

## **Environmental Protection Plan**

Wyndwood Expansion Project



Prepared for:  
Westcoast Energy Inc.  
doing business as  
Spectra Energy Transmission  
(Westcoast)  
2600 - 425 1 Street SW  
Calgary, AB T2P 3L8

Prepared by:  
Stantec Consulting Ltd.  
500 - 4700 Kingsway  
Burnaby, BC V5H 0C6

October 21, 2016



## Table of Contents

<b>ABBREVIATIONS</b>	<b>I</b>
<b>1.0 INTRODUCTION</b>	<b>1.1</b>
1.1 PURPOSE	1.1
1.2 EXTENT AND LIMIT	1.1
1.3 STRUCTURE AND USE	1.2
<b>2.0 PROJECT DESCRIPTION</b>	<b>2.1</b>
2.1 PROJECT COMPONENTS	2.1
2.2 CONSTRUCTION SCHEDULE	2.1
2.3 ENVIRONMENTAL CONTEXT	2.4
<b>3.0 ENVIRONMENTAL ROLES AND RESPONSIBILITIES</b>	<b>3.1</b>
<b>4.0 ENVIRONMENTAL COMPLIANCE</b>	<b>4.1</b>
4.1 INDUSTRY GUIDELINES AND REGULATIONS	4.1
4.2 COMPLIANCE MEASURES AND NON-COMPLIANCE REPORTING	4.1
4.3 RESOURCE TIMING WINDOWS	4.3
<b>5.0 PRE-CONSTRUCTION ACTIVITIES</b>	<b>5.1</b>
5.1 CONSTRUCTION PREPARATION	5.1
5.2 STAKEHOLDER NOTIFICATION	5.2
5.3 SURVEYING AND WORK AREA PREPARATION	5.3
<b>6.0 GENERAL PROJECT AND RESOURCE-SPECIFIC MITIGATION MEASURES</b>	<b>6.1</b>
6.1 WILDLIFE MANAGEMENT PLAN	6.4
6.1.1 Species of Concern Discovery	6.5
6.1.2 Beaver Dams	6.6
6.1.3 Wildlife Encounters	6.6
6.1.4 Caribou Habitat Restoration Plan	6.6
6.1.5 Western Toad Management	6.7
6.2 VEGETATION MANAGEMENT PLAN	6.8
6.2.1 Discovery of Plant Species and Ecosystems at Risk	6.15
6.3 HERITAGE AND TRADITIONAL LAND USE MITIGATION MEASURES	6.15
<b>7.0 PIPELINE CONSTRUCTION</b>	<b>7.1</b>
7.1 CLEARING AND GRUBBING	7.1
7.2 SOIL STRIPPING AND GRADING	7.3
7.3 WATERCOURSE AND WETLAND CROSSINGS	7.5
7.3.1 Discovery of Fish Species and/or Habitat of Concern	7.6
7.3.2 Pipeline Crossings	7.8
7.3.3 Vehicle Crossings	7.10
7.3.4 Non-Pipeline ROW Crossings	7.11

## ENVIRONMENTAL PROTECTION PLAN

7.4	TRENCHING.....	7.19
7.5	STRINGING AND LOWERING-IN .....	7.21
7.6	BACKFILLING.....	7.22
7.7	SPILL PREVENTION AND RESPONSE PLAN .....	7.23
	7.7.1 Prevention.....	7.23
	7.7.2 Response.....	7.23
7.8	FUEL STORAGE AND HANDLING PLAN .....	7.26
7.9	WASTE MANAGEMENT.....	7.27
7.10	HYDROSTATIC TESTING.....	7.28
7.11	CLEAN-UP AND RECLAMATION.....	7.29
<b>8.0</b>	<b>POST-CONSTRUCTION ACTIVITIES AND MONITORING.....</b>	<b>8.1</b>
<b>9.0</b>	<b>REFERENCES.....</b>	<b>9.1</b>

### LIST OF TABLES

Table 2-1	Project Component Summary.....	2.1
Table 2-2	Construction Schedule .....	2.1
Table 3-1	Roles and Responsibilities of Project Personnel .....	3.1
Table 4-1	Environmental Compliance Measures .....	4.1
Table 4-2	Resource Timing Windows.....	4.3
Table 5-1	Measures for Pre-Construction Activities.....	5.1
Table 5-2	Measures for Stakeholder Notification .....	5.2
Table 5-3	Environmental Protection Measures for Surveying and Access.....	5.3
Table 6-1	Environmental Protection Measures for All Project Activities .....	6.1
Table 6-2	Mitigation Measures for Wildlife Resources.....	6.4
Table 6-3	Mitigation Measures for Vegetation Resources .....	6.9
Table 6-4	Mitigation Measures for Heritage Resources .....	6.15
Table 6-5	Environmental Protection Measures for Traditional Use Sites .....	6.17
Table 7-1	Environmental Protection Measures for Clearing and Grubbing .....	7.1
Table 7-2	Environmental Protection Measures for Soil Stripping and Grading.....	7.3
Table 7-3	Summary of Watercourse Classifications from 2015 Field Surveys.....	7.5
Table 7-4	Mitigation Measures for Work in Watercourses .....	7.7
Table 7-5	Mitigation Measures for Isolated and Open Cut Watercourse Crossings .....	7.8
Table 7-6	Mitigation Measures for Trenchless Crossings of Waterbodies/ Water courses .....	7.9
Table 7-7	Mitigation Measures for Vehicle Crossings.....	7.10
Table 7-8	Mitigation Measures for non-Pipeline ROW Crossings .....	7.11
Table 7-9	Watercourse and Wetland Crossing Table .....	7.13
Table 7-10	Environmental Protection Measures for Trenching .....	7.19
Table 7-11	Environmental Protection Measures for Stringing and Lowering-In....	7.21
Table 7-12	Environmental Protection Measures for Backfilling.....	7.22



## ENVIRONMENTAL PROTECTION PLAN

Table 7-13	Westcoast BC Pipeline and Field Services Spill/Leak Reporting Requirements and Reportable Quantities .....	7.25
Table 7-14	Fuel Storage and Handling Mitigation Measures .....	7.26
Table 7-15	Construction Waste Management .....	7.27
Table 7-16	Environmental Protection Measures for Hydrostatic Testing .....	7.28
Table 7-17	Environmental Protection Measures for Clean-Up and Reclamation.....	7.29
Table 8-1	Environmental Protection Measures for Post-Construction Activities .....	8.1

## LIST OF FIGURES

Figure 2-1	Wyndwood Expansion Project—Overview Map .....	2.2
Figure 2-2	Detailed Overview Figure .....	2.3

## LIST OF APPENDICES

<b>APPENDIX A</b>	<b>ENVIRONMENTAL ALIGNMENT SHEETS .....</b>	<b>A.1</b>
<b>APPENDIX B</b>	<b>ENVIRONMENTAL APPROVALS/PERMIT LIST .....</b>	<b>B.1</b>
<b>APPENDIX C</b>	<b>BEST MANAGEMENT PRACTICES FOR PIPELINE STREAM CROSSINGS IN BRITISH COLUMBIA .....</b>	<b>C.1</b>
C.1	Introduction .....	C.1
C.2	Dry Open-Cut Crossings .....	C.2
C.3	Isolated Crossings .....	C.5
C.4	Trenchless Crossing .....	C.8
C.5	Temporary Ford Stream Crossings .....	C.11
C.6	Maintenance of Riparian Vegetation in Existing Right-of-Way .....	C.14
C.7	Clear Span Bridges .....	C.16
C.8	References .....	C.19
<b>APPENDIX D</b>	<b>EMERGENCY AND GENERAL PROJECT CONTACTS .....</b>	<b>D.1</b>
<b>APPENDIX E</b>	<b>CONSTRUCTION SPECIFICATIONS AND TYPICAL DRAWINGS .....</b>	<b>E.1</b>
<b>APPENDIX F</b>	<b>CONTINGENCY PLANS .....</b>	<b>F.1</b>
F.1	Fire Contingency Plan .....	F.1
F.2	Release of Drilling fluid Contingency plan .....	F.11
F.3	Extreme Weather Contingency Plan .....	F.12
F.4	Contaminated Soils Contingency Plan .....	F.12
F.5	Final Clean-Up Delay Contingency Plan .....	F.15
F.6	Heritage Resource Discovery Contingency Plan .....	F.17
F.7	Wet Soils Contingency Plan .....	F.17
<b>APPENDIX G</b>	<b>ACTIVE MIGRATORY BIRD NEST SURVEY PROGRAM .....</b>	<b>G.1</b>

## ENVIRONMENTAL PROTECTION PLAN

APPENDIX H	ACCESS AND TRAFFIC MANAGEMENT PLAN .....	H.1
APPENDIX I	PRELIMINARY CARIBOU HABITAT RESTORATION PLAN.....	I.1

### Abbreviations

ALR	Agricultural Land Reserve
BC	British Columbia
BMP	best management practice
BWBSmw	Moist Warm Boreal White and Black Spruce
CDC	Conservation Data Centre
CI	chief inspector
cm	centimetre
CHRP	Caribou Habitat Restoration Plan
CSA	Canadian Standards Association
CSR	Contaminated Site Regulation
DFO	Fisheries and Oceans Canada
EC	Environment Canada
EHS	Environment, Health, and Safety
EI	environmental inspector
EMCPC	Environmental Manual for Construction Projects in Canada
EPMG	Environmental Protection and Management Guideline
EPP	Environmental Protection Plan
ER	Environmental Resource
ESA	Environmental and Socio-economic Assessment
GBPU	Grizzly Bear Population Unit
ha	hectare

## ENVIRONMENTAL PROTECTION PLAN

HDD	horizontal directional drill
HWM	high water mark
kg	kilogram
km	kilometre
KP	kilometre point
L	litre
m	metre
MBCA	<i>Migratory Birds Convention Act</i>
MDZ	minimal disturbance zone
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
MOE	Ministry of Environment
MSDS	material safety data sheet
MWLAP	Ministry of Water, Land, and Air Protection
NEB	National Energy Board
NCD	non-classified drainage
NWE	no watercourse evident
OGC	Oil and Gas Commission
OGMA	Old Growth Management Area
OPR	Onshore Pipeline Regulations
PAG	potentially acid generating
PDA	project development area
PM	project manager
Project	Wyndwood Expansion Project

## ENVIRONMENTAL PROTECTION PLAN

psi	pounds per square inch
RMA	riparian management area
RMZ	riparian management zone
ROW	right-of-way
RRZ	riparian reserve zone
s.58	section 58
SARA	<i>Species at Risk Act</i>
TDG	Transportation of Dangerous Goods
TU	traditional use
TWS	temporary workspace
UTM	universal transverse mercator
Westcoast	Westcoast Energy Inc. doing business as Spectra Energy Transmission
WHMIS	Workplace Hazardous Materials Information System



# ENVIRONMENTAL PROTECTION PLAN

Introduction  
October 21, 2016

## 1.0 INTRODUCTION

This Environmental Protection Plan (EPP) is specific to the Wyndwood Project (the Project) proposed by Westcoast Energy Inc., doing business as Spectra Energy Transmission (Westcoast). Stantec has been retained by Westcoast to prepare this EPP for Project construction activities. It describes general and specific environmental protection and mitigation measures to be implemented before, during, and after Project construction. This EPP accompanies a National Energy Board (NEB) section 58 (s. 58) *National Energy Board Act* (NEB Act) Application and Environmental and Socio-economic Assessment (ESA) for the Project.

