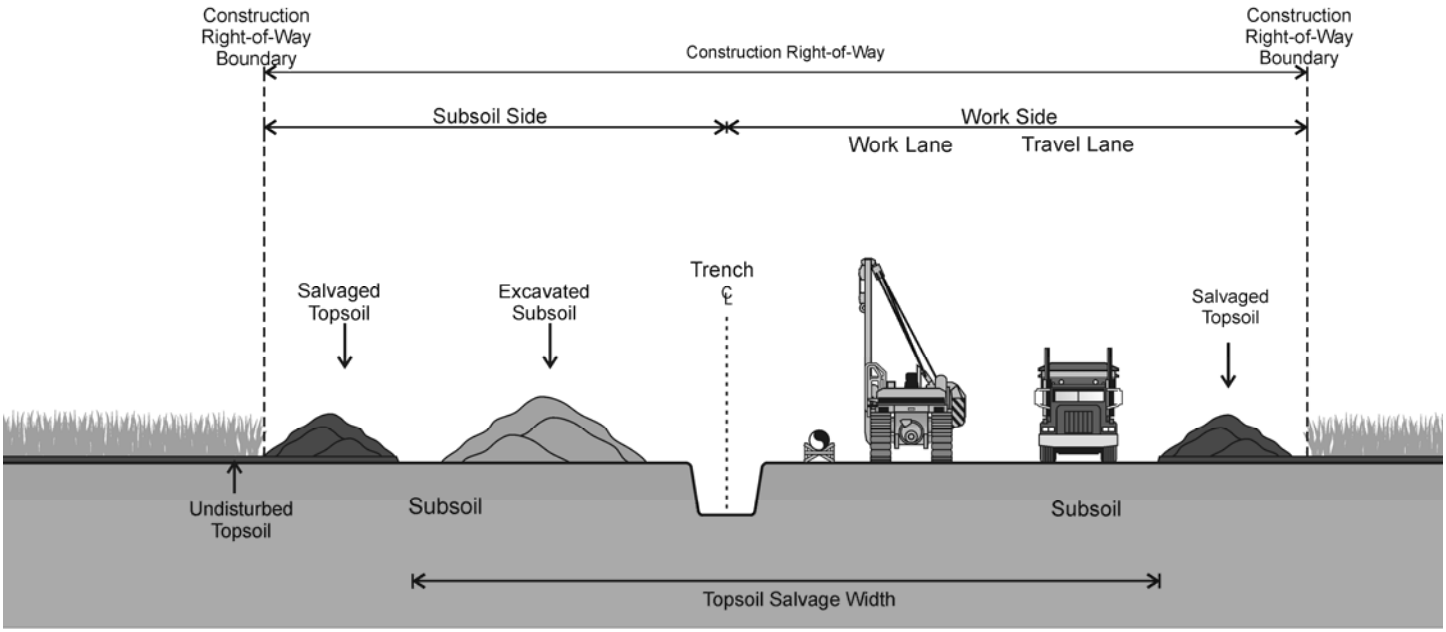
7894	December 2013	Drawing 33



Representation Only

Activity:	**Notes:**
1. Implementation	- Reduced salvaging width procedures will be employed in localized sensitive areas during frozen and non-frozen conditions. - Reduce traffic in the localized sensitive area. Install a separation layer of suitable material and thickness over the undisturbed topsoil/root zone material to reduce the risk of disturbance to the sod layer during topsoil/root zone material replacement.
2. Salvage and Stockpile Topsoil/Root Zone Material	- Salvage snow from the trench area and store on the subsoil side at the edge of the construction right-of-way. - Salvage topsoil/root zone material from the trench line only. Depth of topsoil/root zone material salvage should be to colour change, plow layer, depth indicated on the Environmental Alignment Sheets or as recommended by Trans Mountain's Environmental Inspector. The work side topsoil/root zone material pile may be flattened down to allow pipe to be set-up on the salvaged topsoil/root zone material. - Limit topsoil/root zone material salvaging activities to specialized equipment capable of accurately separating variable depths of topsoil/root zone material from subsoil (*e.g.,* frozen topsoil cutter, topsoil mulcher or equivalent, if available). If such equipment is not available, rip frozen topsoil/root zone material to the same depth as the salvage requirements. Multiple passes with a ripper are preferred to avoid topsoil/root zone material mixing that commonly occurs when attempting to rip to the full salvage depth. Do not over rip and avoid overstripping. - If straw is used as a separation layer, spread straw under the subsoil pile area, if approved by the landowner, to a sufficient thickness to reduce the risk of disturbance to the sod layer during backfilling. Ensure that straw is free of weeds.
3. Excavate Trench and Stockpile	- Excavate trench subsoil and store on the subsoil side adjacent to the trench. - Maintain separation between the topsoil/root zone material and subsoil piles/windrows if topsoil/root zone material is windrowed on the subsoil side. - Store subsoil at least 1 m from the edge of the trench.
4. Backfill Trench	- Backfill the trench. Crown the trench to allow for settlement. Avoid excessive trench crown height. Leave breaks in the crown at obvious drainages. Avoid mixing excavated subsoil with topsoil/root zone material or snow (if applicable) and avoid scalping the sod layer.
5. Replace Topsoil/Root Zone Material and Clean-up	- Replace topsoil/root zone material over areas of the construction right-of-way where topsoil/root zone material salvage was conducted. Avoid scalping the sod layer. - Pick stones equivalent to the surrounding topsoil/root zone material. - Revegetate the construction right-of-way with an appropriate seed mix and apply erosion control as necessary.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TOPSOIL OR ROOT ZONE MATERIAL SALVAGE – TRENCH WIDTH		
	7894	December 2013	Drawing 34



Profile
(Not to Scale)

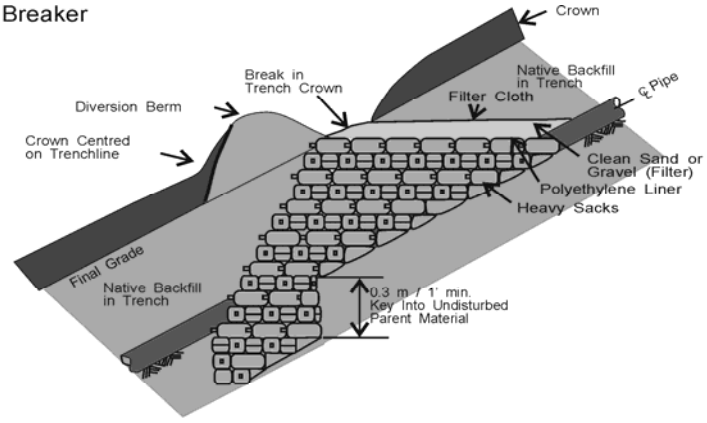
Activity: **Notes:** ***Representation Only***

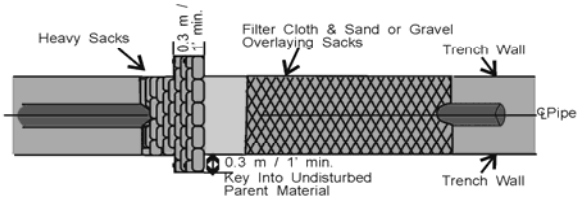
1.	Salvage and Stockpile Topsoil	- Salvage topsoil from over the proposed trench, subsoil storage and work areas during non-frozen conditions. Topsoil storage on both sides of the construction right-of-way adjacent to the salvaged area, as shown is preferred, however, storage of all salvaged topsoil on one side of the construction right-of-way is also acceptable. - Salvage topsoil to colour change, plow layer, as shown on the Environmental Alignment Sheets or as recommended by the Environmental Inspector. - Apply tackifier if erosion of topsoil piles becomes evident. - Leave breaks in the topsoil windrow at obvious drainages.
2.	Excavate Trench and Stockpile	- Maintain a separation between topsoil and subsoil windrows. - Store subsoil at least 1 m (3 feet) from the edge of the trench.

Note: Topsoil and subsoil pile storage locations may vary depending on the site-specific conditions.

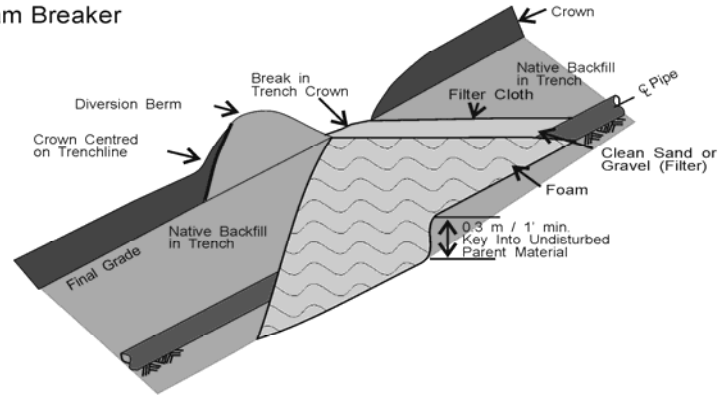
tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TOPSOIL SALVAGE ON AGRICULTURE LANDS – FULL RIGHT-OF-WAY		
	7894	December 2013	Drawing 35

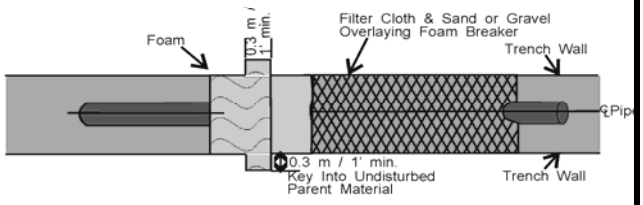
Sack Breaker



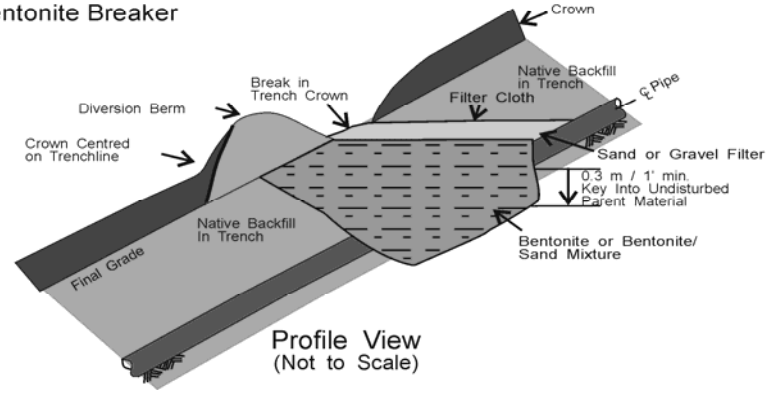


Foam Breaker

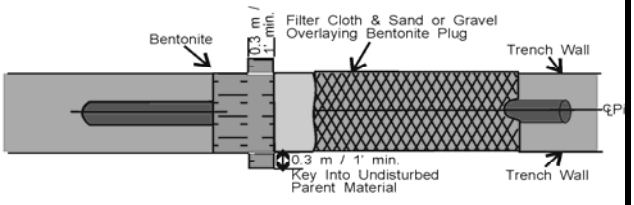




Bentonite Breaker



Profile View
(Not to Scale)



Plan View
(Not to Scale)

Representation Only

Adapted from CAPP *et al.* (2005)

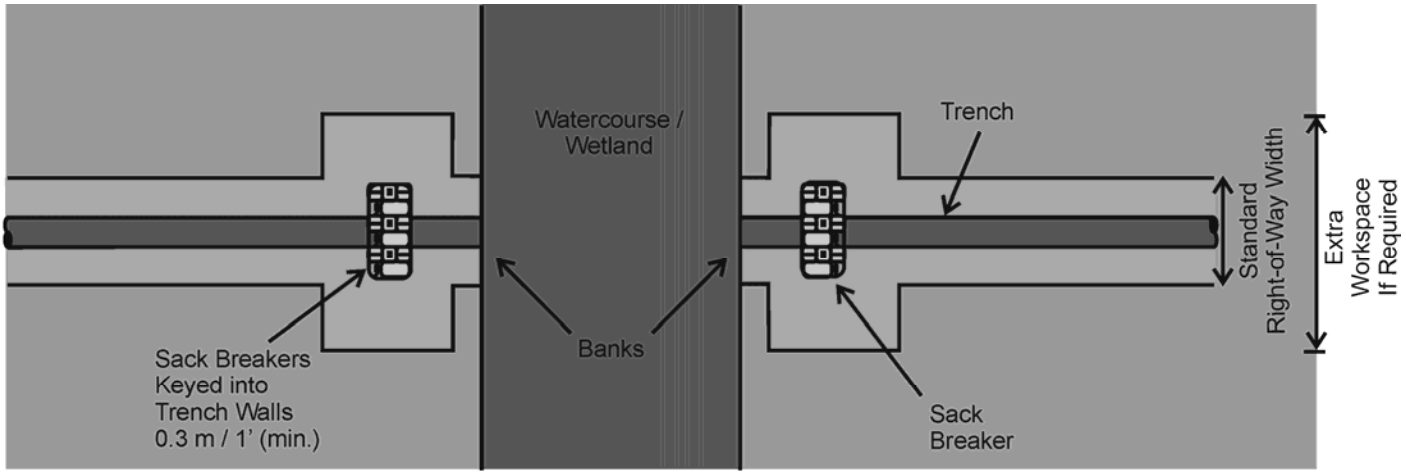
tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TRENCH BREAKERS/DITCH PLUGS		
	7894	December 2013	Drawing 36 Page 1 of 2