This EPP incorporates relevant information from the Environmental Manual for Construction Projects in Canada (EMCPC) provided Westcoast. The Spectra EMCPC applies to the Project and describes in general terms the environmental protection policies, mitigation measures, and contingency plans for Westcoast projects (Spectra 2014).

### 1.1 PURPOSE

This EPP:

- Outlines environmental protection measures related to Project construction activities
- Provides Westcoast personnel and contractors (Project personnel) with instructions for carrying out construction activities in such a way as to reduce environmental effects
- Forms part of the construction contract documents and provides the primary reference for specific environmental protection measures contained in Project contract documents
- Serves as the basis for orientation and training of Project personnel
- Provides the basis for environmental inspection and monitoring during construction as verification of compliance with Project-specific commitments

### 1.2 EXTENT AND LIMIT

The scope of this EPP extends to all activities before, during, and after construction is undertaken on the pipeline loop.

The EPP is based on environmental assessment work conducted during Project regulatory review and permitting, Spectra's EMCPC, and information obtained through stakeholder consultation. Specific mitigation measures may require revision as a result of design changes during ongoing consultation with regulators and stakeholders.

Additional revisions will be incorporated to address unforeseen site-specific conditions noted during construction. Westcoast will resolve new or unforeseen issues that arise during construction with the chief inspector (CI), environmental inspector (EI), environment lead, and construction supervisor in consultation with the appropriate regulators, as required. The resolution(s) will be documented in a revision to the EPP, or elsewhere as necessary, and communicated to the appropriate parties.



## **ENVIRONMENTAL PROTECTION PLAN**

Introduction  
October 21, 2016

Following receipt of an Order from the NEB under s.58, a revision to this plan may be required to address conditions associated with the Order or from consultation with stakeholders and provincial regulatory offices.

### **1.3 STRUCTURE AND USE**

Within the EPP, environmental protection measures are provided to correspond with specific Project activities. They should be referred to in conjunction with the Environmental Alignment Sheets (Appendix A) and other appendices included with the EPP. The EPP also provides several resource protection, management, and contingency plans that apply throughout the Project area during all phases of construction.

Westcoast personnel and the contractor will review the entirety of the EPP before engaging in Project activities.

The EPP and supporting documentation will be accessible in the construction field offices.



## ENVIRONMENTAL PROTECTION PLAN

Project Description  
October 21, 2016

## 2.0 PROJECT DESCRIPTION

### 2.1 PROJECT COMPONENTS

**Table 2-1 Project Component Summary**

Component	Description
Pipeline Loop	<ul style="list-style-type: none"><li>• Approximately 28 km of new 914 mm (NPS 36) pipeline aligned adjacent and generally parallel to an existing natural gas pipeline within the Transmission-North (T-North) system including:<ul style="list-style-type: none"><li>– Two pig launcher and receiver pads</li><li>– Associated crossover valves</li><li>– 20 - 35 m wide permanent ROW</li><li>– 20 - 60 m wide TWS</li><li>– Minor modifications to piping at CS-2 (Willow Flats) compressor station, including tie-ins at either end of the loop</li><li>– Temporary access road upgrades</li></ul></li></ul>

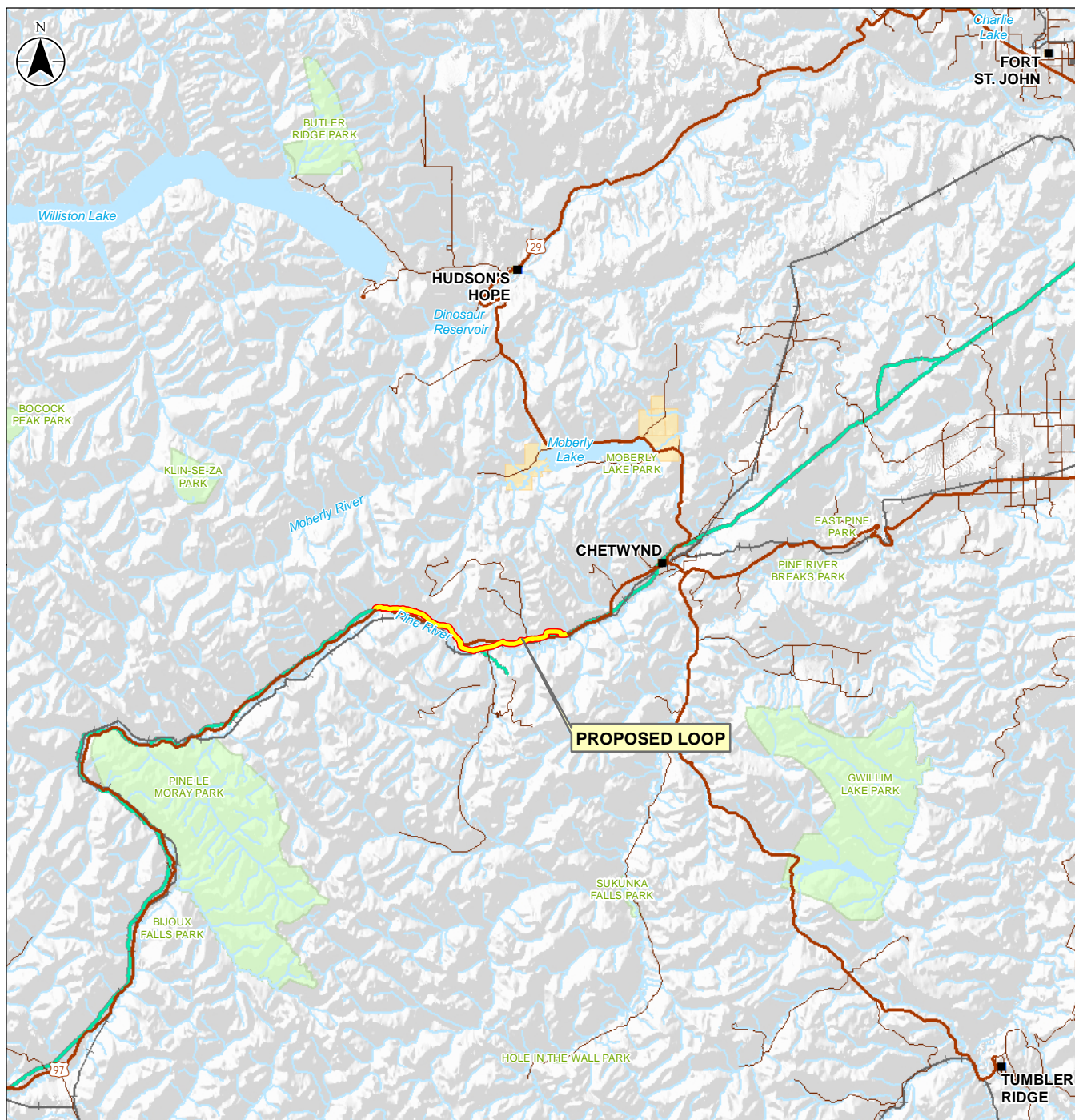
The pipeline is comprised of one pipeline loop as summarized in Table 2-1 and Figure 2-1 and Figure 2-2.

### 2.2 CONSTRUCTION SCHEDULE

All Project activities are proposed to occur in 2017 and 2018. The construction schedule is summarized in Table 2-2.

**Table 2-2 Construction Schedule**

Activity	Preferred Timing
Clearing	August to September 2017
Pipeline construction	August to December 2017
Commissioning	December 2017 to January 2018
Reclamation and cleanup	Spring/Summer 2018
In-service	Early spring 2018



- City or Town
- Highway
- Road
- Railway
- Watercourse
- Existing Right of Way

- Waterbody
- Indian Reserve
- Parks, Protected Area, Ecological Reserve and Conservancy
- Proposed Loop



Project Location  
North-Eastern  
British Columbia

123220406  
Prepared by S.Sun on 2016-09-23  
Technical Review by I.Dinneen  
Independent Review by K.Hewitt

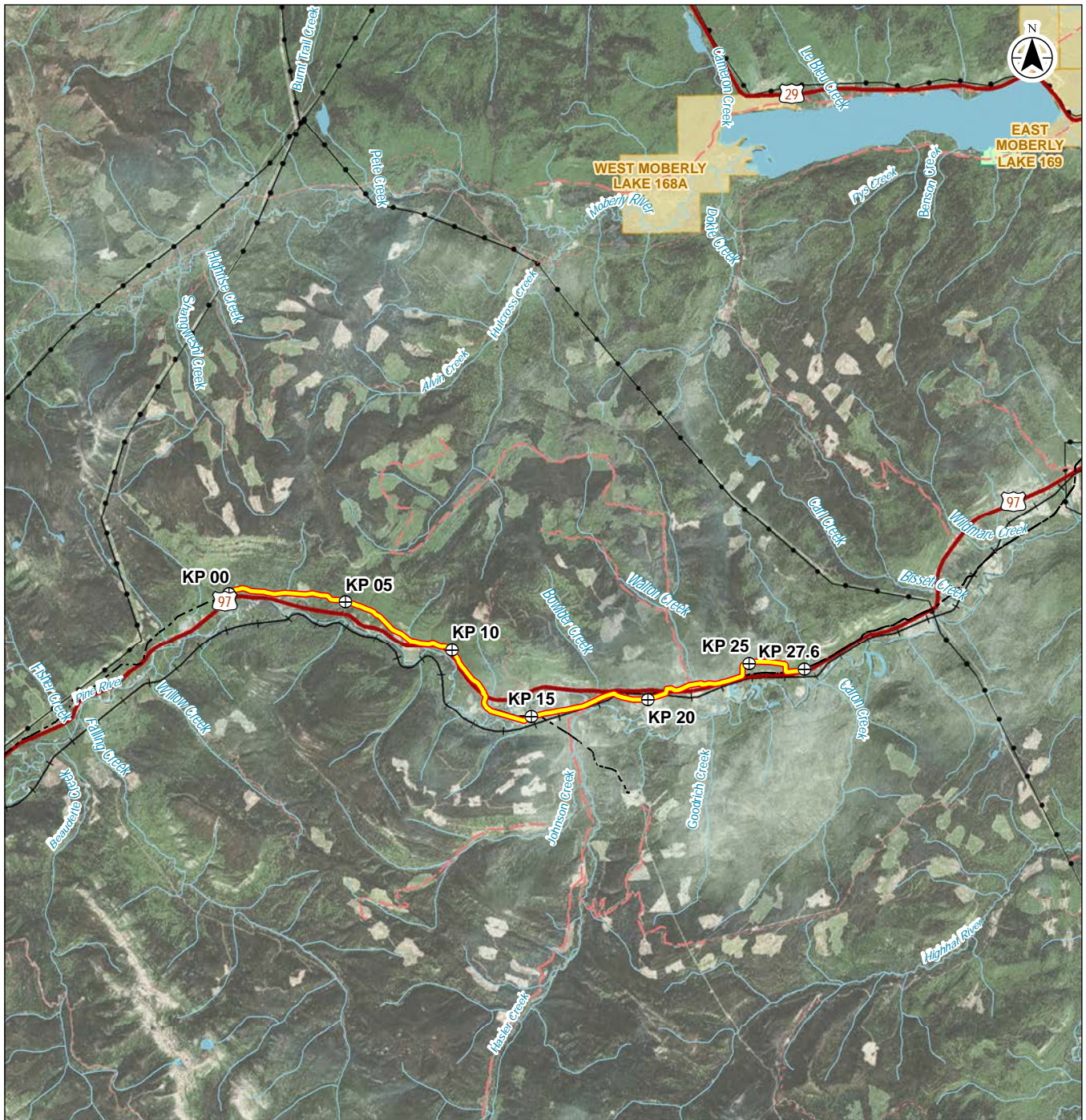
Client/Project  
Spectra Energy Transmission  
Wyndwood Expansion Project  
Environmental Protection Plan

Figure No.  
2-1  
Title

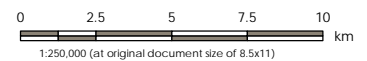
## WYNDWOOD EXPANSION PROJECT OVERVIEW MAP

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.





- Existing Pipeline
- Paved Road
- - - Loose Road
- - - Rough Road
- Railway
- Watercourse
- Waterbody
- Indian Reserve
- Park, Protected Area, and Conservancy
- ⊕ Kilometre Post (KP)
- Proposed Loop



Project Location  
North-Eastern  
British Columbia

12322406  
Prepared by S.Sun on 2016-09-29  
Technical Review by T.Dinneen  
Independent Review by K.Hewgill

Client/Project  
Spectra Energy Transmission  
Wyndwood Expansion Project  
Environmental Protection Plan

Figure No.  
2-2  
Title

Wyndwood Expansion Project  
Project Detail

Notes  
1. Coordinate System: NAD 1983 UTM Zone 10N  
2. Data Sources: DataBC; Government of British Columbia (GovBC); Terrain Resource Information Management, GovBC; National Topographic System, GovBC; BC Stats, GovBC; BC Oil & Gas Commission, GovBC; CanVec v12, Government of Canada (GC); National Hydrology Network, GC; Atlas of Canada National Framework, GC; Fisheries and Oceans Canada, GC; Environment Canada, GC; Natural Resources Canada, GC;  
Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

## ENVIRONMENTAL PROTECTION PLAN

Project Description  
October 21, 2016

### 2.3 ENVIRONMENTAL CONTEXT

The Project area overlaps cultivated land, industrial developments, various settlements, and forested, riparian, and wetland habitat within both Crown and privately held lands. The terrain is largely in the lowlands of the Rocky Mountain Foothills and within the incised valleys near the Pine River. Of the total 28 km long proposed pipeline route, approximately 12.0 km falls within the Agricultural Land Reserve (ALR), of which, 10.2 km is privately owned.

There are 31 classified watercourses (of 62 mapped watercourses) and 13 wetland pipeline crossings associated with the Project (Table 7-8; mitigation associated with these crossings is provided in sections 6.2 and 7.3 of this EPP). The Project centerline intersects two caribou herd ranges: the Moberly (Klinse-Za) caribou herd range for 5.2 km and the Burnt Pine caribou herd range for 6.3 km. The Project also intersects two Grizzly Bear Population Units (GBPU): the Moberly GBPU for 23.1 km and the Hart GBPU for 12.7 km. Mitigation for the caribou herd ranges and GBPUs is found in section 6.1 of this EPP.

The Project lies within the Moist Warm Boreal White and Black Spruce (BWBSmw) biogeoclimatic subzone. Forests in the BWBSmw are often dominated by trembling aspen and lodgepole pine, with white spruce as the dominant climax species. Wetter upland sites with rich soils are generally dominated by balsam poplar (*Populus balsamifera*) or white spruce (*Picea glauca*), with black spruce (*Picea mariana*) the dominant tree species at lowland sites on poorer soils with a thick organic layer (DeLong et al. 2011).



## ENVIRONMENTAL PROTECTION PLAN

Environmental Roles and Responsibilities  
October 21, 2016

### 3.0 ENVIRONMENTAL ROLES AND RESPONSIBILITIES

The responsibilities of Project personnel, as they relate to environmental protection during Project construction, are described in Table 3-1. Contact information can be found in Emergency and General Project Contacts (Appendix D).

**Table 3-1 Roles and Responsibilities of Project Personnel**

Role	Responsibilities
<i>Westcoast Project Manager (PM)</i>	<ol style="list-style-type: none"><li>1. Project planning—integrate environmental requirements into design, contracts, approvals, permitting, and plans.</li><li>2. Communicate environmental requirements to contractors and sub-contractors, and maintain capacity to comply with environmental commitments.</li><li>3. Provide and communicate mechanisms for effective site selection and inspection, implementation of protection measures, and regular communication with personnel on-site.</li><li>4. Exercise or delegate authority to stop any work/activity regarded as not conforming with the Spectra EMCPC, Project commitments, or environmental regulations.</li><li>5. Implement and maintain a Project Life Cycle Approach.</li><li>6. Implement and maintain mechanisms for timely response and correction to non-conformance incidents.</li><li>7. Share lessons learned and encourage team to share lessons learned from previous projects.</li><li>8. Maintain communication channels with environmental regulatory authorities.</li><li>9. Oversee transfer of environmental responsibilities from construction to operations phase.</li></ol>
<i>Westcoast Environmental Specialist—Projects</i>	<ol style="list-style-type: none"><li>10. Support integration of environmental requirements in pre-construction activities.</li><li>11. Provide Project environmental information and EPP at the construction kick-off meeting.</li><li>12. Responsible for supporting communication of environmental requirements to contractors, either directly or through the EI; the PM will provide the EI and key construction personnel will have a copy of the EPP and will verify that they are familiar with the mitigation measures.</li><li>13. Responsible for implementation of environmental inspection and communication protocols are implemented to comply with the Spectra EMCPC and Project commitments.</li><li>14. Responsible for liaising through the appropriate Westcoast channels with regulatory agencies and stakeholders regarding environmental issues.</li><li>15. Responsible for timely response to and correction of environmental non-conformance incidents.</li><li>16. Establish and maintain communication with environmental regulatory authorities.</li></ol>
<i>Westcoast Chief Inspector (CI) On-Site</i>	<ol style="list-style-type: none"><li>17. Be knowledgeable of daily environmental inspection activities.</li><li>18. Communicate with the PM, environment specialist, and on-site EIs concerning environmental performance and non-compliances.</li><li>19. Cooperate with Project personnel to facilitate correction to non-conformance with the environmental program, commitments, or regulatory requirements.</li><li>20. Exercise authority or support EI's authority to stop work regarded as non-conformance.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Environmental Roles and Responsibilities  
October 21, 2016

**Table 3-1 Roles and Responsibilities of Project Personnel**

Role	Responsibilities
<i>Westcoast Environmental Inspector (EI) On-Site</i>	<ul style="list-style-type: none"> <li>21. Be knowledgeable of the EPP mitigation measures, best management practices (BMPs), contingency plans, and with potential environmental effects of Project activities.</li> <li>22. Responsible for complying with Spectra's EMCPC</li> <li>23. Review EPP in detail with Environmental Specialist before construction activities.</li> <li>24. Cooperate with Project personnel to address environmental issues and verify conformance with the EPP, Spectra's EMCPC (Section 3.3.4 and Appendix A) and commitments.</li> <li>25. Take immediate action to address, stop, or relocate activities regarded as non-conformance.</li> <li>26. Communicate with on-site personnel, PM, and environment specialist regarding environmental program performance and non-conformances.</li> <li>27. Liaise with regulatory agencies on environmental issues.</li> <li>28. Facilitate on-site environmental inspections by regulatory agencies.</li> <li>29. Facilitate or prepare spill reports and deliver reporting to the Fort St. John Gas Control Centre.</li> <li>30. Prepare daily site inspection reports with pictures to document environmental compliance.</li> </ul>
<i>Westcoast Lands and Community Representative</i>	<ul style="list-style-type: none"> <li>31. Liaise with local communities and other parties to address potential environmental concerns with the Project.</li> <li>32. Consult with individual tenure holders and carry out stakeholder notifications.</li> <li>33. Identify and discuss stakeholder issues related to environmental matters with environment specialists or EI.</li> <li>34. Responsible for complying with Spectra's EMCPC</li> </ul>
<i>Westcoast Aboriginal Relations</i>	<ul style="list-style-type: none"> <li>35. Liaise with Aboriginal community to address potential environmental concerns with the Project.</li> <li>36. Identify and discuss Aboriginal and local community issues related to environmental matters with the EI.</li> </ul>
<i>Westcoast Construction Manager</i>	<ul style="list-style-type: none"> <li>37. Check that all contractor supervisory staff are aware of environmental requirements in the EPP, permits, Environment, Health and Safety (EHS) policy and Spectra's EMCPC, including notifying and updating construction personnel on appropriate schedules, timing restrictions, and requirements.</li> <li>38. Champion a culture of environmental awareness, regulatory compliance, and attendance by all Project personnel to awareness sessions and related meetings.</li> <li>39. Verify the Spectra One Call system is followed in a timely manner should spills or other incidents with potential for negative environmental impact occur.</li> <li>40. Facilitate timely collaboration between the EI and Project team and facilitate a response to any matter of environmental consequence within the area that may impact the Project, schedule, or Westcoast's regulatory relationship.</li> <li>41. Responsible for complying with Spectra's EMCPC</li> </ul>
<i>All Construction Personnel (Westcoast, Prime Contractor, Subcontractors)</i>	<ul style="list-style-type: none"> <li>42. Participate in environmental orientation and training.</li> <li>43. Understand the environmental commitments of the EPP, EHS policy and Spectra's EMCPC and how to access appropriate environmental information and resources.</li> <li>44. Refer to Environmental Alignment Sheets (Appendix A) in conjunction with EPP.</li> <li>45. Diligently execute Contingency Plans (Appendix F) as required.</li> <li>46. Consult with EI and / or Environmental Specialist if it is not clear how to proceed in a specific circumstance.</li> </ul>

## ENVIRONMENTAL PROTECTION PLAN

Environmental Compliance  
October 21, 2016

### 4.0 ENVIRONMENTAL COMPLIANCE

This section describes the responsibilities and practices for facilitation of compliance with applicable regulations, permits, Project commitments, and the Project EPP.

#### 4.1 INDUSTRY GUIDELINES AND REGULATIONS

The Project consists of one pipeline loop segment. The Project will be designed and constructed in accordance with the NEB Onshore Pipeline Regulations (OPR) (1999) and the British Columbia Oil and Gas Commission (BC OGC) Environmental Protection and Management Guideline (2016) and Spectra's EMCPC. The measures provided here also adhere to relevant provincial and federal guidelines and are consistent with industry best practices, such as the Canadian Pipeline Water Crossing Committee Watercourse Crossings 3rd Edition (2005). Where applicable, plans have been customized to address regional and site-specific conditions and include mitigation measures discussed within the ESA.