Notes:

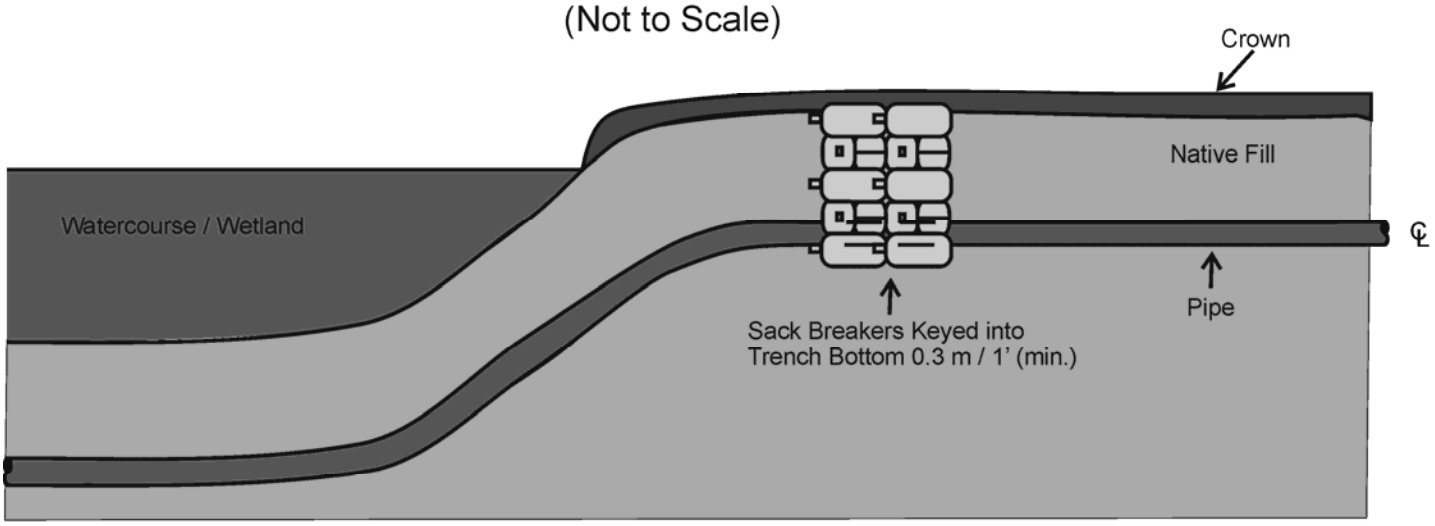
1. Install trench breakers, where warranted, on moderate and steep slopes on non-cultivated lands or flood irrigated lands to control water seepage along the trench line and prevent erosion of backfill materials.
2. Trench breakers may be constructed using earth filled sacks, foam, bentonite or equivalent materials to provide a barrier to water seepage.
3. The drawings above provide a schematic representation of trench breaker installation. Final locations and design of trench breakers will be determined by the project engineer, in consultation with the Environmental Inspector, based on site-specific conditions at the time of construction.
4. Dig keys into trench bottom and sides, to the extent feasible, for added stability.
5. Install a pre-fabricated drain or a layer of sand or gravel covered with filter cloth over the breaker, where required.
6. Mark the location of each breaker prior to backfilling with native material to facilitate correct placement of diversion berm immediately downslope of the breaker. Diversion berms are not always required if there is little to no slope after the trench breaker.
7. Backfill trench on downslope side of breaker before upslope side.
8. Ensure that trench crown does not encroach upon the breaker drain or cross ditch.
9. Ensure cross ditches are located over the end of the drain.
10. Construct diversion berms downslope from the breaker but not over the end of the drain.

Adapted from CAPP *et al.* (2005)

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TRENCH BREAKERS/DITCH PLUGS		
	7894	December 2013	Drawing 36 Page 2 of 2



Plan View
(Not to Scale)



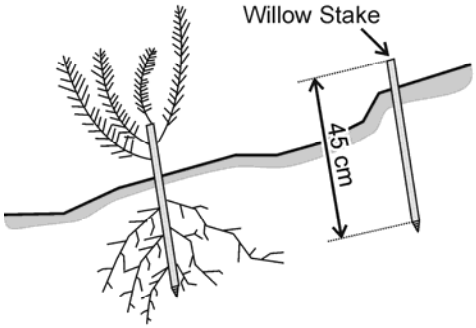
Profile View
(Not to Scale)

Representation Only

Notes:

1. Install sack breakers, where warranted, back from the edge of watercourses on non-cultivated lands to prevent erosion of backfill material.
2. Install trench breakers, where warranted, at the edge of perched wetlands in forested areas to prevent the pipe trench from acting as a drain.
3. Place breaker as close as feasible to the watercourse/wetland bank but within the upland area and as recommended by Trans Mountain's Environmental Inspector(s).
4. Determine the location of trench breakers by on-site investigation considering the potential for subsurface flow, erodibility of backfill material and degree of slope.
5. Fill sacks with earth, clay, sand or a cement/sand mixture.
6. Dig keys into trench bottom and sides for added stability.
7. Place and interlock sacks by hand around the pipe to top of the trench.
8. Mark the location of trench breakers prior to backfilling.
9. Backfill native material above trench breaker.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	TRENCH BREAKER – WATERCOURSE/WETLAND		
	7894	December 2013	Drawing 37



Profile
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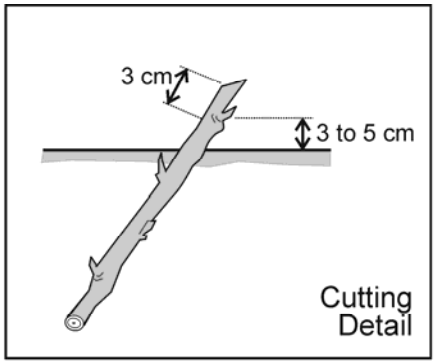

Profile
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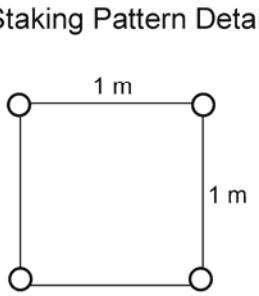
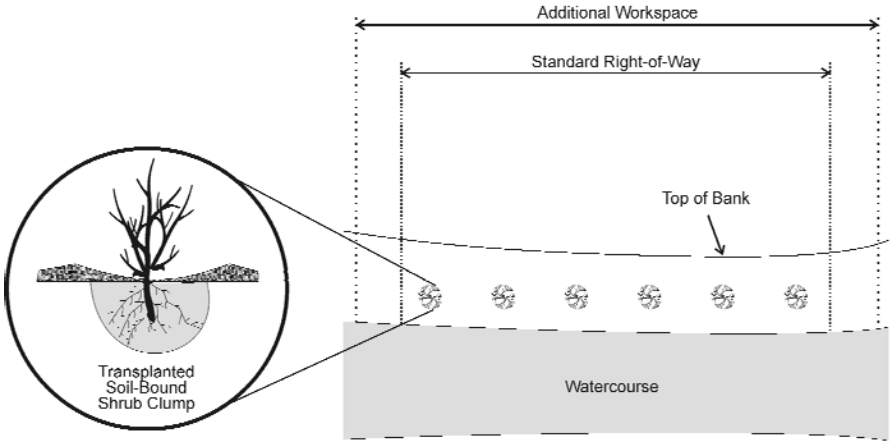


Plan View
(Not to Scale)

Representation Only

Notes:

1. Install dormant stakes of suitable species (*e.g.*, willow, dogwood) on watercourse banks.
2. Make clean cuts with unsplit ends using pruning shears, a hand saw or chain saw.
3. Select stock from the bottom of branches, not tips.
4. Mark basal ends to ensure correct installation.
5. Ensure at least one lateral bud is above surface and three are below. Plant cutting at an angle.
6. Protect material from drying out. Install as quickly as practical after being salvaged.
7. Trim side shoots close to main stock.
8. Use frost pin to make pilot hole. Minimize damage to stake when driving by using a neoprene lined post hole pounder or rubber mallet.
9. Install live stakes on banks 1.5 m (approximately) back from banks for entire disturbed width of right-of-way.



Profile
(Not to Scale)

Plan View
(Not to Scale)

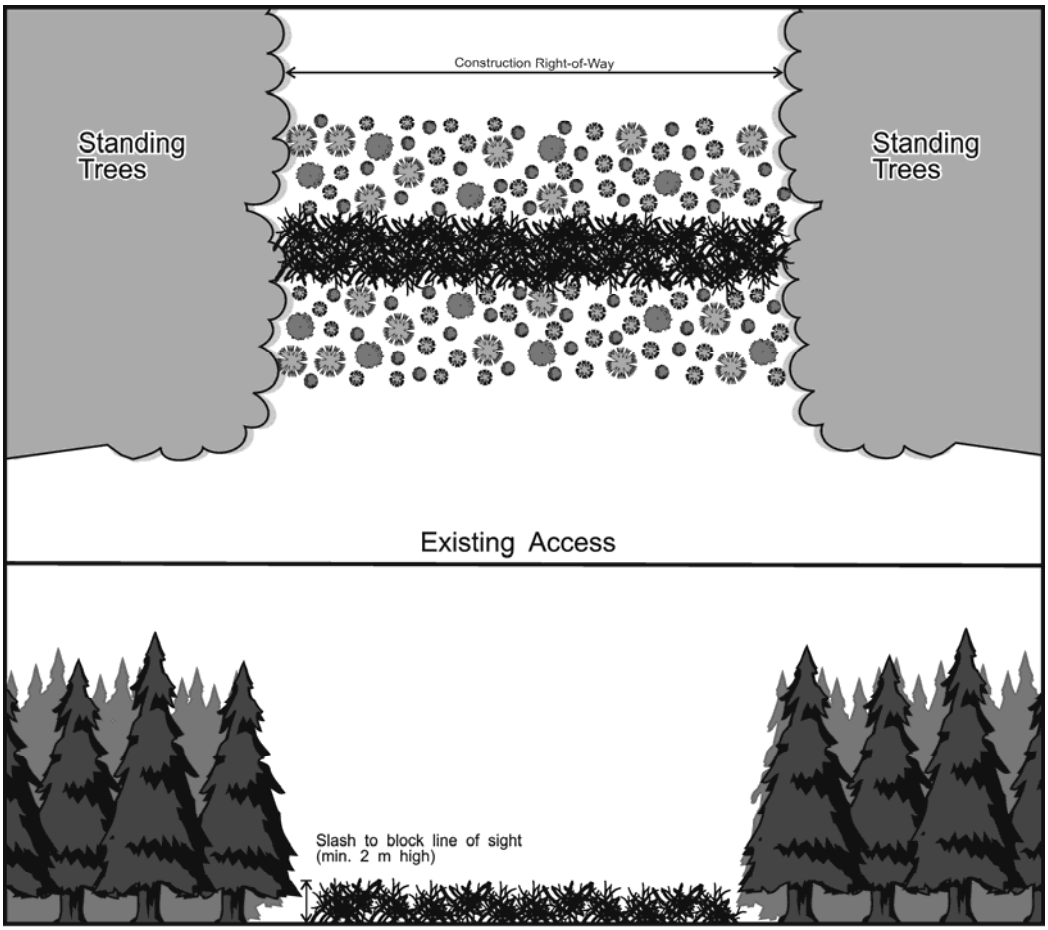
Representation Only

Notes:

1. Salvage and replace dormant shrubs on all watercourse banks where shrubs are present on the right-of-way.
2. Salvage whole bushes from the right-of-way during grading of banks. Ensure bulk of root mass is surrounded by soil.
3. Store salvaged shrubs on edge of right-of-way, cover with soil and do not let dry out.
4. Transplant as quickly as practical when reconstructing watercourse banks.
5. Soak the ground around the transplant with water.