#### 4.2 COMPLIANCE MEASURES AND NON-COMPLIANCE REPORTING

**Table 4-1 Environmental Compliance Measures**

Activity	Compliance Measures
<i>Project Design</i>	1. The Project will be designed, constructed, tested, and operated in accordance with the latest revision of Canadian Standards Association (CSA) Z662, the NEB Act and the Onshore Pipeline Regulations (OPR).
<i>EPP, Spectra's EMCPC, EHS Policy and Contract</i>	2. These documents will form part of the construction contract documents and the Environmental Alignment Sheets for the Project (Appendix A) will form part of the construction drawings. Should conflict between the contract and the EPP requirements arise, the more stringent conditions will apply.
<i>Licenses and Permits</i>	3. All necessary provincial and federal licenses, permits, and approvals will be obtained by Westcoast prior to start of construction activities, including for watercourse crossings and withdrawal of water for hydrostatic testing. Refer to Environmental Approvals/Permit List (Appendix B). 4. Inconsistencies between conditions of different permits will be resolved prior to the start of construction where practical. 5. Project personnel will adhere to all conditions of permits and approvals.
<i>Construction Documents</i>	6. The contractor and Westcoast's inspectors will be provided with the EPP, Spectra's EMCPC and copies of approvals including the most recent updates and revisions. 7. The EI and construction s Westcoast's Supervisor (contractor) will review and be aware of the requirements of the EPP, Spectra's EMCPC and permits prior to commencement of construction.

## ENVIRONMENTAL PROTECTION PLAN

Environmental Compliance  
October 21, 2016

**Table 4-1 Environmental Compliance Measures**

Activity	Compliance Measures
<i>Environmental Inspections</i>	8. Environmental inspection staff will be provided with relevant results of 2016 and 2017 pre-construction surveys, if required, identifying known locations of environmentally sensitive features (e.g., active nests, rare plants, amphibian habitat, caribou areas and riparian zones). Flagging, fencing or narrowing work area widths will be used to identify and protect particularly sensitive features in the field.
<i>Environmental Training</i>	9. All Project personnel, including visitors to the ROW, will receive the appropriate level of environmental training before they can access any development site associated with the Project. 10. This training will include an overview discussion on proper field identification and protocols for resource discovery. 11. Procedures for entering and working in setback areas will be communicated. 12. Environmental Alignment Sheets will be available in the field office. 13. The Westcoast Environmental Specialist, EI, or qualified consultant will provide training on the EPP, Spectra's EMCPC and EHS policy to: <ul style="list-style-type: none"> <li>a. CI or delegate</li> <li>b. Project leads</li> <li>c. All construction supervisors</li> <li>d. Team leads for the various phases of the Project</li> </ul>
<i>Concerns and Complaints</i>	14. The Westcoast PM and Westcoast Lands and Community Representative will establish a procedure or protocol to address concerns in a timely manner, including noise complaints from residents.
<i>Non-Compliance</i>	15. The PM will verify that plans for corrective action are developed in advance of construction. 16. Project personnel are to bring non-compliance incidents to the attention of the EI. 17. The EI will take immediate action to address, stop, or relocate activities regarded as non-compliant. 18. A plan for corrective action will be implemented by the PM and Project personnel. 19. The EI will report non-compliance incidents to the appropriate regulatory authority and Spectra representatives (PM, Environmental Specialist). Refer to Emergency and General Project Contacts (Appendix D). 20. The EI will follow-up on communications and additional conditions from the regulatory authorities to reduce the impact of non-compliance.



## ENVIRONMENTAL PROTECTION PLAN

Environmental Compliance  
October 21, 2016

### 4.3 RESOURCE TIMING WINDOWS

**Table 4-2 Resource Timing Windows**

Resource	Resource Detail	Timing Window	EPP Reference and Rationale
Wildlife	Bird Nests	April 25 to August 8 (critical period)	<ul style="list-style-type: none"><li>• Appendix G—Active Migratory Bird Nest Survey Program</li><li>• Clearing to take place after the bird nest window of April 25 to August 8; bird surveys will be completed if clearing is done early. Westcoast will search for active nests, and if active nests are located, apply appropriate buffer, and report to MFLNRO.</li></ul>
	Caribou	January 15 to July 15 (critical period)	<ul style="list-style-type: none"><li>• Appendix I—Caribou Management Plan, section 7.0.</li><li>• Westcoast plans to construct outside of this critical period. If construction extends past January 15, an application may be made to continue construction.</li><li>• During winter time—Caribou are to the north and west in the higher elevations and tracking shows infrequent use of the lower plateau areas where the proposed routing is located. Also, this area is paralleling an existing pipeline ROW and highway.</li><li>• The Maternal Penning area is about 13 km west of the proposed route and female caribou will be in the penning area from March to early July.</li></ul>
	Amphibian (Western toad)	April 1 to September 15 (critical period)	<ul style="list-style-type: none"><li>• Section 6.1.5</li><li>• Perform sweeps in wetlands five to seven days ahead of active construction and re-locate as required and install temporary barriers to re-entry during construction.</li></ul>

## ENVIRONMENTAL PROTECTION PLAN

Environmental Compliance  
October 21, 2016

**Table 4-2 Resource Timing Windows**

Resource	Resource Detail	Timing Window	EPP Reference and Rationale
Fisheries	<b>P-2; P-3</b> Fur Thief Creek; <b>P-15</b> Rocket Creek; <b>P-40</b> Commotion Creek; <b>P-45; P-50, P-52</b>	July 15 to August 15 (least risk window)	Appendix C.2: Open Cut mitigation measures Appendix C.3: Isolated Crossings • Will not be completed during sensitive fish life stages
	<b>P-29</b> Pine River; <b>P-32</b> Pine River	July 15 to August 15 (least risk window)	Appendix C.4: Trenchless Crossing
	<b>P-43</b>	July 15 to August 15 (least risk window)	Appendix C.2: Open Cut mitigation measures Appendix C.3: Isolated Crossings • Will not be completed during sensitive fish life stages
	<b>P-49</b>	July 15 to March 15 (least risk window)	Appendix C.2: Open Cut mitigation measures Appendix C.3: Isolated Crossings • Will not be completed during sensitive fish life stages
	<b>P-47</b> Stone Creek	July 15 to March 15 (least risk window)	No crossing required
	<b>P-27</b>	July 1 to January 15 (least risk window)	Appendix C.2: Open Cut mitigation measures Appendix C.3: Isolated Crossings • Will not be completed during sensitive fish life stages

## 5.0 PRE-CONSTRUCTION ACTIVITIES

### 5.1 CONSTRUCTION PREPARATION

The following measures describe activities to be undertaken prior to any on-site work.

**Table 5-1 Measures for Pre-Construction Activities**

Activity/Concern	Measures
<i>Field Surveys</i>	<ol style="list-style-type: none"><li>1. Prior to construction, any work area where western toad was observed during baseline field studies will be inspected for the presence of western toad. A qualified biologist will inspect the work area in advance of construction, dependent on the construction schedule, and where practical. This will allow for relocation of toads followed closely by site preparation to reduce the likelihood that toads will move back into the work area before work has commenced. Refer to Western Toad Management (Section 6.1.5).</li><li>2. Prior to construction, rare plant surveys in areas of high likelihood as determined in baseline field studies will be conducted in the Project Development Area by a qualified biologist. If rare plants are found, specific mitigation measures will be developed to limit Project effects on plant species at risk.</li><li>3. If clearing occurs during the provincially identified high risk timing window for breeding birds, a nest sweep will be conducted.</li></ol>
<i>Pre-Job Meeting</i>	<ol style="list-style-type: none"><li>4. Westcoast will hold a pre-job meeting with representatives from its own and appropriate consultants' and contractors' construction, engineering, environmental, and field inspection teams. The pre-job meeting will review Project concerns and discuss required procedures.</li></ol>
<i>Additional Backfill</i>	<ol style="list-style-type: none"><li>5. Secure potential sources for additional or replacement backfill will be identified by the contractor prior to construction.</li><li>6. Obtain appropriate fill placement permits from applicable regulatory agencies for potential fill sites on Agricultural Land Reserve or Crown land.</li></ol>
<i>Spill Response Plan</i>	<ol style="list-style-type: none"><li>7. The contractor will provide Westcoast with a spill response plan for review and approval.</li><li>8. Refer to Westcoast's overarching Spill Prevention and Response Plan (Section 7.7).</li></ol>
<i>Contractor Fire Awareness and Prevention</i>	<ol style="list-style-type: none"><li>9. Complete a Forest Fire Prevention Risk Assessment. Refer to Appendix F.1 Fire Contingency Plan.</li><li>10. Equip job sites and vehicles with fire-fighting equipment in accordance with the Forest Fire Prevention Risk Assessment.</li><li>11. Appoint a fire lead at each job site.</li><li>12. Develop and post a list at each job site of 24-hour fire dispatch coordinators and regional helicopter companies' telephone numbers.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pre-Construction Activities  
October 21, 2016

### 5.2 STAKEHOLDER NOTIFICATION

Westcoast will notify all stakeholders affected by the Project of the intended Project schedule prior to construction start-up to prevent or reduce impacts to their operations or activities.

**Table 5-2 Measures for Stakeholder Notification**

Stakeholder	Notification Measures
<i>Regulatory Authorities</i>	<ol style="list-style-type: none"><li>1. Notify the Ministry of Forests, Lands, and Natural Resource Operations (MFLNRO) a minimum of five working days prior to construction. Contact will be maintained as necessary until Project completion.</li><li>2. Notify Fisheries and Oceans Canada (DFO) at least 10 days prior to commencement of instream activities in accordance with the requirements of the Best Management Practices for Stream Crossings (Appendix C).</li><li>3. Notify BC OGC regarding temporary occupation of Crown Land and license of occupation for construction and pipeline ROW and use of forest service roads.</li></ol>
<i>Tenure Holders</i>	<ol style="list-style-type: none"><li>4. Notify tenure holders of pipeline routing and construction schedules.</li></ol>
<i>Trappers, Guides, and Outfitters</i>	<ol style="list-style-type: none"><li>5. Notify registered trappers as well as identified guides and outfitters of pipeline routing and construction schedules.</li></ol>
<i>Aboriginal Groups</i>	<ol style="list-style-type: none"><li>6. Notify representatives of Aboriginal communities involved in the Westcoast Consultation Program of the proposed construction schedule.</li></ol>
<i>Water Users</i>	<ol style="list-style-type: none"><li>7. Notify appropriate authorities and licensees if required by terms and conditions of approvals, prior to commencement of watercourse crossing construction and prior to withdrawing water for hydrostatic testing.</li></ol>
<i>Resource Companies</i>	<ol style="list-style-type: none"><li>8. Notify applicable companies for road and pipeline crossings, if required by crossing and road use agreements.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pre-Construction Activities  
October 21, 2016

### 5.3 SURVEYING AND WORK AREA PREPARATION

Westcoast aims to limit disturbance to the approved workspace, and to limit disturbance of vegetation and sensitive features to the greatest extent practical. The following measures will be implemented for surveying of and access to the work area.