Adapted from CAPP *et al.*(2005)

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	SHRUB STAKING AND TRANSPLANTING		
	7894	December 2013	Drawing 38



LEGEND

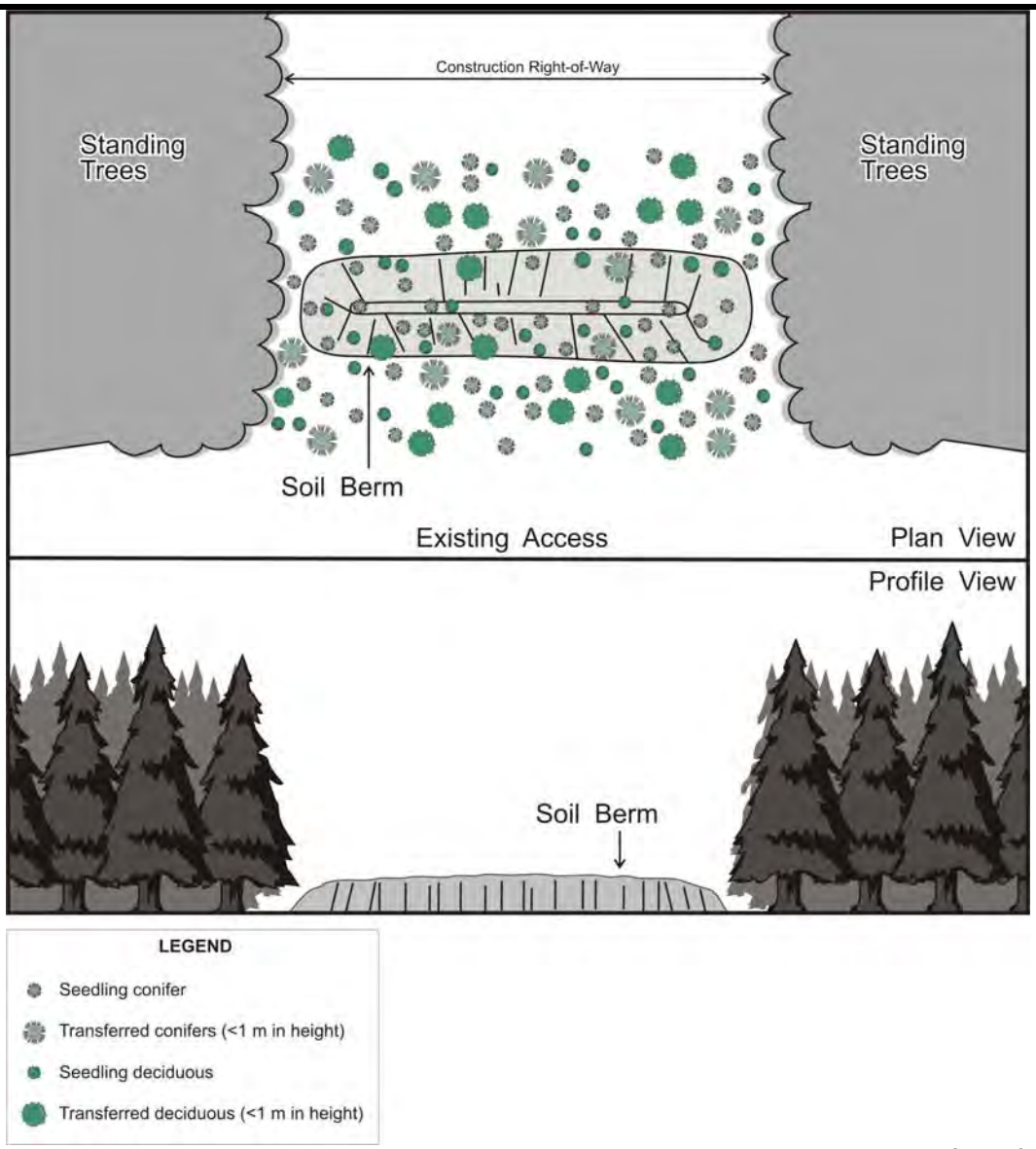
- Seedling conifer
- Transferred conifers (<1 m in height)
- Seedling deciduous
- Transferred deciduous (<1 m in height)

Representation Only

Notes:

1. Use only nonmerchantable timber for slash pile.
2. Locate slash pile across the entire width of the construction right-of-way.
3. Do not locate slash pile in drainages or depressions.
4. Ensure slash pile is of sufficient height to restrict line of sight down the construction right-of-way.
5. Plantings adjacent the slash berm on each side will be established no less than the width of the slash berm.
6. Plant suitable early and late seral plants together, adjacent, on both sides of the slash berm.
7. Transfer dormant, woody plants <1 m in height from adjacent vegetated areas along the length of the slash berm on both sides.
8. Transfer dormant, woody plants at a density of 0.35 plant / m^2.
9. Plant seedling woody plants at a density of 1 plant / m^2.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	VEGETATION AND SLASH BERM - LINE-OF-SIGHT BREAK		
	7894	December 2013	Drawing 39

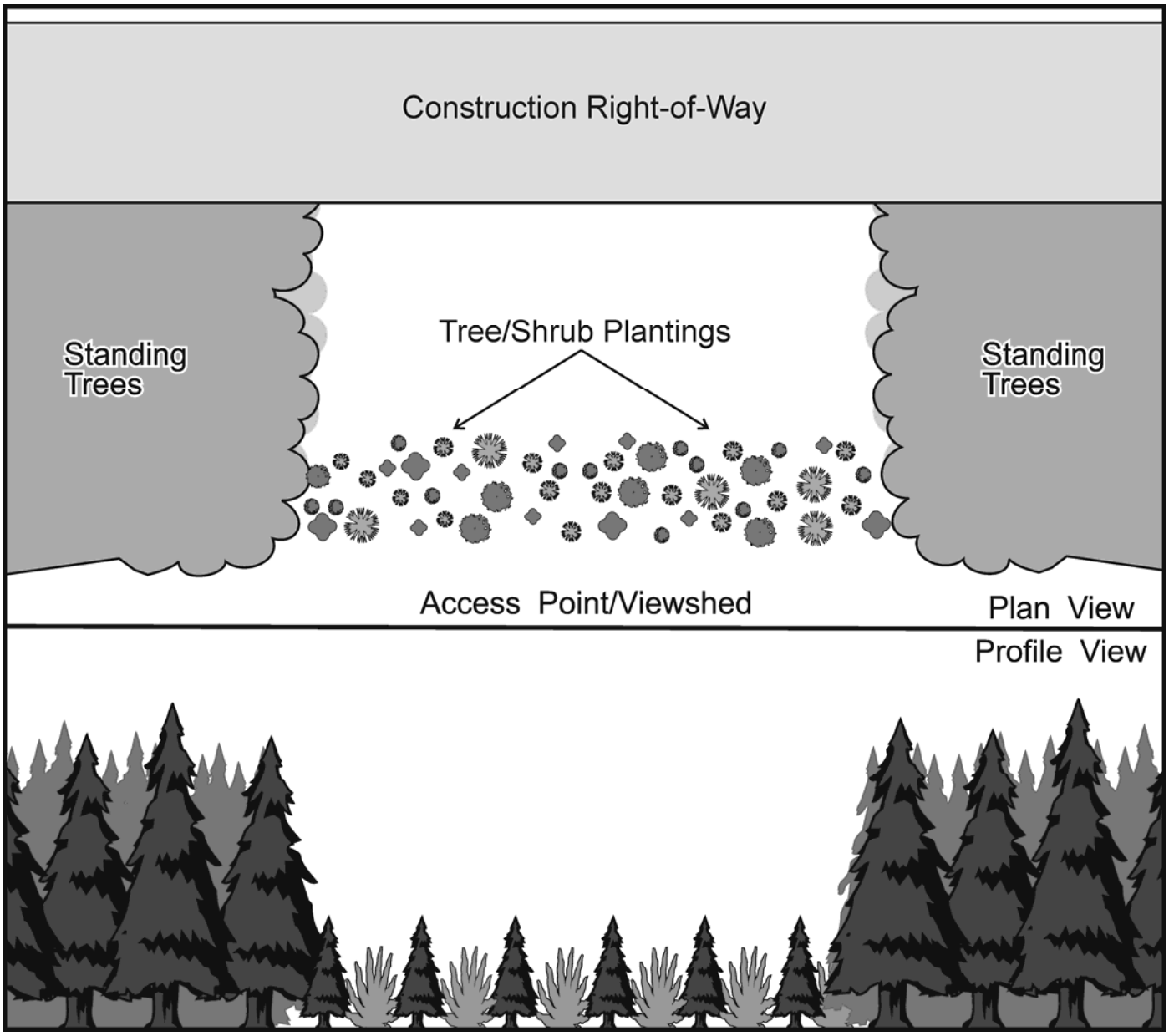


Representation Only

Notes:

1. Use subsoil to construct berm.
2. Locate berm across the entire width of the construction right-of-way.
3. Cover constructed berm with topsoil/root zone material.
4. Do not locate berm in drainages or depressions.
5. Ensure soil berm is of sufficient height to restrict line of sight down the construction right-of-way from existing access.
6. Plantings adjacent the berm on each side will be established no less than the width of the berm.
7. Plant suitable early and late seral plants together, adjacent, on the sides and top of the berm.
8. Transfer dormant, woody plant s <1 m in height from adjacent vegetated areas onto sides and adjacent areas of the berm.
9. Transfer dormant, woody plants at a density of 0.35 plant / m^2.
10. Plant seedling woody plants at a density of 1 plant / m^2.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	VEGETATION AND SOIL BERM - LINE-OF-SIGHT BREAK		
	7894	December 2013	Drawing 40

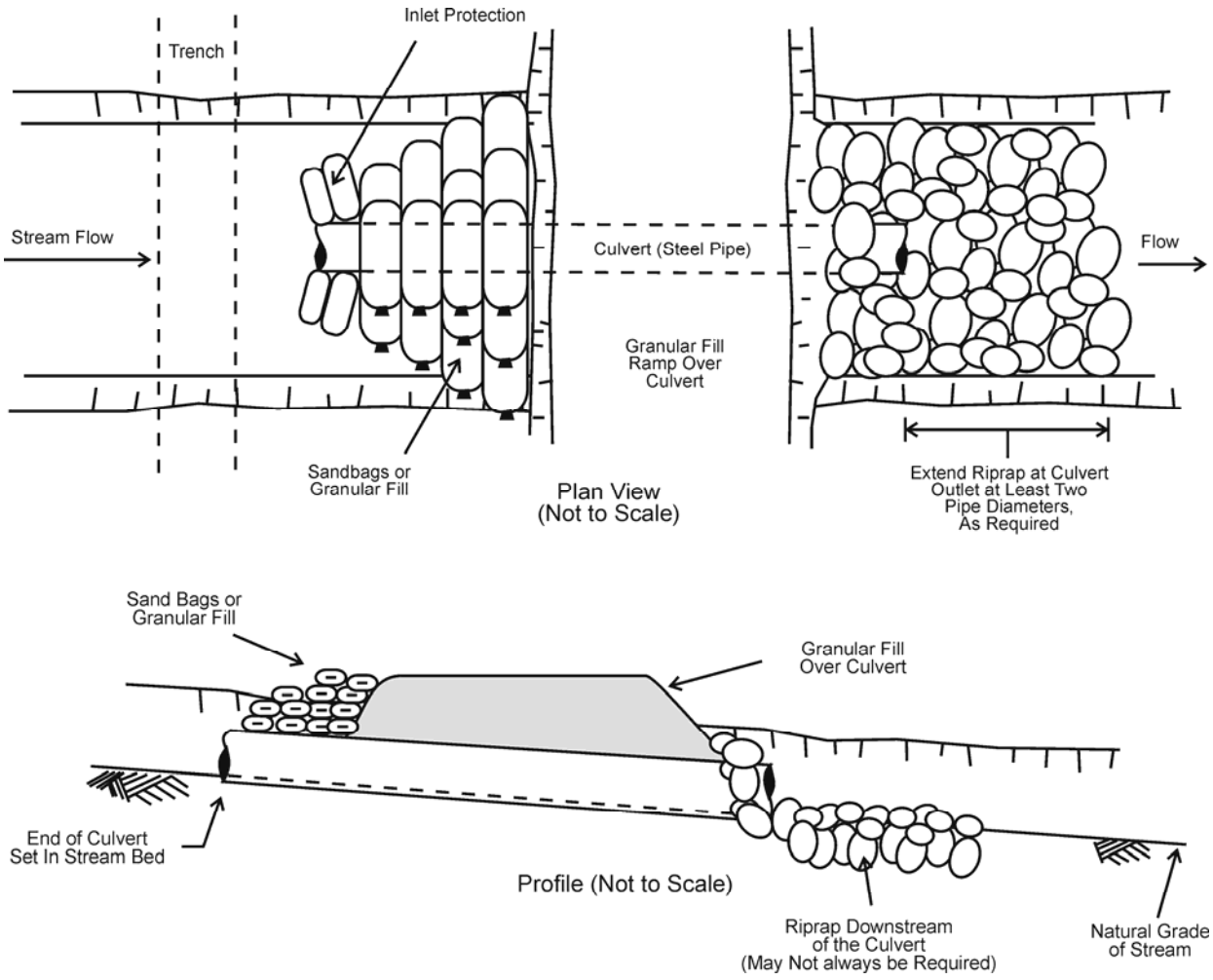


Representation Only

Notes:

1. Plant suitable early and late seral trees and shrubs together along the temporary access points/viewsheds to the construction right-of-way.
2. Do not plant trees and shrubs in drainages.
3. Plant only shrubs within 3 m of the centre line of the pipe to address pipe integrity and monitoring requirements.
4. Transfer dormant, woody plants < 1 m in height from adjacent areas to the area requiring the vegetation screen at a density of 0.35 plants / m^2.
5. Plant seedling rooted stock plants in the area requiring the vegetation screen at a density of 1 plant / m^2.