**Table 5-3 Environmental Protection Measures for Surveying and Access**

Activity/Concern	Measures
<i>Work Area</i>	<ol style="list-style-type: none"><li>1. Stake and/or flag the boundaries of the ROW, facility sites, TWS, work sites, staging areas, and temporary access roads to clearly delineate approved work areas.</li><li>2. The contractor will conduct a constructability review of the provided ROW and workspace. If additional workspace is required during construction, Westcoast will obtain permission from the province or landowner prior to creating additional workspace in the field.</li><li>3. Extra work areas (such as staging areas and additional spoil storage) will be avoided in wetlands where practical. Any additional working area, if required, will be located if possible a minimum of 20 m away from a wetland, including stream high water mark (HWM) boundaries.</li></ol>
<i>Pipe Transport and Handling</i>	<ol style="list-style-type: none"><li>4. Confirm that grading, locations for turn out and turn around, and parking can accommodate uninterrupted access to and along the work area by equipment and personnel.</li></ol>
<i>Sensitive Areas</i>	<ol style="list-style-type: none"><li>5. Clearly stake and/or flag sensitive areas specified by the Environmental Alignment Sheets, including identified wetlands and red-listed ecosystems, or heritage sites.</li><li>6. Communicate procedures for entering and working in sensitive areas.</li><li>7. Riparian management areas (RMA) will be flagged prior to the commencement of clearing activities or construction activity near the watercourse. See Table 7-8 for riparian setback areas. Where possible, extra work area required at watercourse crossings will be situated beyond a minimum Riparian Reserve Zone as identified in Table 7-8</li><li>8. Flag sensitive features near watercourses such as riparian areas, root wads, and log overhang.</li><li>9. Limit clearing dimensions and reduce disturbance to vegetation, where practical, and where wetlands and ecosystems at risk are located adjacent to the PDA.</li><li>10. TWSs will be reduced and located outside of wetlands, ecosystems at risk and designated Old Growth Management Areas where practical.</li></ol>
<i>Survey Slash Lines</i>	<ol style="list-style-type: none"><li>11. Avoid unnecessary removal of trees when preparing survey line-of-sight slash lines in sensitive areas (e.g., riparian areas).</li><li>12. All timber will be felled onto the ROW during survey line clearing where practical.</li></ol>
<i>Wildlife and Wildlife Habitat Discovery</i>	<ol style="list-style-type: none"><li>13. Previously unidentified environmentally sensitive areas (e.g., nests, mineral licks, beaver dams, ponds or lodges, muskrat pushups, bear dens) will be reported to the EI and mitigated in consultation with the appropriate resource specialists and regulator(s). Any such area will be flagged and/or fenced in the field prior to commencement of clearing and construction. Refer to Species of Concern Discovery in the Wildlife Management Plan (Section 6.1.1).</li></ol>



## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

### 6.0 GENERAL PROJECT AND RESOURCE-SPECIFIC MITIGATION MEASURES

The measures in this section apply to all Project construction activities at all job sites.

**Table 6-1 Environmental Protection Measures for All Project Activities**

Activity/Concern	Mitigation Measures
<i>Access and Traffic</i>	<ol style="list-style-type: none"><li>1. Refer to Access Plan (Appendix H).</li><li>2. Existing provincial, municipal, and private roads and highways will be utilized to access the Project work area, and may require upgrading and maintenance.</li><li>3. Abide by all provincial and municipal traffic regulations.</li><li>4. Install and maintain construction site signage.</li><li>5. Speed limits will be posted for on and off ROW travel. Contractor will reduce speed on secondary and private roads. See Wildlife Encounters section 6.1.3 for further details</li><li>6. Abide by all conditions for access and use of forestry roads.</li><li>7. Unauthorized entry will be discouraged using signs and gates at appropriate locations.</li><li>8. Recreational use of all-terrain vehicles along ROW and other construction areas will be prohibited.</li></ol>
<i>Work Area</i>	<ol style="list-style-type: none"><li>9. TWS will be obtained adjacent to the proposed ROW to support access and construction of pipeline and facilities.</li><li>10. All activity will be confined to the approved work area, including designated access, to limit disturbance.</li><li>11. Limit clearing to areas specified by approved construction plans and within flagged boundaries with the exception of dangerous trees (WorkSafeBC requirement)</li></ol>
<i>Waste Handling and Disposal</i>	<ol style="list-style-type: none"><li>12. Personnel will be expected to perform continuous clean-up of personal refuse.</li><li>13. Food waste will not be stored on-site as it will be taken into the main office yard for disposal each night. It will be stored in a bear proof container until taken to an appropriate facility.</li><li>14. Construction waste will be kept on-site and will be removed as required to an appropriate facility.</li></ol>
<i>Personal Hygiene</i>	<ol style="list-style-type: none"><li>15. Portable bathroom facilities will be located on-site and maintained during all construction-related activities.</li></ol>
<i>Equipment Fueling and Servicing</i>	<ol style="list-style-type: none"><li>16. Fuel will be stored and handled in accordance with the Fuel Storage and Handling Plan (Section 7.8)</li><li>17. Equipment maintenance will be performed at approved locations using tarps and drain trays to contain fluid release.</li><li>18. Where stationary equipment cannot be relocated 20 m from a watercourse or wetland, they will be situated in a designated area that has been bermed and lined with an impermeable barrier or other approved methods of containment.</li><li>19. In the event of a spill, refer to Spill Prevention and Response Plan (Section 7.7).</li><li>20. Used oil, filters and grease cartridges and other products of equipment maintenance will be collected and disposed of at an approved waste site. Proper containment and documentation will be required for the transportation of such material.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-1 Environmental Protection Measures for All Project Activities**

Activity/Concern	Mitigation Measures
Weeds	<p>21. Equipment must arrive to the Project site in a clean condition free of remnant soil and vegetation to reduce the risk of noxious weed and invasive plant introduction. Equipment which arrives in a dirty condition, as determined by the EI or other Westcoast construction inspection personnel will not be allowed on the ROW or facility site until it is cleaned. Before moving equipment from areas found to have weed infestations, inspect equipment, and manually remove attached plants, remove mud and debris with shovel and sweep. High pressure water, steam, or compressed air may be used to wash equipment if practical.</p> <p>22. Where practical, avoid driving equipment through noxious weed or invasive plant infested areas.</p> <p>23. As required, truck cleaning stations will be constructed locations approved by the EI, on stripped level ground with containment of fluid. The size of individual stations is to be adequate to accommodate the maximum size of equipment expected.</p>
Contaminated Soils	<p>24. Contaminated soils will be cleaned up in consultation with the EI and the appropriate government agencies as required. Refer to the Contaminated Soils Contingency Plan (Appendix F.4).</p>
Hazardous Materials	<p>25. Labelling of hazardous materials must comply with Workplace Hazardous Materials Information System (WHMIS). Deleterious materials will not be used within 20 m of a waterbody or wetland where practical.</p> <p>26. Bulk storage of hazardous material must be confined to an approved designated storage area, which must be inspected regularly. Where practical, storage areas must not be located within 200 m of a waterbody or wetland; if not feasible then additional secured containment will be implemented. Containment ponds and sumps will be designed as appropriate for each storage facility.</p>
Erosion and Sediment Control – Watercourses and Wetlands	<p>27. At the most upland boundary between wetlands or riparian areas and construction areas, install, monitor, and maintain appropriate erosion and sediment control measures such as silt fencing, temporary diversion berms, and clear crush check dams as applicable and directed by Westcoast.</p>
Erosion and Sediment Control - Sediment Barriers and Energy Dissipators	<p>28. Sediment barriers will be inspected as needed to verify proper functioning and maintenance. Barriers will be inspected and maintained on a scheduled basis throughout construction and as soon as practical following storm events.</p> <p>29. Temporary interceptor dikes will be installed in locations deemed appropriate. Interceptor dikes may be constructed of materials such as compacted soil, silt fence, or sand bags.</p> <p>30. Where practical the outfall from interceptor dikes will be directed to a vegetated area at least 30 m from the nearest waterbody. Alternatively, an energy-dissipating device (silt fence, erosion control fabric) will be constructed at the end of the interceptor dike. Interceptor dikes will be positioned to prevent sediment discharge into waterbodies or other sensitive areas.</p> <p>31. Temporary interceptor dikes will be inspected regularly in areas of active construction to verify proper functioning and maintenance. In other areas, the interceptor dikes will be inspected and maintained on a scheduled basis throughout construction.</p> <p>32. Surface diversion berms and cross ditches (Appendix E; Drawing 4) will be installed in areas deemed necessary.</p>



## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-1 Environmental Protection Measures for All Project Activities**

Activity/Concern	Mitigation Measures
<i>Erosion and Sediment Control -Wind</i>	<p>33. Where high winds have the potential to erode topsoil piles or remove topsoil from the working side of the ROW, measures such as the application of water, mulch, or tackifiers, will be used to stabilize the topsoil.</p> <p>34. Construction activities may be temporarily halted during excessively high wind conditions.</p>
<i>Air Emissions</i>	<p>35. Strategies will be utilized to reduce air emissions from equipment and vehicles, such as meeting the minimum load requirements, adjusting speeds and loads, and servicing and updating equipment to reduce fuel consumption where practical.</p> <p>36. Where practical, equipment will be turned off when not in use.</p>
<i>Noise</i>	<p>37. If the construction activities are located less than the minimum buffer distance to residences, nearby residents will be advised of construction activities, and need for additional mitigation will be determined</p> <p>38. Construction activities will be scheduled during normal working hours where practical</p> <p>39. Machinery and construction equipment will be well maintained and noise-abatement equipment in good working order.</p> <p>40. All construction equipment with gas or diesel engines will be fitted with a muffler system (e.g., hydraulic or electric controlled units where practical). Equipment enclosure doors will be kept closed as much as practical.</p> <p>41. Construction traffic to and from the site will be restricted to approved access routes or will consider alternative routes to reduce travelling near residences.</p> <p>42. Where applicable, temporary buildings or material stockpiles will be used as noise barriers. Existing on-site buildings will be used for acoustical screening where practical.</p>
<i>Wet Soil</i>	<p>43. Construction activities may be temporarily halted during excessively wet soil conditions. To reduce soil structure damage through rutting or compaction due to wet soil conditions on agricultural land, Westcoast will determine the need to temporarily halt construction using the following indicators as a guide:</p> <ol style="list-style-type: none"> <li>Rutting of topsoil to the extent that mixing of soil horizons may occur</li> <li>Excessive wheel slip</li> <li>Excessive build-up of mud on tires and cleats</li> <li>Formation of puddles; or</li> <li>Excessive tracking of mud on to roads as vehicles leave the ROW</li> </ol> <p>44. Corduroy, wooden mats or equivalent will be installed in areas of permanently wet top soils to reduce terrain disturbance and top soil structure damage where practical. Further details see section 6.7 of Spectra's EMCPC.</p> <p>45. Harvested timber will be used for corduroy where necessary, with a preference for non-merchantable timber when practical. Measures to maintain adequate cross drainage will be implemented where required.</p>

The following resource-specific mitigation measures will be applied during all Project activities.

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

### 6.1 WILDLIFE MANAGEMENT PLAN

Further details on these mitigation measures are found in section 6.8 Spectra's EMPCP.

**Table 6-2 Mitigation Measures for Wildlife Resources**

Concern	Mitigation Measures
Mortality Risk	<ol style="list-style-type: none"><li>1. Clearing activities should be conducted outside of the breeding bird window (April 25 to August 8) when practical (Environment Canada 2014).</li><li>2. For clearing required during the breeding bird window, an Active Migratory Bird Nest Program will be completed prior to clearing (Appendix G). Active nests, especially raptor nests, identified prior to clearing will be flagged and/or fenced off in the field and a buffer will be maintained until cleared by a professional biologist, or the nest is no longer active. Buffer distances are based on direction from provincial and federal best management practices.</li><li>3. Refer to 6.1.5 Western Toad Management (Section 6.1.5).</li><li>4. Temporary fencing will be erected around hazards such as sump pit excavations when conditions warrant.</li><li>5. Construction will be avoided, where practical, during the critical period identified for trumpeter swan (April 1 to August 31, BC MFLNRO 2014) within 200 m from the high water mark of active trumpeter swan breeding sites (BC OGC 2016). If not feasible, the duration of work in within the buffer will be reduced to the greatest extent possible.</li><li>6. Clearing of trees identified as potentially supporting a fisher den will be avoided during the critical period identified for fisher natal denning and early rearing (March 15 to June 30; BC MFLNRO 2014). If clearing of identified potential fisher den trees cannot be avoided during the critical period, a qualified biologist will assess the potential fisher dens prior to clearing, early in the denning season to determine if the dens identified within the PDA are active and whether they are confirmed as used by fisher. If the dens are determined to be fisher dens and they are active (i.e., in use), a setback will be established in consultation with the appropriate regulatory agency (MFLNRO) where clearing will be avoided until the young and adults have left the den site.</li></ol>
Encounters	<ol style="list-style-type: none"><li>7. Feeding or harassment of wildlife will be prohibited.</li><li>8. Project-related wildlife deaths and nuisance animals will be immediately reported to appropriate authorities. Refer to Wildlife Encounters (6.1.3) and Westcoast Environmental Specialist.</li><li>9. A buffer will be implemented (flagged or fenced) around environmentally sensitive features discovered during breeding bird and amphibian surveys (i.e., nests, breeding ponds) as noted on Environmental Alignment Sheets (Appendix A) before clearing and construction.</li></ol>
Movement	<ol style="list-style-type: none"><li>10. Major game trails will be cleared of timber and slash from clearing activities that may block game trails</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-2 Mitigation Measures for Wildlife Resources**

Concern	Mitigation Measures
<i>Habitat</i>	<ol style="list-style-type: none"><li>11. Any previously unidentified sensitive habitat feature will be reported to EL and Westcoast Environmental Specialist, and mitigation will be planned. Refer to Species of Concern Discovery (Section 6.1.1).</li><li>12. To avoid effects to mineral licks, maintain 100 m buffer (BC OGC 2016), where practical, from April to October (BC MFLNRO 2014). If it is not possible to maintain 100 m buffer during this period, additional mitigation measures may be required, such as maintaining trees to provide a buffer, or snow fencing erected between ROW and mineral lick to prevent encroachment by construction crews.</li><li>13. Avoid routing and disturbance within 250 m of a caribou mineral lick and wildlife trails connecting to mineral licks (BC MFLNRO 2014).</li><li>14. Avoid routing and disturbance, including aerial activities, within 500 m of designated caribou habitat areas (e.g., HEWR).</li></ol>
<i>Western Toad</i>	<ol style="list-style-type: none"><li>15. Where practical, construction will be avoided in wetlands containing western toad egg masses and tadpoles during the breeding period for western toad (mid-April to mid-September).</li><li>16. If construction cannot be avoided during the breeding period for western toad, an amphibian survey and salvage will be conducted prior to construction within previously identified breeding wetlands to relocate western toad individuals, eggs, or tadpoles. Locations will be determined within the Amphibian Salvage Permit. Westcoast will contact the appropriate regulator, acquire the necessary permits, and use best practices for salvage and relocation.</li><li>17. During the pre-construction survey if breeding habitat is identified within 30 m of the Project footprint, Project activities are likely to affect western toad juvenile dispersal. Silt fencing will be used to prevent dispersing juvenile toads from moving into Project clearing or construction areas from nearby wetlands.</li><li>18. Wetlands will be swept prior to ground disturbance and monitored to determine presence of western toad in the potential breeding habitat.</li></ol>

### 6.1.1 Species of Concern Discovery

#### 6.1.1.1 Discovery of Wildlife Species of Concern during Project Construction

In the event that previously identified wildlife species of concern (Appendix B of the ESA) are discovered during Project construction, the following measures will be implemented as required.

1. Work will be suspended immediately in the vicinity of newly discovered wildlife species of concern. Work at that location will not resume until the measures below are undertaken.
2. The EI will be notified, and will notify the CI and Westcoast Environmental Specialist.
3. The EI will assess the discovery and either allow construction to be resumed or, in the event of a confirmed or potential discovery, proceed by notifying:
  - a. Applicable government agencies (e.g., MFLNRO, NEB, BC Conservation Data Centre [BC CDC], Environment Canada [EC]) as required (for contact information, see Appendix D)
  - b. Westcoast's wildlife consultant
4. Westcoast's wildlife consultant may deem it necessary to visit the site and will, regardless of whether a site visit is warranted, develop an appropriate mitigation plan in consultation with Westcoast's Environmental Specialists, and regulatory authorities as required.

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

### 6.1.2 Beaver Dams

If a beaver dam is found, the EI will be contacted to request permission to remove the beaver dam where required. Where dam removal is required, Westcoast will engage the registered trapper(s), submit a General Wildlife Permit for Beaver Dam Removal in the case the trapper does not hold a permit, file a Section 9 notification to the BC OGC and follow the requirements of the Standards and Best Practices for Instream Works (MWLAP 2004).

### 6.1.3 Wildlife Encounters

Wildlife surveys completed in 2015 and 2016 observed signs of deer and moose usage of the forested habitat patches. White-tailed deer were observed at several locations throughout the assessment area. Observations of tree markings, dens, and an apparent abundance of food sources indicate that black bears may also be present in the area.

In the event of an encounter or vehicle collision with wildlife during Project construction, either at the construction site or on the commute to/from the site, the following measures will be implemented:

1. Project personnel will not approach, harass, or feed wildlife.
2. The EI will be notified, and will notify the CI and Westcoast Environmental Specialist.
3. Any incidents (e.g., aggressive behaviour, nuisance behaviour) with wildlife will be reported to the EI who will immediately notify the applicable regulatory agency, Westcoast Environmental Specialist and, if warranted, the local police detachment (for contact information see Appendix D).
4. Any trapped, injured, or dead animals on the site will be reported to the EI. The EI will contact the applicable provincial agency to consult on appropriate action.
5. Location and details of collisions with wildlife will be reported to the EI. The EI will notify the applicable provincial authorities and, if warranted, the local police detachment (for contact information see Appendix D).
6. Once the preceding contacts have been made, the EI will also contact Westcoast's Environmental Specialist and health and safety specialist.

### 6.1.4 Caribou Habitat Restoration Plan

The purpose of the preliminary Caribou Habitat Restoration Plan (CHRP) is to describe how the Project will achieve the following objectives:

- Avoid displacement and sensory disturbance to caribou in the Burnt Pine and Moberly/Klinse-Za herd ranges
- No net loss of caribou habitat in the Burnt Pine and Moberly/Klinse-Za herd ranges
- Avoid increased predation of caribou in the Burnt Pine and Moberly/Klinse-Za herd ranges

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

The CHRP includes the following components:

- Project interaction with caribou
- Regulatory and policy framework
- Current caribou recovery efforts
- Consultation with regulatory agencies and Aboriginal Communities
- Mitigation measures
- Monitoring and the adaptive management framework
- Reporting

The temporal scope of the CHRP is from the planning (pre-construction) phase of the Project through to five years' post-construction (operation phase). The spatial scope of the CHRP is the portion of the Project footprint that intersects the Burnt Pine and Moberly/Klinse-Za herd ranges. The preliminary CHRP for the Project can be found in Appendix I.

### 6.1.5 Western Toad Management

If Project construction in areas of potential western toad habitat cannot be completed during the period of least risk, and if previously unidentified amphibian species of concern are discovered during pre-construction, amphibian surveys will be conducted within the wetlands to identify the presence of western toad individuals, eggs or tadpoles. The EI will conduct regular toad sweeps prior to start of construction activities. Capture and relocation (if applicable) will be conducted under the supervision of a qualified biologist and based on the requirements of a Wildlife Salvage Permit.

The wetlands will be swept prior to ground disturbance and monitored on a scheduled basis when construction activities are not occurring for the duration of construction to determine presence of western toad in the potential breeding habitat.

#### 6.1.5.1 Discovery of Western Toad

Capture/relocation (if applicable) will be conducted under the supervision of a qualified professional biologist and under a provincial *Wildlife Act* permit. If a western toad is found, it will be relocated to an area at least 300 m outside the ROW within the same or similar habitat type. Capture and handling of toads will be in accordance with the 1998 Standards for Live Animal Capture and Handling Guidelines established by the Ministry of Environment (MOE). In areas where high densities of toads have been captured, silt fencing will be placed either side of the workspace along the edges of the PDA to temporarily prevent toads from migrating back.

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

### 6.2 VEGETATION MANAGEMENT PLAN

Project personnel will reduce disturbance of vegetation within, and adjacent to, the Project development area (PDA), to the greatest extent practical. All Project-related work in areas of the PDA that are not classified as an ecosystem or species of interest (red- or blue-listed ecosystem or plant species, wetland, old forest, noxious weed infestation) will follow the environmental protocols and mitigation measures described in Section 6.4 of the Spectra EMCPC, as well as the general mitigation measures listed in Table 6-1 of this EPP. For those areas of the PDA that have been identified as an ecosystem or species of interest the measures in Table 6-3 will be implemented prior to and during construction.