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	VEGETATION SCREEN		
	7894	December 2013	Drawing 41

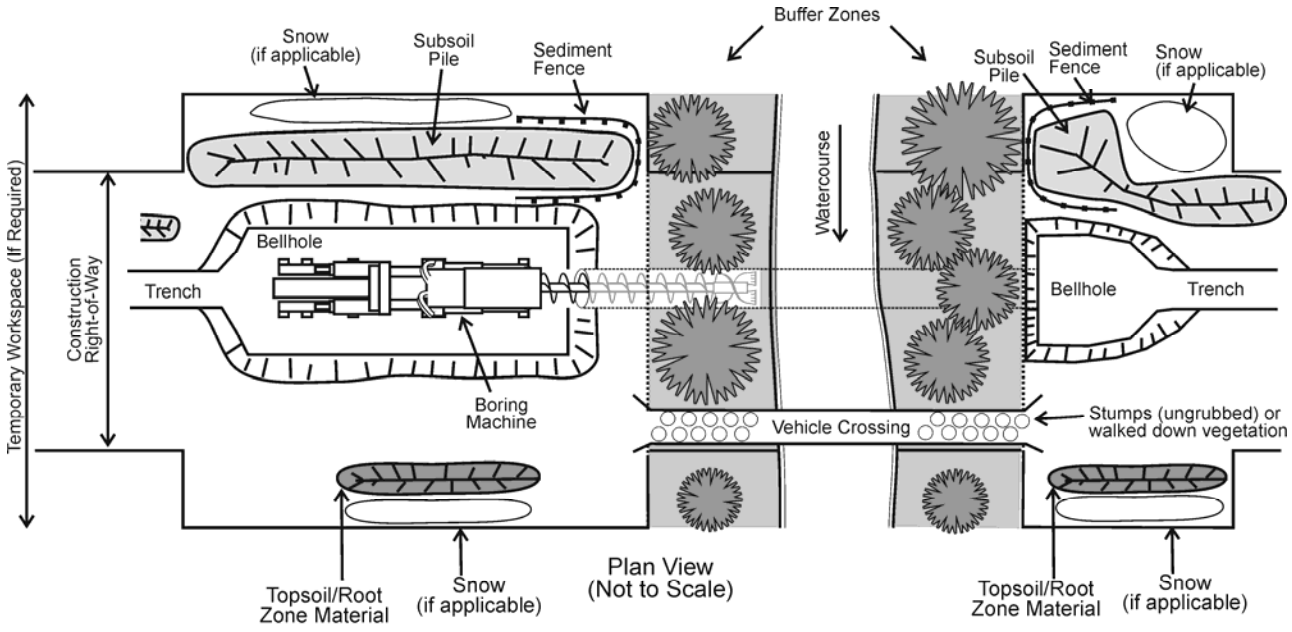


Notes:

1. Install ramp and culverts to allow vehicles to cross relatively narrow watercourses where sedimentation must be minimized or fish passage allowed.
2. Isolate the watercourse prior to installing the culvert and ramp.
3. Do not use organic materials (*e.g.*, topsoil/root zone material) to construct the ramp.
4. Design culverts to handle 150% of maximum anticipated flows or to a five year flood level and according to specific guidelines where fish passage (*i.e.,* migration) is required. Contact appropriate regulatory authorities for minimum water depth specifications, and maximum water velocities. Ensure dam is impermeable.
5. Place ends of culverts below the natural grade of watercourse at an angle that does not exceed normal watercourse gradient. Depth of placement is dependent upon bed type, culvert size and expected flow conditions.
6. Remove temporary culverts and ramp materials when no longer required.
7. Reestablish and stabilize bed and banks.

Source: Adapted from CAPP *et al.* (2005)

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	VEHICLE CROSSING – RAMP AND CULVERT		
	7894	December 2013	Drawing 42



Plan View
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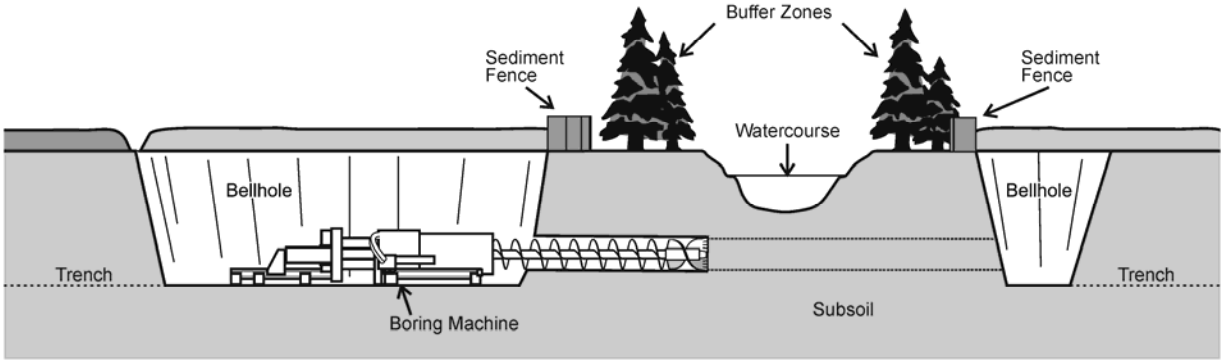

Profile
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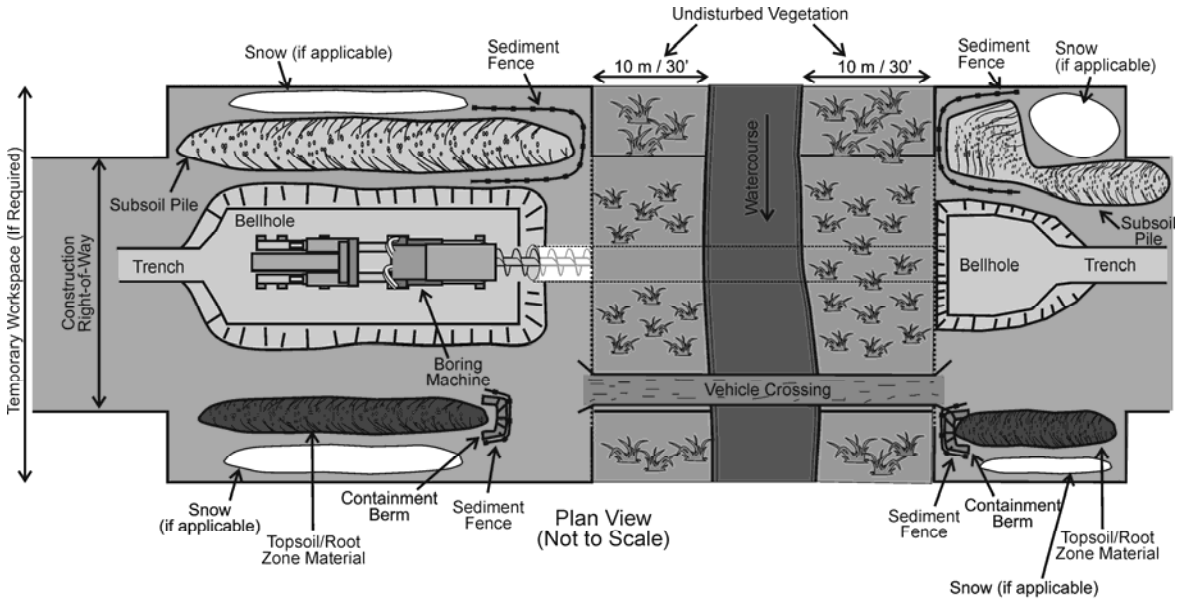
Representation Only

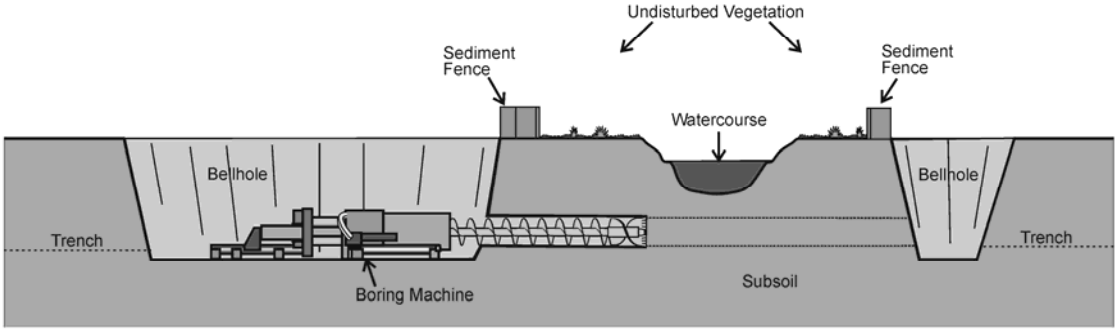
ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN	
	WATERCOURSE CROSSING – BORE OR PUNCH METHOD (FORESTED)	
7894	December 2013	Drawing 43 Page 1 of 2

Notes:

1. Ensure temporary berms and/or sediment fence installed following grading (see Section 8.2) will adequately control runoff from entering the open trench in the vicinity of water crossings.
2. Windrow surplus snow and any snow over the trench to the closest side of the construction right-of-way immediately prior to trenching.
3. Minimize trench width on native grasslands during trenching in order to limit spoil storage requirements and sod disturbance.
4. Limit the length of open trench and the time the trench will be left open to reduce the amount of trench sloughing, frost penetration and interference with wildlife, landowners and livestock. Where bore holes are located near public access areas, fence the entire perimeter of the excavation to avoid injury to livestock and wildlife.
5. Ensure that trenching does not encroach upon the riparian buffer area at watercourse and wetlands crossings. Allow adequate space for the excavation of a bellhole to complete the tie-in following watercourse/wetland crossing construction without disturbance of the riparian buffer.
6. Leave or install soft plugs in the trench, in the event that the pipeline trench separates livestock from water supply. If the livestock are reluctant to cross the trench, make arrangements to provide a temporary water supply (trucked in water and troughs) in the area where the livestock are located.
7. Place a barrier (*e.g.*, approximately 15 cm thick straw barrier, tarps or other material approved by Trans Mountain's Environmental Inspector[s]) at localized areas where a 1 m (minimum) separation cannot be maintained between topsoil/root zone material and subsoil piles due to workspace limitations.
8. Leave gaps in the spoil pile and trench line, where requested, to allow farm equipment and livestock to cross the construction right-of-way. Gaps will be coincident with gaps in welded pipe and topsoil/root zone material, snow (if present) and rollback windrows (if present).
9. Keep a trench spoil pile separate from topsoil/root zone material pile. Maintain a minimum separation distance of 1 m between topsoil and trench spoil piles (on agricultural lands [see Right-of-Way Configuration Drawing in Appendix R]).
10. Leave hard plugs or install soft plugs at locations where the open trench could dewater a wetland or flood other areas. Allow access for excavators to remove hard and soft plugs.
11. Install soft plugs across the open trench, where warranted, in areas of high wildlife use and where the trench will be left open for a longer than typical period (*e.g.*, locations where blasting or boulder excavation will be or has been conducted) in order to provide access across the trench by wildlife. Locations where trench plugs for wildlife movement are to be installed will be identified by a Wildlife Resource Specialist and Environmental Inspector(s) or as shown on the Environmental Alignment Sheets.
12. Remove trapped animals from the trench before conducting construction activities.
13. Refer to environmental resource-specific mitigation tables for wildlife crossings (including caribou) in Appendix L.