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-3 Mitigation Measures for Vegetation Resources**

Category	KP	Location (UTM)	Area (ha)	Mitigation Measures
<b>General mitigation measures for vegetation and wetlands</b>				
General	-	-	-	<ol style="list-style-type: none"> <li>1. Follow environmental management practices as described in the Spectra EMCPC (Spectra 2014) Section 6.4 Vegetation for forest resources, revegetation, and restoration.</li> <li>2. Exclusion fencing, staking and/or flagging will be installed around rare plant populations that occur adjacent to, and within 10 m of, the PDA.</li> <li>3. The EI, or designate experienced in ecosystem classification and delineation, will stake or flag the boundaries of identified wetlands and red-listed ecosystems within the PDA and within 10 m of the PDA boundary, prior to the start of construction. See alignment sheets for the location and general extent of listed ecosystems.</li> <li>4. Clearing or grubbing will not be allowed beyond the staked or flagged construction ROW boundaries.</li> <li>5. Where practical, snow bridges will be used over rare plant populations and ecosystems of interest when conditions allow.</li> <li>6. Clearing will only be conducted to the extent necessary; leave the shrub and/or herb layer when practical and where safe to do so.</li> </ol>

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-3 Mitigation Measures for Vegetation Resources**

Category	KP	Location (UTM)	Area (ha)	Mitigation Measures	
Forest ecosystems at risk (red-listed and blue-listed communities)					
White spruce – Currant – Horsetail (111) (blue-list)	9.81	559077E 6165230N	0.1	<div>1. Disturbance to vegetation and soil within the identified listed ecosystems will be limited where practical.</div> <div>2. The use of blade width clearing will be used where practical.</div> <div>3. Where listed ecosystems are associated with riparian habitats mitigation measures will be followed as described in the Spectra EMCPC (Spectra 2014) and Sections 6.6 Fish and Fish Habitat</div> <div>4. Felling of trees into listed ecosystems will be avoided.</div> <div>5. The root network will be retained within salvaged soil when practical to encourage recruitment of native species at reclamation.</div> <div>6. Directing water into dry habitats via diversion channels or temporary drainage will be avoided where practical.</div> <div>7. Creating extra work space or laydown areas will be avoided in listed ecosystems where practical.</div>	
	13.39	561013E 6162519N	0.2		
	13.59	561204E 6162460N	<0.1		
	13.68	561294E 6162446N	<0.1		
Balsam poplar – White spruce – Mountain alder – Dogwood (112) * (blue-listed mature forest structure)	17.59	565019E 6162941N	0.2		
NOTES:					
* Mitigation measures related to riparian areas also apply to the Balsam poplar – Mountain alder – Dogwood (112/CD) ecosystem unit. In particular mitigation measures #19, 20, 24, 25, 28, 29, 31, and 32.					



## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-3 Mitigation Measures for Vegetation Resources**

Category	KP	Location (UTM)	Area (ha)	Mitigation Measures
<b>Wetlands and listed riparian ecosystems</b>				
Sandbar willow (FI06) (red-listed riparian)	14.12	561710E 6162310N	<0.1	<ol style="list-style-type: none"> <li>Follow the mitigation measures for wetlands in the Spectra EMCPC (Spectra 2014) Section 6.7.</li> <li>ROW matting or corduroy will be used (swamp matting/rig mats) when working during non-frozen conditions where practical and required.</li> <li>Existing lines or trails will be used whenever practical to limit disturbance in or near wetlands.</li> <li>Interrupting natural drainage patterns will be avoided where practical. For construction activities adjacent to or crossing, any watercourse, waterbody, or wetland, an appropriate buffer zone will be established where practical in consultation with the EI.</li> </ol>
Swamp horsetail – Beaked sedge (Wm02) (blue-listed wetland)	13.42	561048E 6162516N	<0.1	
	13.52	561138E 6162484N	<0.1	
	13.66	561269E 6162445N	0.1	<ol style="list-style-type: none"> <li>Where erosion or sedimentation of wetlands or waterbodies is possible, erosion control structures will be installed prior to construction.</li> <li>Construction traffic will be limited in wetlands to only that required for construction. Upland access roads around wetlands will be used wherever available.</li> <li>Notify the EI a minimum of one day before clearing of the vegetated buffer and again before crossing a wetland.</li> <li>Where practical, clearing will be postponed for wetland approach slopes and banks until immediately prior to crossing construction, except, if necessary, to install vehicle crossing structures.</li> <li>Vegetation removal will be limited to only that necessary adjacent to waterbodies and wetlands.</li> <li>Tree clearing will be reduced to the greatest extent possible in wetlands.</li> <li>Where practical, grubbing will be limited to only the trench line and those areas on either side of the trench that are required for safe work.</li> <li>Shrubs, stumps, and root systems will be left in place when practical. The root network will be retained within salvaged soil when practical to encourage recruitment of native species at reclamation.</li> <li>Salvaged soil will not be stored in riparian or wetland habitats where practical.</li> <li>Permanent wetlands will not be fully dewatered unless the proper regulatory body is notified and required permitting is in place.</li> <li>Limit grading in and around riparian areas and wetlands where practical during construction.</li> </ol>
Bebb's willow – Bluejoint (Ws03) (blue-listed wetland)	12.57	559776E 6162876N	<0.1	
	12.77	560055E 6162794N	<0.1	
	13.29	560914E 6162545N	0.1	
	13.42	561048E 6162516N	<0.1	
	13.55	561170E 6162474N	0.1	
	19.91	567226E 6163059N	0.2	
	20.69	567966E 6163272N	<0.1	
	21.59	568670E 6163485N	0.1	
	21.63	568699E 6163501N	0.1	

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-3 Mitigation Measures for Vegetation Resources**

Category	KP	Location (UTM)	Area (ha)	Mitigation Measures
<b>Wetlands and listed riparian ecosystems</b>				
Beaked sedge – Water sedge (Wm01)	12.75	559776E 6162876N	<0.1	16. If mulch or erosion control structures are required in or around riparian areas or wetlands certified weed seed free straw or coconut husk will be used. Hay will not be used. 17. Wetlands will be allowed to naturally revegetate.
	12.77	560055E 6162794N	<0.1	
	13.29	560914E 6162545N	0.1	
	13.42	561048E 6162516N	<0.1	
	13.55	561170E 6162474N	<0.1	
Uncorrelated swamp wetland (Ws00)	13.72	561334E 6162425N	0.3	
	20.19	567492E 6163120N	<0.1	
Uncorrelated marsh wetland (Wm00)	14.46	562043E 6162221N	0.1	
	19.91	567226E 6163059N	0.2	
	20.69	567966E 6163272N	<0.1	
shallow open water wetland (Ww00)	13.52	561138E 6162484N	<0.1	
	13.66	561269E 6162445N	<0.1	

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-3 Mitigation Measures for Vegetation Resources**

Category	KP	Location (UTM)	Area (ha)	Mitigation Measures
Old Forest				
Upper Moberly 12 Old Growth Management Area (OGMA)	3.68	553399E 6167402N	0.2	1. The EI or designate experienced in ecosystem classification and delineation will flag or stake the boundary of old forests and the boundaries of old growth management areas prior to the start of construction. 2. Clearing will be limited and the shrub and herb layer will be retained to the extent practical while still maintaining a safe work environment. 3. Limit grading where practical when working within old forest ecosystems. 4. Avoid felling of trees into old forest ecosystems where practical.
	4.15	554051E 6167297N	<0.1	
Upper Moberly 19 OGMA	20.9	568093E 6163554N	<0.1	
Noxious weeds and invasive plant species				
Canada thistle ( <i>Cirsium arvense</i> )	0.56	550524E 6167677N	1. Follow environmental management practices as described in section 6.1, 6.4.2 and 7.1 in the Spectra EMCPC (Spectra 2014) for noxious weeds and invasive plant species. 2. An EI or designate experienced in noxious weed and invasive plant identification will flag or stake known locations of noxious weed and invasive plant species within the PDA and manage infestations prior to construction disturbance. 3. All heavy machinery and equipment will be clean (free of dirt, plant parts and seeds) prior to entering the work site. 4. All machinery, workers and equipment will be cleaned prior to leaving a noxious weed or invasive plant infested area to prevent spread. 5. Only regionally approved seed mixes will be used, unless specific mix is requested by landowner(s). 6. Imported fill (if required) will come from verified weed free sources. 7. Areas close to existing weed infested areas will be seeded and monitored for treatment, as needed. 8. Noxious weeds requiring manual removal will be bagged, transported to a central waste collection center, and incinerated. 9. Integrated management approaches will be used to determine the best fit for treatment type at the specific location (i.e., manual removal, where needed) 10. Regular pipeline patrols will monitor for weed infestations during operations and during the first three growing seasons after final clean-up.	
	2.17	552097E 6167430N		
	2.45	552377E 6167454N		
	2.45	552381E 6167446N		
	13.40	561024E 6162508N		
	13.40	561028E 6162517N		
	14.13	561718E 6162307N		
	14.42	562010E 6162239N		
	18.48	565847E 6163275N		
	19.26	566643E 6163377N		
	19.31	566638E 6163104N		
	19.43	566748E 6163046N		
	19.66	566975E 6163055N		
	19.86	567170E 6163047N		
	19.90	567218E 6163054N		
23.60	570564E 6163817N			

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-3 Mitigation Measures for Vegetation Resources**

Category	KP	Location (UTM)	Area (ha)	Mitigation Measures
meadow buttercup ( <i>Ranunculus acris</i> )	8.97	558264E 6165350N		
	9.79	559049E 6165215N		
oxeye daisy ( <i>Leucanthemum vulgare</i> )	12.56	560511E 6163105E		
Perennial sow-thistle ( <i>Sonchus arvensis</i> )	8.38	557697E 6165451N		
	12.64	560538E 6163015N		
	13.13	560779E 6162616N		
	17.16	564635E 6162758N		
	19.66	566975E 6163055N		
	20.15	567456E 6163101N		
	21.64	568716E 6163495N		
	23.60	570564E 6163817N		
quackgrass ( <i>Elymus repens</i> )	12.56	560511E 6163105N		
	18.48	565847E 6163275N		
	19.26	566643E 6163377N		
	27.60	573810E 6164267N		
Wild oat ( <i>Avena fatua</i> )	12.56	560511E 6163105N		
	18.48	565847E 6163275N		
	19.26	566643E 6163377N		
	27.60	573810E 6164267N		

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

### 6.2.1 Discovery of Plant Species and Ecosystems at Risk

In the event that plant species or ecosystems at risk are discovered in addition to any communities already identified in 2015 and 2016 field surveys, an assessment will be undertaken by a qualified professional, which will include the following:

- Position of the plant or community on the ROW
- Relative rarity of the plant or community (e.g., regionally, nationally)
- Local abundance of the plant or community
- Growth habit and propagation strategy of the plant or community
- Habitat preferences of the plant or community

Following this assessment, Westcoast's vegetation consultant will develop appropriate mitigation measures, in consultation with Westcoast's Environmental Specialist, and regulatory authorities, as required.

## 6.3 HERITAGE AND TRADITIONAL LAND USE MITIGATION MEASURES

No previously recorded archaeological sites are located within the PDA. There are five previously recorded archaeological sites within 2000 m of the Project footprint however the closest was 1,443 m to the south.

Table 6-4 identifies the unrecorded sites found during field studies in 2015. Further details can be found in Appendix C of the ESA.