Adapted from CAPP *et al.* (2005)





Profile
(Not to Scale)

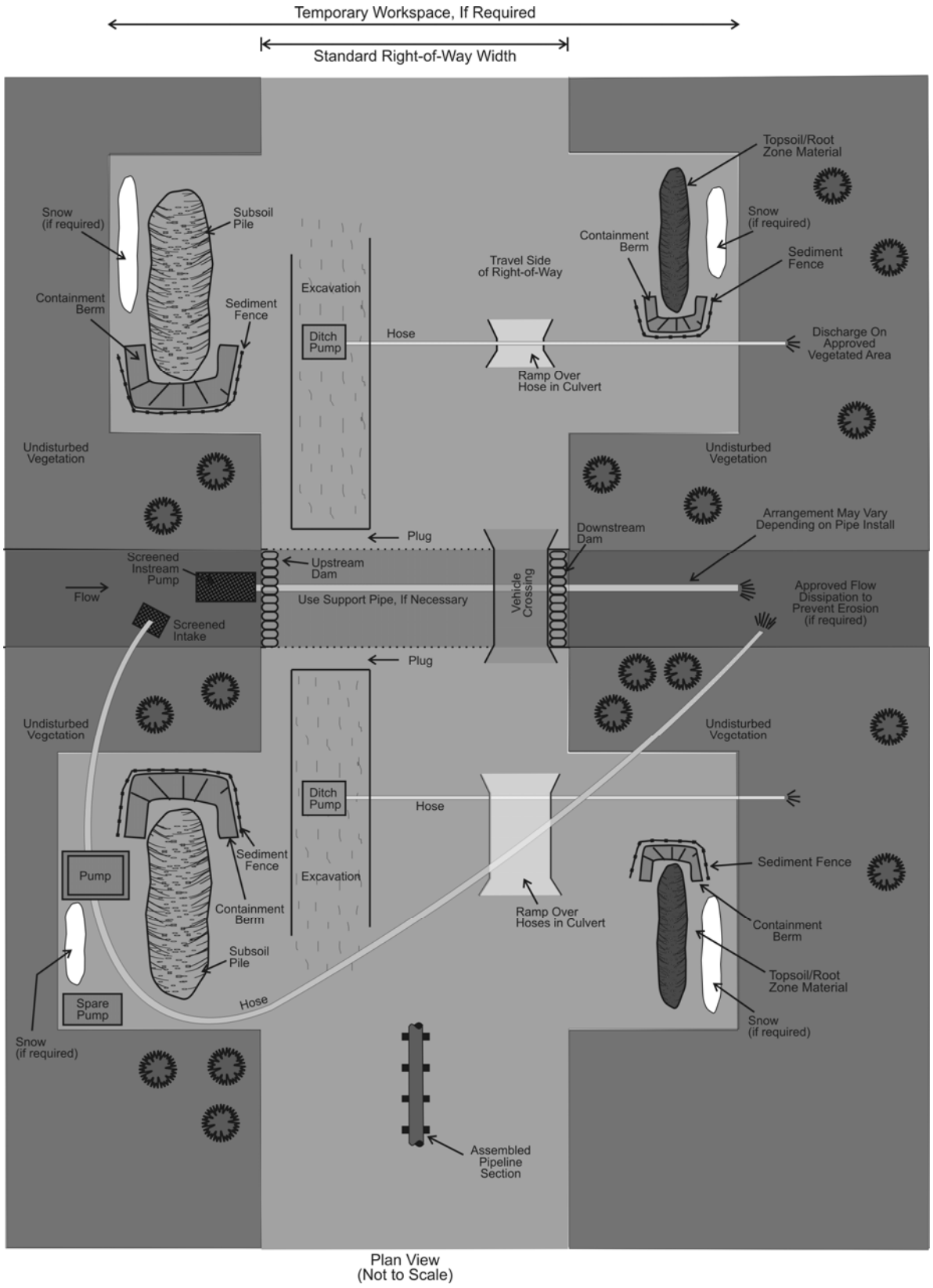
Representation Only

Notes:

1. Adhere to all measures outlined in the DFO *Operational Statement for Punch and Bore Crossings* in both the Pacific (DFO 2008m) and Central and Arctic Regions (DFO 2008l). Adhere to all measures outlined in the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* in Alberta (AESRD 2000) and the *Standards and Best Management Practices for Instream Works* in BC (BC Ministry of Water, Land and Air Protection 2002).
2. Acquire and mark additional temporary workspace, if warranted.
3. Set-up equipment back from the edge of the watercourse/wetland. Do not clear or grade within the vegetated buffer zone, except along the work side if a temporary vehicle crossing is installed. Where grading is avoided, mulch stumps or level travel lane using snow or matting.
4. Excavate bellhole. Store subsoil on the opposite side of right-of-way as the topsoil.
5. Complete boring and tie in to mainline.
6. Dewater the bellholes onto stable, well-vegetated land, where approved, or pump water to a tank truck and dispose of at an approved facility.
7. Backfill and compact. Leave a trench crown to allow for subsidence.
8. Reseed and fertilize as appropriate.

Adapted from CAPP *et al.* (2005)

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	WATERCOURSE CROSSING – BORE OR PUNCH METHOD (GRASSLANDS)		
	7894	December 2013	Drawing 44



Plan View
(Not to Scale)

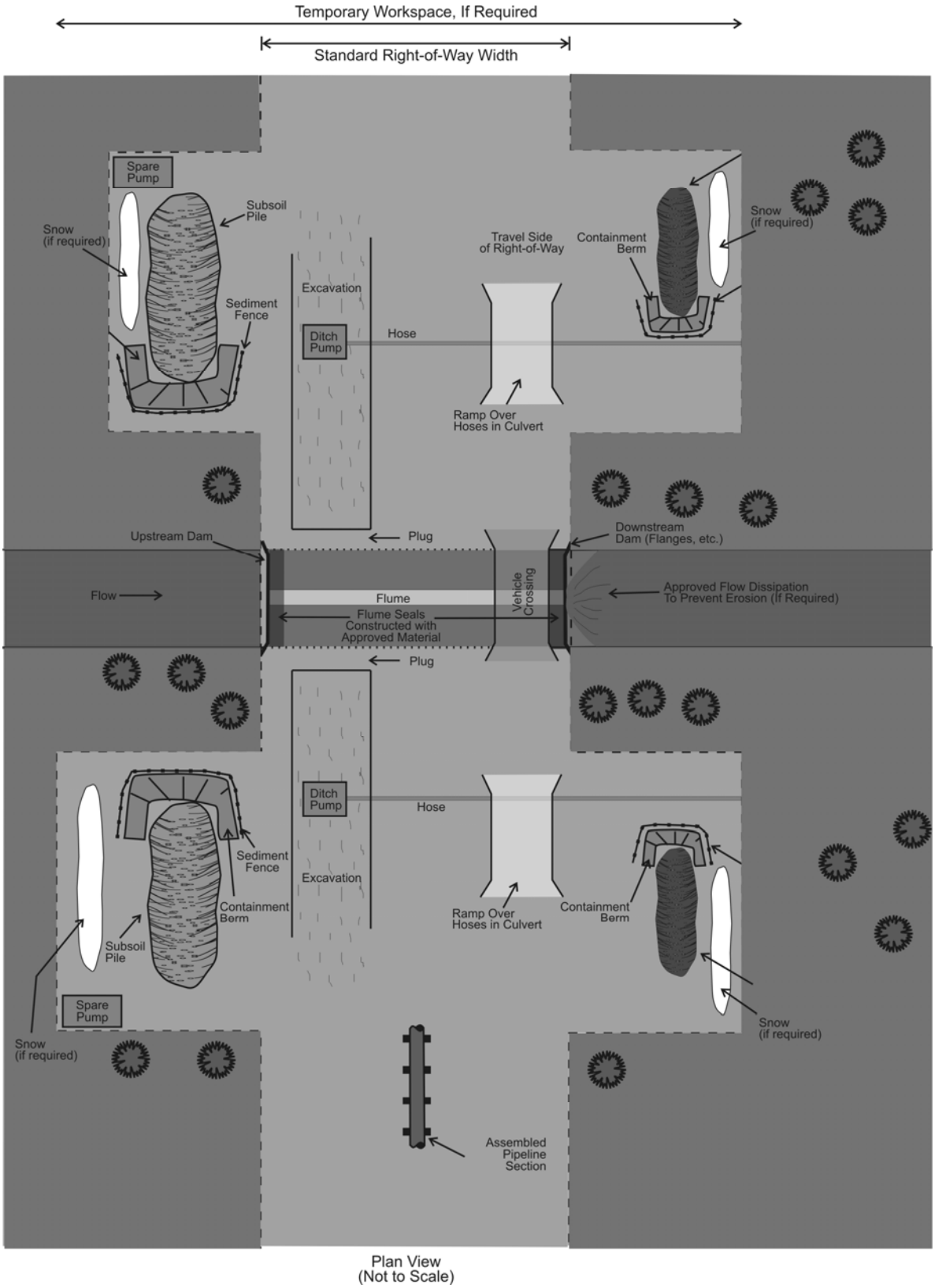
Adapted from CAPP *et al.* (2005)

Representation Only

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	WATERCOURSE CROSSING – DAM AND PUMP METHOD		
	7894	December 2013	Drawing 45 Page 1 of 2

Notes:

1. Adhere to all measures outlined in the DFO *Operational Statement for Isolated or Dry Open-cut Stream Crossings* in the Central and Arctic Region (DFO 2008h). In BC, isolated pipeline crossings are not included under the Pacific Region DFO Operational Statements. A Letter of Advice from DFO is required prior to pipeline installation using an isolated method. Adhere to all measures outlined in the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* in Alberta (AESRD 2000) and in the *Standards and Best Practices for Instream Works* for BC (BC Ministry of Land, Water and Air Protection 2004).
2. Clear snow to the edge of the temporary workspace area prior to topsoil/root zone material salvage.
3. Install the vehicle crossing, if required, on the work side edge of the construction right-of-way to allow for a wide excavation.
4. Stockpile all necessary materials and equipment on-site prior to beginning instream work.
5. Complete construction of the instream pipe section. Weld, coat pipe and, if warranted, weight the pipe prior to commencement of instream activity.
6. Suspend construction activities to allow for fish salvage to occur within the isolated area prior to dewatering, if warranted.
7. Ensure that all appropriate permits for fish salvage, amphibian salvage, beaver dam removal, etc. are in place prior to construction, as warranted.
8. Install pumps in natural pools upstream of the excavation, if feasible. Excavate a temporary sump within the construction right-of-way if no natural pools exist.
9. Install pumps and check operation to equalize flow. Screen pump intakes with screen openings no larger than 2.54 mm (0.1 inch, as per regulatory guidelines). Size the screen to ensure that water approach velocities do not result in entrainment or entrapment of fish.
10. Construct the upstream dam close to the edge of the temporary workspace to allow for a wide excavation. Ensure dam is impermeable by installing a polyethylene liner. Dam may be constructed with sand bags, aquadam, sheet piling or other approved material that ensures a tight seal of the bed and banks.
11. Plug the vehicle crossing culvert or construct the downstream dam. Where a bridge is used, the dam should be constructed as close to the edge of the temporary workspace as practical to allow for a wide excavation.
12. Assess the need to dewater the isolated section of the watercourse or the trench. Ensure a tight seal around the dams prior to excavation.
13. Salvage the upper 0.5 m (1.5 feet, minimum) of clean granular material, if present, and stockpile separately from the remainder of the trench subsoil.
14. Excavate the trench as rapidly as practical. Create subsoil containment sumps, if warranted, to keep subsoil from flowing back into the stream channel.
15. Backfill the stream channel by first pushing the silted water back into the bank excavations. Pump or drain the bank excavations while progressively backfilling from the stream channel outward. Construct water containment sumps, if warranted.
16. Complete the backfill. Leave a small, shallow sump (*e.g.*, 50 cm [1.5 feet]) on the upstream side of the downstream dam and install a pump in the sump.
17. Temporarily suspend diversion pumping and slowly elevate a corner of the upstream dam in order to allow the isolated area to fill with water. Allow silt laden water to flow into the shallow sump and be removed from the isolated area. Ensure discharge is directed to a well-vegetated area.
18. Cap the upper 0.5 m (1.5 feet, minimum) of the trench with the salvaged clean granular material. Where a granular cap material was not present or where salvaged granular material was not clean, cap the trench with imported clean granular material.
19. Remove any accumulations of silt and sediment from the streambed.
20. Restore, stabilize and reclaim the bed and banks of the stream channel to pre-construction profiles.
21. Remove the downstream dam or vehicle crossing plug then remove the upstream dam or vehicle crossing plug.



Plan View
(Not to Scale)

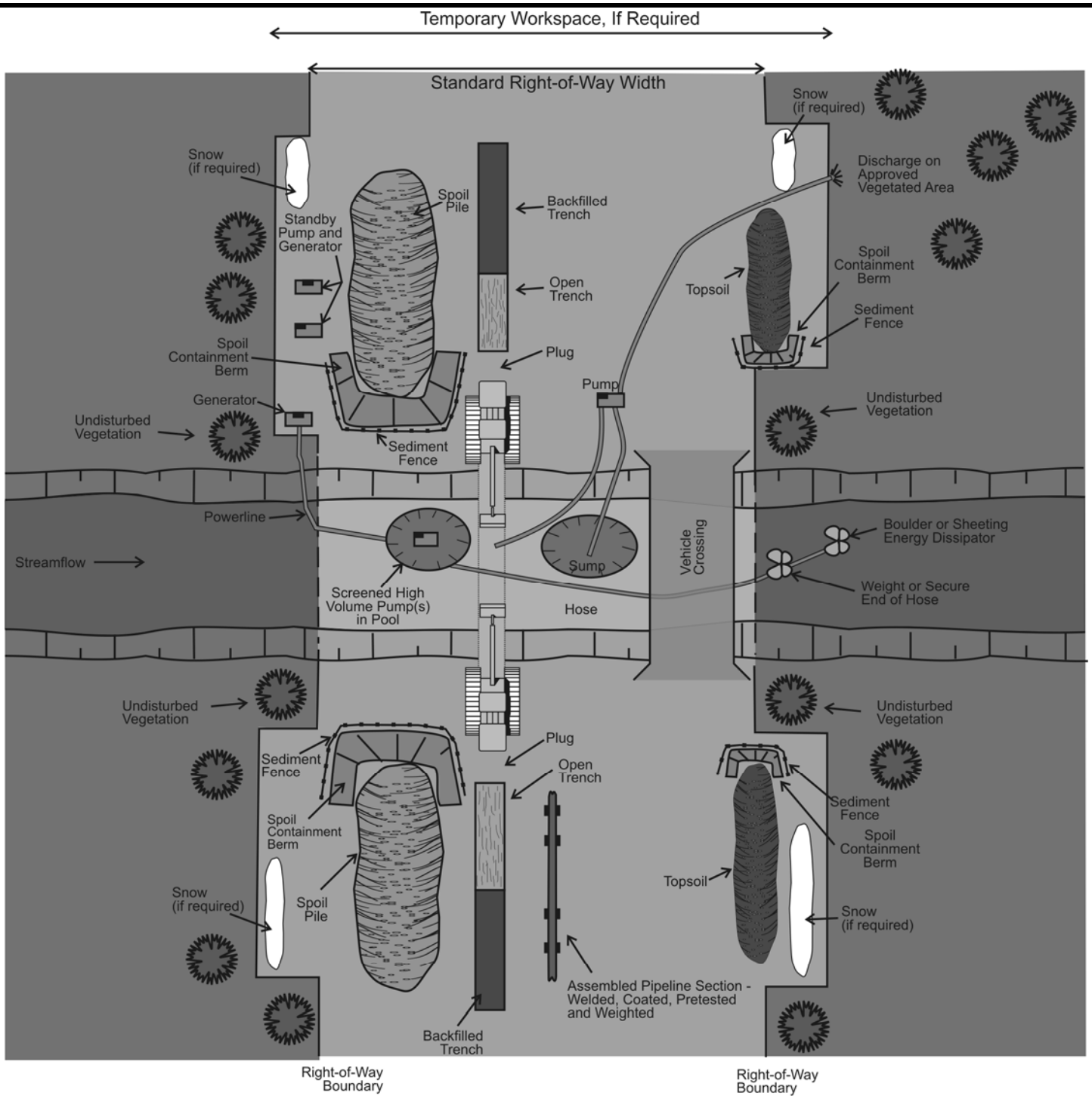
Adapted from CAPP *et al.* (2005)

Representation Only

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	WATERCOURSE CROSSING – FLUME METHOD		
	7894	December 2013	Drawing 46 Page 1 of 2

Notes:

1. Adhere to all measures outlined in the DFO *Operational Statement for Isolated or Dry Open-cut Stream Crossings* in the Central and Arctic Region (DFO 2008h). In BC, isolated pipeline crossings are not included under the Pacific Region DFO Operational Statements. A Letter of Advice from DFO is required prior to pipeline installation using an isolated method. Adhere to all measures outlined in the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* for Alberta (AESRD 2000) and the *Standards and Best Practices for Stream Crossings* for BC (BC Ministry of Water, Land and Air 2004).
2. Install the vehicle crossing, if required, on the work side edge of the right-of-way to allow for a wide excavation.
3. Size flume to handle anticipated flows.
4. Stockpile all required materials prior to beginning instream work.
5. Suspend construction activities to allow for fish salvage to occur within the isolated area prior to dewatering, if warranted.
6. Ensure that all appropriate permits for fish salvage, amphibian salvage, beaver dam removal, etc. are in place prior to construction, as warranted.
7. Install a pre-assembled flume, or construct a flume and install both an upstream and downstream dam.
8. Install additional erosion control, if required, downstream of the flume outlet.
9. Ensure a tight seal about the dam and flume prior to undertaking trench excavation. Minimize the duration of instream activities, to the extent feasible, or as directed by regulatory approvals. Create subsoil containment sumps or berms, if warranted, to keep subsoil from flowing back into the stream channel.
10. Pump excavation, as required, to prevent downstream flow of silted water. Direct the pumped water onto vegetated areas well back from the watercourse. Construct water containment sumps, if warranted.
11. Backfill the stream channel first, squeezing the silted water into the bank excavations. Pump or drain the bank excavations while progressively backfilling from the stream channel outward.
12. Complete backfill and stabilize the bed, leaving a small shallow (*e.g.*, 50 cm) sump upstream of the downstream dam. Install a pump intake in this sump.
13. Slowly elevate corner of flume (or edge of dam) and/or shut down auxiliary bypass pumps, and allow isolated channel to be flushed with water. Sediment-laden water will flow into the shallow sump and then be pumped onto a well-vegetated area.
14. Once isolated channel is flushed, remove downstream seal materials.
15. Remove upstream seal materials.
16. Remove the flume.
17. Restore, stabilize and reclaim banks of stream channel to pre-construction profiles.



Plan View
(Not to Scale)

Representation Only

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	WATERCOURSE CROSSING - HIGH VOLUME PUMP METHOD		
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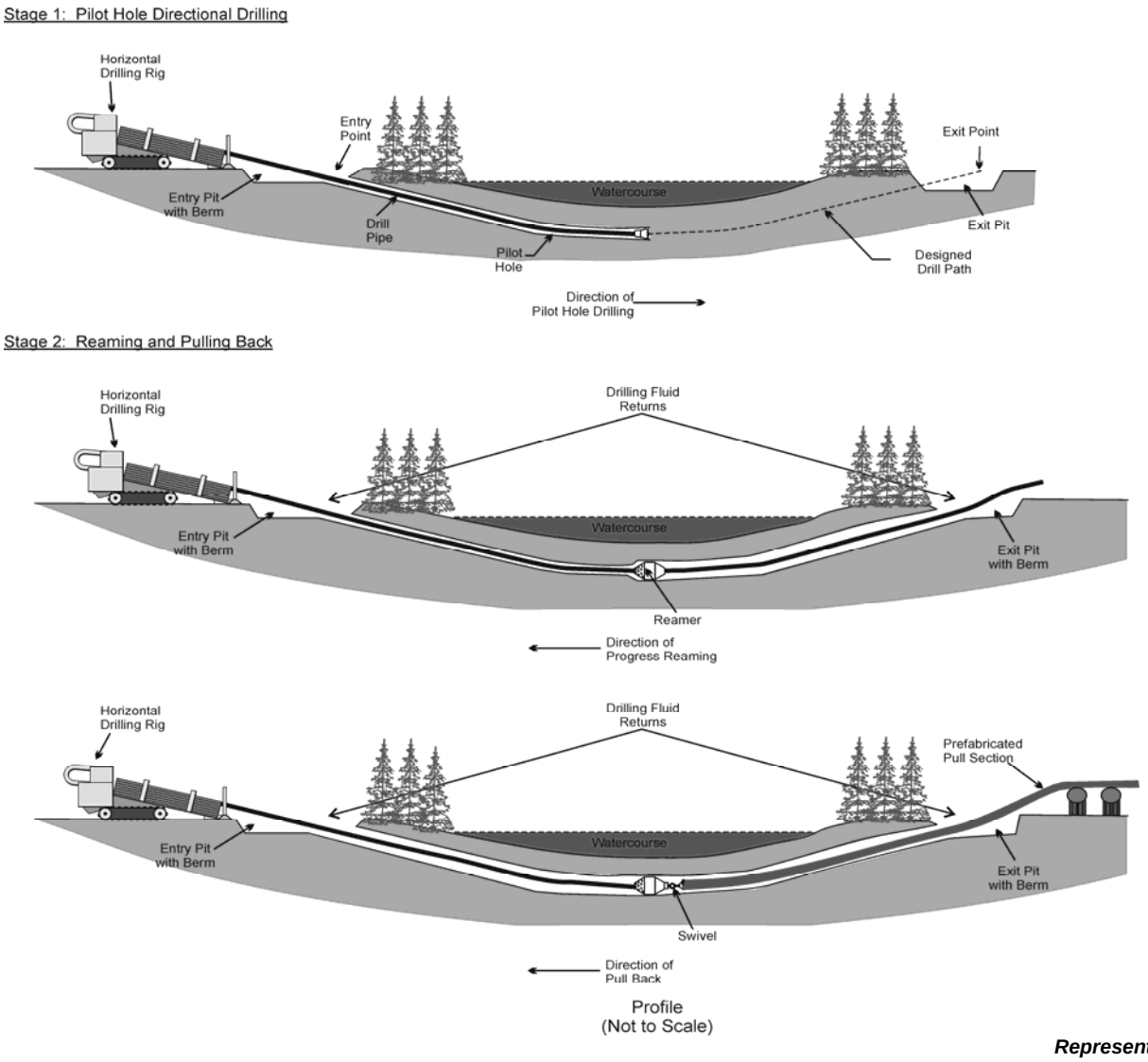
Notes:

1. Adhere to all measures outlined in the DFO *Operational Statement for Isolated or Dry Open-cut Stream Crossing* in the Central and Arctic Region (DFO 2008h). In BC, isolated pipeline crossings are not included under the Pacific Region DFO Operational Statements. A Letter of Advice from DFO is required prior to pipeline installation using an isolated method. Adhere to all measures outlined in the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* for Alberta (AESRD 2000) and the *Standards and Best Practices for Instream Works* for BC (BC Ministry of Water, Land and Air 2004).
2. Install vehicle crossing, if required, on the work side edge of the construction right-of-way to allow for a wide excavation.
3. Ensure adequate electric power supply and adequately sized pumps to handle anticipated flow. Have standby pumps and generators capable of handling 100% of anticipated flow on-site and ready to be used if the operating pumps fail.
4. Install high volume pump (with screening as per regulatory guidelines) in pool located upstream of the excavation. Excavate temporary upstream sump in the right-of-way if no natural pool exits. Add additional pumping capacity, if required. Discharge water through or into an energy dissipater into the channel sufficiently downstream of the trench to prevent water flowing back into the excavation.
5. Immediately initiate fish salvage from isolated pools. Ensure fish salvage permits are acquired prior to installing pump.
6. Excavate a small sump downstream of crossing to collect silt-laden waters. Install small pumps in sump and trench to discharge silt-laden water onto well-vegetated soils away from watercourse.
7. Excavate trench, complete installation and backfill trench. Move hose, if warranted, to maintain streamflow.
8. Wash backfilled trench area into sump. Pump silt-laden water from trench onto a well-vegetated area off right-of-way. Complete this step each evening prior to shutting off upstream pump, if instream work is to occur on successive days.

Adapted from CAPP *et al.* (2005)

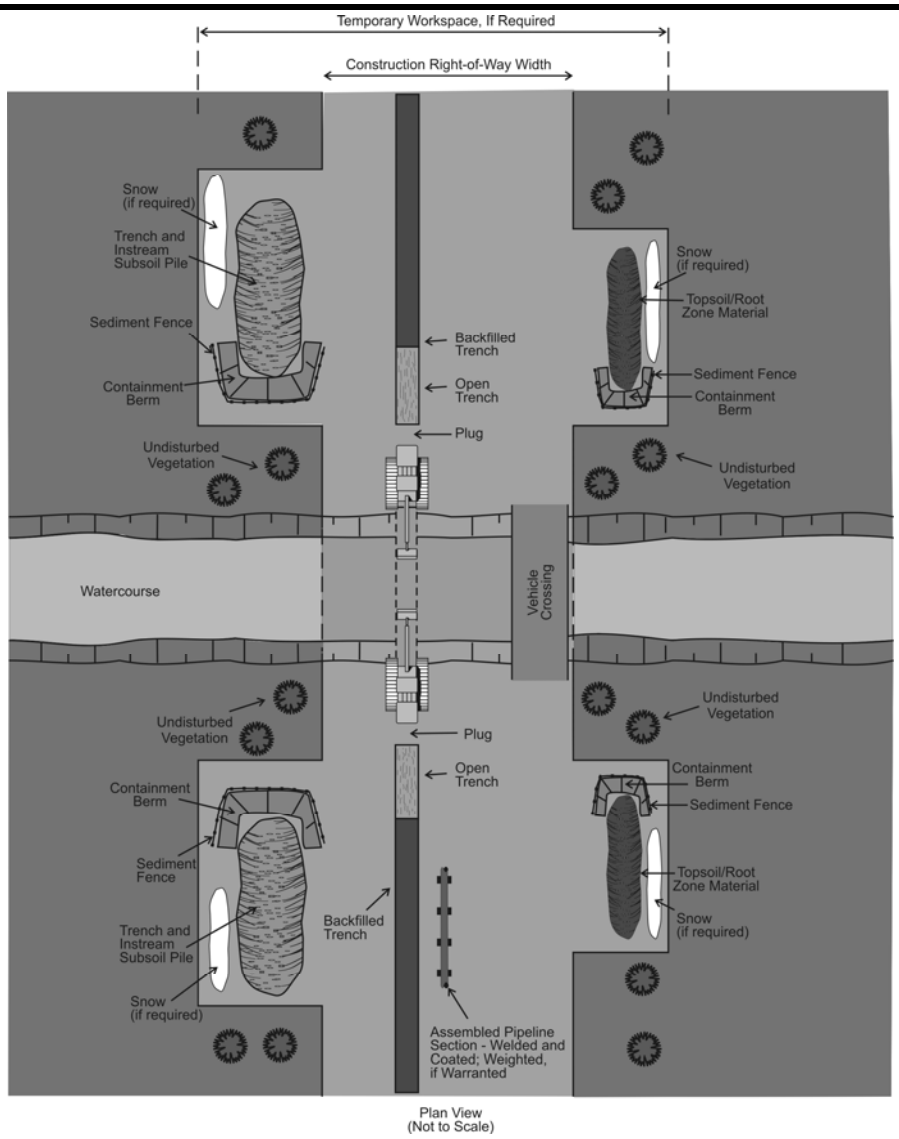


Representation Only

Notes:

1. Adhere to all measures outlined in the DFO *Operational Statement for Directional Drilling* in the Pacific Region (DFO 2008e) and the DFO *Operational Statement for High-Pressure Directional Drilling* in the Central and Arctic Region (DFO 2008d). Adhere to all measures outlined in the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (Alberta only) (AESRD 2000).
2. Obtain geotechnical data prior to initiating drilling. Drilling may not be feasible in some materials such as unconsolidated gravels.
3. Set up drilling equipment at a suitable distance back from the edge of the watercourse. Do not clear or grade within vegetated buffer zone, except along the work side, if a temporary vehicle crossing is utilized.
4. Assign Trans Mountain's Environmental Inspector(s) and/or water quality monitors to observe for an inadvertent mud release into or adjacent to the watercourse.
5. Ensure that only bentonite-based drilling mud is used. Do not allow the use of any additives in the drilling mud without the approval of the appropriate regulatory authority.
6. Install suitable containment structures (*e.g.*, mud tanks or sumps) to prevent inadvertent mud release into or adjacent to the watercourse.
7. Install berms downslope from the drill entry and anticipated exit points to contain any release of drilling mud. Have vacuum tank truck on-site to recover excess mud when pulling back.
8. Dispose of drilling mud in accordance with the appropriate regulatory authority requirements.

Adapted from CAPP *et al.* (2005)



Plan View
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Representation Only

Notes:

1. Adhere to all measures outlined in the DFO *Operational Statement for Dry Open-cut Stream Crossings* in the Pacific Region (DFO 2008i) and the DFO *Operational Statement for Isolated or Dry Open-cut Stream Crossings* in the Central and Arctic Region (DFO 2008h). Adhere to all measures outlined in the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* in Alberta only (AERSD 2000) and the *Standards and Best Management Practices for Instream Works* in BC (BC Ministry of Water, Land and Air 2004).
2. Trench through watercourse if dry or frozen to the bottom at the time of construction.
3. Use additional temporary workspace to allow instream subsoil to be stored on banks.
4. Install sediment and erosion control structures, as required.
5. Leave plugs at end of standard trench.
6. Trench through watercourse retaining hard plugs back from each bank until just prior to pipe installation. Stockpile all instream subsoil on banks above the normal high watermark. Construct berms (*e.g.,* subsoil, saddle weights, shotrock) to prevent saturated subsoil from flowing back into watercourse.
7. Lower-in and backfill immediately. Restore stream channel to approximate pre-construction profile and substrate. Attempt to complete all instream activity within 48 hours.
8. If necessary to control water flow and trench sloughing, install temporary soft plugs and dewater trench onto stable vegetated land, not directly to watercourse.
9. Restore, stabilize and reclaim watercourse banks and approaches to pre-construction profiles.

Adapted from CAPP *et al.* (2005)

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	WATERCOURSE CROSSING - OPEN CUT METHOD FOR DRY/FROZEN WATERCOURSES		
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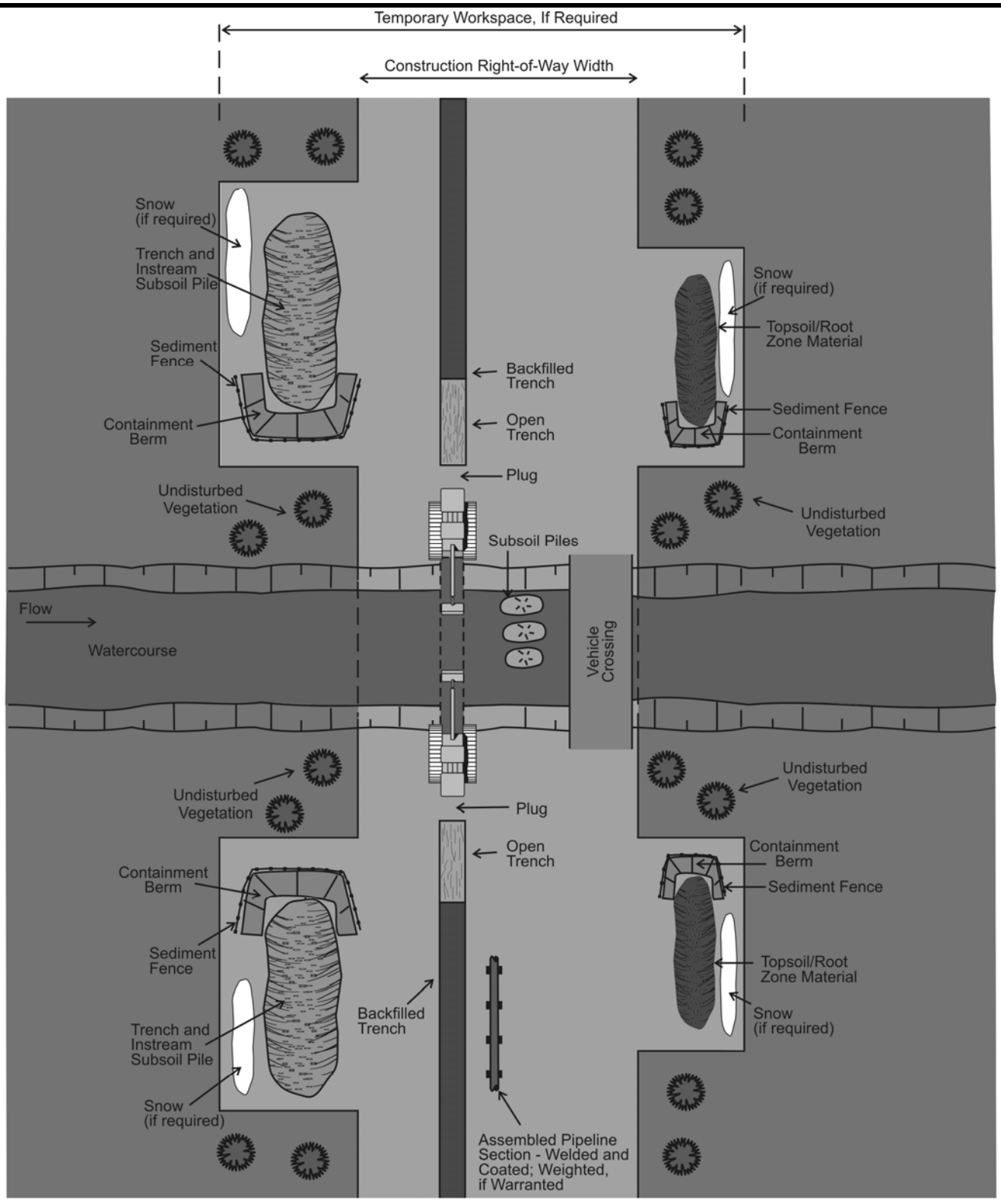

Plan View
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Representation Only

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	WATERCOURSE CROSSING - OPEN CUT METHOD FOR FLOWING WATERCOURSES		
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Notes: This method applies to any watercourse with standing or flowing water (*e.g.*, anything other than dry or frozen to bottom conditions).

1. Adhere to all measures as outlined in the *Code of Practice for Watercourse Crossings* (AESRD 2001) and the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* in Alberta (AESRD 2000) and the *Standards and Best Management Practices for Instream Works* in BC (BC Ministry of Water, Land and Air 2004). In Alberta and BC, open cut pipeline crossing methods for flowing watercourses are not included under the Central and Arctic or Pacific Regions DFO Operational Statements (DFO 2008h, DFO 2008i). A Letter of Advice from DFO is required prior to pipeline installation using an open cut method for flowing watercourses.
2. Obtain additional temporary workspace to allow instream subsoil to be stored on banks.
3. Install vehicle crossing, if warranted.
4. Leave plugs at the end of the standard trench.
5. Install sediment and erosion control structures, as required.
6. Complete construction of the instream pipe section. Weld, coat and, if warranted, pre-test and weight pipe prior to commencement of instream activity.
7. Retain plugs back from each bank until just prior to pipe installation. Stockpile as much subsoil on banks as practical. If necessary, store subsoil instream in piles avoiding areas of highest water velocity. Instream subsoil should be piled in long piles parallel to flow in order to reduce erosion. Do not windrow subsoil across the channel or block more than two-thirds of the channel. Maintain stream flow, if present, throughout crossing construction. Exact trenching and subsoil storage requirements will depend on local conditions and equipment used.
8. If necessary to control water flow and trench sloughing, install temporary soft plugs and dewater trench onto stable vegetated land, not directly to watercourse.
9. Lower-in pipe and backfill immediately. Restore stream channel to approximate pre-construction profile and substrate. Attempt to complete all instream activity as quickly as practical.
10. Restore, stabilize and reclaim watercourse banks and approaches to pre-construction profiles.

Adapted from CAPP *et al.* (2005)

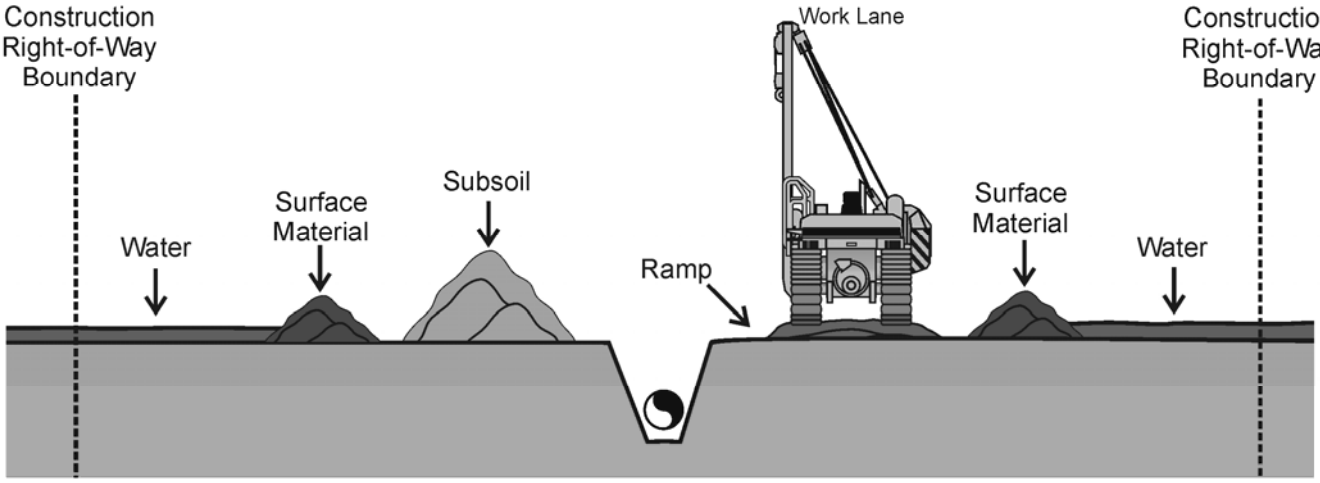
CRITERIA FOR IMPLEMENTATION:

Management of weeds and non-native plant species is of paramount concern to Trans Mountain. The goal of non-native species management for the Trans Mountain Expansion Project is to prevent the introduction and spread of non-native plants to control them, to the extent feasible, along the existing TMPL system. Accurate records of weed infestations, control measures undertaken and the success of control measures will be maintained so that weed management and control plans can be modified as necessary to ensure an effective program of ongoing weed monitoring and control.

Following are measures to be implemented during the reclamation and post construction monitoring of the Trans Mountain Expansion Project.

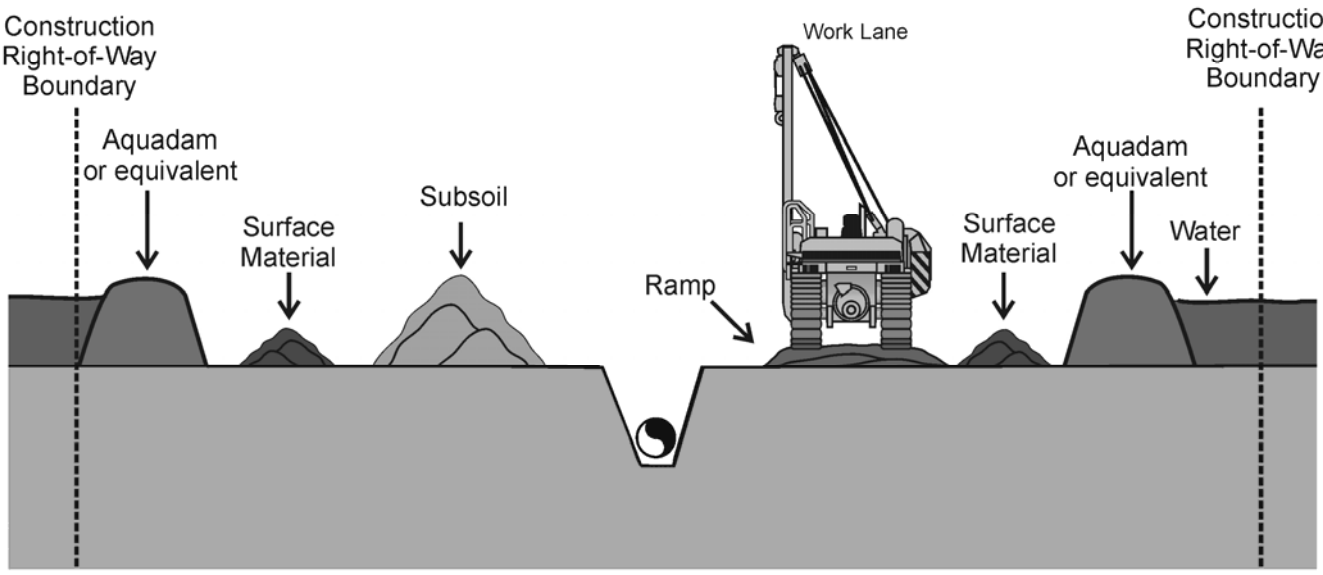
1. All reclamation equipment shall arrive for project work in a clean condition to minimize the risk of weed introduction. Any equipment which arrives in a dirty condition will not be allowed to work until it has been cleaned off at a suitable location.
2. Equipment passing through areas identified as having a weed problem will be cleaned prior to continuing work on the right-of-way.
3. Equipment clean-off stations will be established by the main pipeline contractor under the direction of the Trans Mountain's Environmental Inspector(s). The preferred method of clean-off will be pressurized water, weather permitting.
4. Weed growth will be specifically monitored by personnel trained in weed identification walking the right-of-way and recording the density and species of all weeds observed. Weed monitoring will be conducted by teams in a timely manner so that weed control plans can be developed.
5. Monitoring will be conducted prior to, during and as per PCEM requirements.
6. Frequency of monitoring may be increased where: high potential for weeds of management concern was identified prior to, during or following construction. Weeds will generally be monitored in the spring when weed seedlings can be identified and subsequently controlled, if warranted. Additional weed monitoring in the late summer prior to setting seed will be conducted where high weed concerns exist or where spring surveys identify the need for follow-up.
7. Areas of poor plant cover will be reseeded and weed control measures applied as required.
8. The equipment cleaning station will be assessed in fall, late spring and mid-summer for at least three growing seasons following construction. Subsequent monitoring will be at least once per season, depending on weed issues identified during previous years. Weed species of concern that are identified at the sites will be treated. Manual removal of plants or chemical treatment will occur. If weeds are manually removed when in flower, the weed material will be disposed of in an approved land-fill facility.

A.



Profile View
(Not to Scale)

B.



Profile View
(Not to Scale)

Representation Only

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	WETLAND CROSSING – NON FROZEN AND FROZEN		
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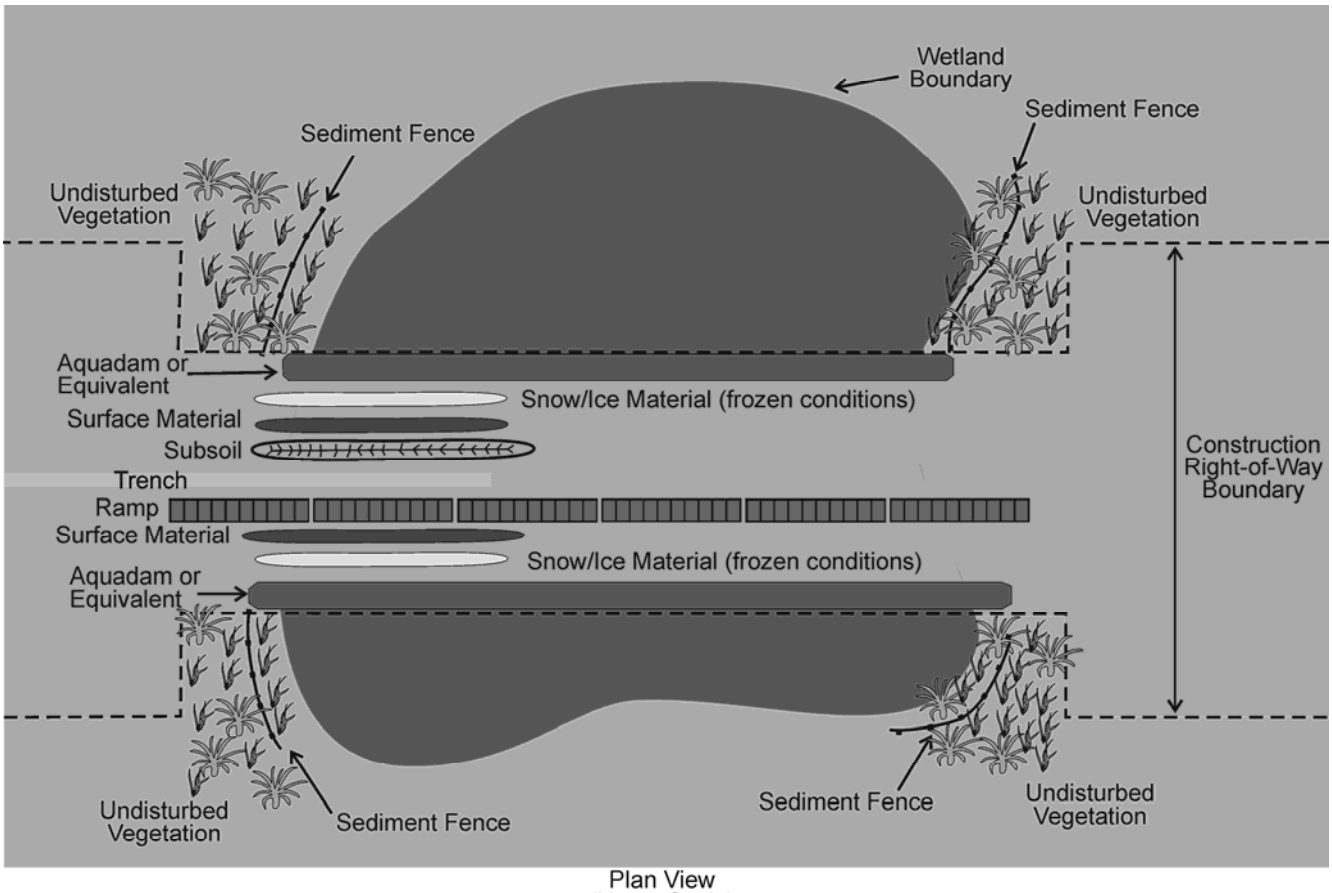

Plan View
(Not to Scale)

Representation Only

tera ENVIRONMENTAL CONSULTANTS	**TRANS MOUNTAIN EXPANSION PROJECT** TRANSMOUNTAIN		
	WETLAND CROSSING – NON FROZEN AND FROZEN		
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Notes:

1. Schedule construction in wetlands for dry or frozen conditions.
2. *Test Holes:* Excavate test holes on the trench line to determine mineral soil/organic content and water table depth that could influence trench stability and water management needs.
3. *Workspace:* Locate workspace areas a minimum 10 m from wetland boundaries except where adjacent upland consists of actively cultivated land or other disturbed land. Ensure landowner and/or regulatory approvals are in place for all additional work areas prior to use.
4. *Access:* Utilize shoo-flies in upland areas for access, where practicable. Where shoo-flies in upland areas do not provide reasonable access, consider ramping options to support work side traffic and pipeline installation.
5. *Equipment:* Use wide pad, low-ground-pressure equipment or have standard equipment work off mats (see Plan View) to install or create containment berms/barriers. Avoid rutting and admixing of wetland with appropriate ramping options such as mats (timber or swamp mats) or geotextile and subsoil ramps.
6. *Clearing / Grading:* Restrict vegetation removal only to that area necessary for pipeline construction. Utilize appropriate machinery (*i.e.,* wide pad machines) and swamp mats or equivalent. Review and adhere to the clearing and grading measures presented in the EPP.
7. *Surface Materials:* Review and adhere to the surface material salvage measures presented in the EPP.
8. *Isolation:* If deep water is encountered, salvaged surface material and trench subsoil may be used as a containment berm/barrier (see A.). Consider using subsoil material from the trench line as a containment barrier where salvaged surface material is not able to support a berm/barrier. Alternate dam devices such as an aquadam or meter bags are other options (see B.). Pump excess water from work area and trench to opposite side of berm or work ramp. The pipe should be strung and welded outside of the deep water portion of the wetland and then moved into place after the trench has been excavated.
9. *Dewatering:* If the trench requires dewatering prior to lowering-in, pump water into stable and well-vegetated areas. Monitor discharge areas and change discharge location if sedimentation occurs.
10. If the wetland is dry or frozen during construction, the pipe can be strung and welded within the boundaries of the wetland.
11. *Trench Plugs:* Ensure trench does not provide drainage conduit into or out of wetland during or after construction. Install trench plugs where warranted or monitor hard plugs.
12. *Trench Breakers:* Install trench breakers, where warranted, at the edge of wetlands to prevent the pipe trench from acting as a drain and to prevent unconsolidated organic soils from sloughing into the channel.
13. *Buoyancy:* If warranted, weight pipe as per engineering specifications prior to installation.
14. *Backfill:* Backfill and do not leave a trench crown during clean-up of mineral wetlands. Leave a low trench crown during clean-up of peatlands to allow for settlement of backfill. Leave breaks in trench crown at obvious drainages.
15. *Reclamation:* Reestablish surface hydrology patterns within the construction right-of-way as close to preconstruction contours as practical during reclamation. Regrade areas with vehicle ruts, erosion gullies or where the trench has settled.
16. *Reclamation:* Do not seed wetlands (*i.e.,* allow for natural regeneration). Consult with Trans Mountain's Environmental Inspector to determine if seeding of the riparian areas adjacent the wetland is required. Seed with an appropriate native or riparian seed mix if it is deemed warranted.
17. *Sediment Control:* Maintain sediment fences in place at wetland boundaries until revegetation of adjacent construction right-of-way is stable.

CRITERIA FOR IMPLEMENTATION:

Where wind erosion is observed, employ one or more of the following control measures:

- apply erosion matting ;
- seed a cover crop;
- install wind fencing;
- apply tackifier and mulch;
- install brush wind barrier;
- install staked logs; and
- spread woody debris.

Tackifier and fiber mulch and/or erosion matting will be used for interim control where erosion events are evident. Seeding of a cover crop will be considered following construction in areas identified as having an extremely high potential for wind erosion.

Notes:

1. Monitor the right-of-way for wind erosion at areas identified on the Environmental Work Sheets following seeding and reclamation until vegetation cover is re-established.

2. Tackifier and mulch mixture will be applied using methods and rates recommended by the supplier and approved by the land authority. All products will be biodegradable, nontoxic and of organic origin (*i.e.*, calcium or ammonium lignosulfonate, or an equivalent product).

3. Apply tackifier mulch mixture on specified slopes immediately following seeding. Do not mix seed into the tackifer as a substitute for seeding operations.

4. Avoid further disruption of the slope surface following tackifer application.

5. Where disruption of the erodible surface occurs, reseed and reapply tackifier mulch mixture.

6. Where trampling and grazing pressures from ungulates or livestock will jeopardize reclamation efforts on erosion-prone slopes, the use of temporary fencing (including electric) around the reclaimed site will be discussed with the land authority and implemented where advised. The fencing will be removed once a stable vegetation cover becomes established.

APPENDIX S

DETAILS

Detail Seed Installation and Seed Mixes

Information will be provided prior to construction.

(PLACE HOLDER)