**Table 6-4 Mitigation Measures for Heritage Resources**

Borden Number	UTM		Site Type	Mitigation Measure
	Eastings	Northing		
GjRm-3	557471	6165505	subsurface lithics	Site is located within current development plans and cannot be avoided. A Section 12 Site Alteration Permit is recommended.
GjRm-1	557799	6165448	subsurface lithics	Site is located ~1 m north of the Project and will not be impacted by construction activities. Temporary construction fencing is recommended owing to proximity to Project.
GjRn-6	551403	6167524	subsurface lithics	Site is located ~4 m north of the Project and will not be impacted by construction activities. Temporary construction fencing is recommended owing to proximity to Project.
GjRn-5	550717	6167587	subsurface lithics	Site is located ~6 m south of the Project and will not be impacted by construction activities. Temporary construction fencing is recommended owing to proximity to Project.
GjRn-4	550217	6167525	subsurface lithics	Site is located ~12 m southeast of the Project and will not be impacted by construction activities

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-4 Mitigation Measures for Heritage Resources**

Borden Number	UTM		Site Type	Mitigation Measure
	Easting	Northing		
GjRm-2	558377	6165433	subsurface lithics	Site is located ~26 m northeast of the Project and will not be impacted by construction activities
GjRm-4	557581	6165500	subsurface lithics	Site is located ~27 m north of the Project and will not be impacted by construction activities
GjRI-6	568111	6163275	subsurface lithics	Site is located ~32 m northeast of the Project and will not be impacted by construction activities
GjRm-5	557275	6165728	subsurface lithics	Site is located ~32 m northeast of the Project and will not be impacted by construction activities
GjRI-5	568175	6163294	subsurface lithics	Site is located ~83 m east of the Project and will not be impacted by construction activities

The following table (Table 6-5) identifies Traditional Use (TU) and Environmental Resources (ER) locations along the proposed Project ROW identified by First Nations while conducting archaeological surveys with Landsong Heritage Consulting Ltd. on behalf of Westcoast that have recommend mitigations. Additional environmental resource locations were identified during the study and included in the overall baseline study however they have not been listed as there were no identified mitigations required. The mitigation measures identified below were discussed with First Nations and Westcoast. If a heritage resource is encountered during construction that isn't identified below, Westcoast will follow the Heritage Resource Contingency Plan (Appendix F.6). These sites can be identified on the environmental alignment sheets located in Appendix A.

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-5 Environmental Protection Measures for Traditional Use Sites**

TU/ER Identifier	KP	Site Type	Easting	Northing	Mitigation Measures	Buffer Distance (if applicable)
<b>Ecological Resource Sites</b>						
ER3	0-1	game trail (moderate use)	550676	6167594	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.	N/A
ER11	1-2	squirrel midden (cache)	551447	6167531	Avoidance of active middens through Project redesign, where practical. Provide the locations to a registered trapline owner or to a local First Nations.	N/A
ER12	2-3	game trail (moderate use)	552626	6167445	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.	N/A
ER16	2-3	game trail (moderate use)	552849	6167446	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.	N/A
ER47	12-13	game trail (moderate use)	560635	6163322	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.	N/A
ER49	13-14	game trail (moderate use)	561029	6162530	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.	N/A
ER63	21-22	wildlife tree	568647	6163514	Recorded for baseline inventory No mitigation requirements	N/A

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-5 Environmental Protection Measures for Traditional Use Sites**

<b>TU/ER Identifier</b>	<b>KP</b>	<b>Site Type</b>	<b>Easting</b>	<b>Northing</b>	<b>Mitigation Measures</b>	<b>Buffer Distance (if applicable)</b>
ER68	21-22	squirrel midden (cache)	568766	6163441	Avoidance of active middens through Project redesign. Destruction of active middens, if mid-summer. Provide the locations to a registered trapline owner or to a local First Nations.	N/A
ER69	21-22	squirrel midden (cache)	568766	6163462	Avoidance of active middens through Project redesign. Destruction of active middens, if mid-summer. Provide the locations to a registered trapline owner or to a local First Nations.	N/A
ER74	23-24	game trail (moderate use)	570573	6163828	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.	N/A
ER87	24-25	game trail (moderate use)	571211	6164260	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. <ul style="list-style-type: none"> <li>Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.</li> </ul>	N/A
ER93	24-25	game trail (heavy use)	571277	6164603	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. <ul style="list-style-type: none"> <li>Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.</li> </ul>	N/A
ER102	24-25	game trail (moderate use)	571140	6164801	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. <ul style="list-style-type: none"> <li>Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.</li> </ul>	N/A



## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-5 Environmental Protection Measures for Traditional Use Sites**

TU/ER Identifier	KP	Site Type	Easting	Northing	Mitigation Measures	Buffer Distance (if applicable)
ER103	25-26	game trail (moderate use)	571614	6164548	Clear trail of strippings, spoil, snow, rollback windrows and felled trees. Separate and rest down the pipe during stringing. <ul style="list-style-type: none"> <li>Undertake an efficient construction schedule to reduce the times in which welded pipe is strung and trenches are open.</li> </ul>	N/A
<b>Traditional Use Sites</b>						
TU1	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Recorded for baseline inventory</li> <li>No mitigation requirements</li> </ul>	N/A
TU2	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Pre-construction collection</li> </ul>	N/A
TU3	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Contact registered Trapline owner</li> </ul>	N/A
TU4	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Pre-construction collection</li> </ul>	N/A
TU5	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Pre-construction collection</li> </ul>	N/A
TU6	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Pre-construction collection</li> </ul>	N/A
TU7	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Pre-construction collection</li> </ul>	N/A
TU8	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Pre-construction collection</li> </ul>	N/A
TU9	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Pre-construction collection</li> </ul>	N/A
TU10	Confidential	Confidential	Confidential	Confidential	<ul style="list-style-type: none"> <li>Pre-construction collection</li> </ul>	N/A

## ENVIRONMENTAL PROTECTION PLAN

General Project and Resource-Specific Mitigation Measures  
October 21, 2016

**Table 6-5 Environmental Protection Measures for Traditional Use Sites**

<b>TU/ER Identifier</b>	<b>KP</b>	<b>Site Type</b>	<b>Easting</b>	<b>Northing</b>	<b>Mitigation Measures</b>	<b>Buffer Distance (if applicable)</b>
TU11	Confidential	Confidential	Confidential		<ul style="list-style-type: none"><li>• Pre-construction collection</li></ul>	N/A
TU12	Confidential	Confidential	Confidential		<ul style="list-style-type: none"><li>• Pre-construction collection</li></ul>	N/A
TU13	Confidential	Confidential	Confidential		<ul style="list-style-type: none"><li>• Recorded for baseline inventory</li><li>• No mitigation requirements</li></ul>	N/A
TU14	Confidential	Confidential	Confidential		<ul style="list-style-type: none"><li>• Pre-construction collection</li></ul>	N/A
TU15	Confidential	Confidential	Confidential		<ul style="list-style-type: none"><li>• Pre-construction collection</li></ul>	N/A

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.0 PIPELINE CONSTRUCTION

#### 7.1 CLEARING AND GRUBBING

Project personnel will limit disturbance to vegetation around watercourses where practical during clearing of the work area.

**Table 7-1 Environmental Protection Measures for Clearing and Grubbing**

Activity/Concern	Mitigation Measures
<i>Timing</i>	<ol style="list-style-type: none"><li>1. Refer to Section 4.3 for resource timing window constraints.</li><li>2. The environmental inspector will check that all timber harvesting permits are in place prior to initiating clearing.</li></ol>
<i>Disturbance</i>	<ol style="list-style-type: none"><li>3. Limit clearing to areas specified by the construction documents and within flagged boundaries.</li><li>4. Limit disturbance adjacent to wetlands and watercourses, to that which is required to safely permit vehicle access and pipe installation.</li><li>5. Avoid unnecessary removal of trees when using existing access or opening previously used access and consider trimming of existing vegetation and maintenance of an undisturbed root mat where required, particularly near watercourses.</li></ol>
<i>Felling</i>	<ol style="list-style-type: none"><li>6. All brush and trees will be felled toward the ROW, TWS or other construction areas to reduce disturbances to vegetation outside of the work area.</li><li>7. Trees will be felled away from wetlands, riparian areas, listed ecosystems, and old forest areas to reduce damage to stream banks, beds, and ecological communities.</li><li>8. Hazard trees will be removed in areas that have the potential to become a danger to worker safety along the edge of the PDA, and from major game trails.</li></ol>
<i>Timber Salvage</i>	<ol style="list-style-type: none"><li>9. Timber salvage operations will be undertaken in a manner that reduces butt shatter, breakage and avoids off-site disturbance.</li><li>10. Logs will not be skidded across any classified watercourses.</li></ol>
<i>Timber Deck Site/Preparation</i>	<ol style="list-style-type: none"><li>11. The appropriate regulatory authority will be consulted on the disposition of the salvaged biomass.</li></ol>
<i>Grubbing</i>	<ol style="list-style-type: none"><li>12. Grubbing will extend to all areas subject to grading.</li><li>13. Stumps and roots will be grubbed from the work side of the ROW and piled for disposal.</li><li>14. Grubbing width will be limited through wet areas during construction to reduce disturbance and facilitate the restoration of shrub communities.</li><li>15. Root grubbing will be restricted in wet areas and near watercourses to avoid creation of bog holes. Root grubbing will be restricted on steep erosion-prone slopes in order to reduce erosion.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-1 Environmental Protection Measures for Clearing and Grubbing**

Activity/Concern	Mitigation Measures
<i>Grubbing (cont'd)</i>	<p>16. Where practical stump removal and root grubbing will be limited to over the trench line in the RMA. Vegetation will not be grubbed within buffers adjacent to watercourses (Environmental Alignment Sheets, Appendix A), except along the trench line and spoil pile area (only if deemed necessary for grade considerations), and travel lane if a vehicle crossing is to be installed. Clearing and grading within the vegetated buffer may be approved if completion of these activities will result in a reduction in erosion or sedimentation risk. Vegetation within the 10 m buffer will be hand-cleared. Clearing and grading within the vegetated buffer will be subject to the approval of the EI.</p> <p>17. Grubbing will be reduced in ecosystems of interest (blue- or red-listed species and ecosystems, wetlands, old forest) whenever practical.</p>
<i>Slash Disposal</i>	<p>18. All cut trees and branches will be removed from the wetland and stockpiled or mulched in an upland area for disposal or sale. Vegetation cleared from construction areas (e.g., slash, brush, wood chips) will not be placed within wetland areas.</p> <p>19. Slash and rootballs will be stockpiled on stripped existing cleared ground for burning or mulching at a later date. Refer to Clean-Up and Reclamation (Section 7.11).</p> <p>20. If mulching is chosen as the disposal option mulch will be placed less than 5 cm deep.</p>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.2 SOIL STRIPPING AND GRADING

The measures in this section will be used during stripping, salvage, and grading of soil to reduce effects to productivity, surface drainage patterns, land use, and wildlife habitat.

**Table 7-2 Environmental Protection Measures for Soil Stripping and Grading**

Activity/Concern	Mitigation Measures
<i>Soil Handling</i>	<ol style="list-style-type: none"><li>1. All soil handling will remain within the confines of the designated ROW and work area.</li><li>2. Typical drawings for soil handling and topsoil conservation measures are found in Appendix E. References to the typical drawings and conservation measures are identified on the environmental alignment sheets under "Soils Procedure" and associated soil notes.</li><li>3. Gaps in the strippings windrow will be left, if warranted, at well-defined drainages and wildlife trails. Additional gaps will be placed in areas where no obvious gaps can be identified, to allow for livestock or wildlife movement during construction. Locations where wildlife gaps are appropriate will be determined in the field by the EI. EI will verify that gaps coincide with gaps in the rollback windrows.</li></ol>
<i>Stripping – ALR Land</i>	<ol style="list-style-type: none"><li>4. On ALR lands, topsoil will be stripped to the depth indicated on the Environmental Alignment Sheets, or to the depth of colour change where colour change is distinguishable, at the direction of the EI.</li><li>5. In organic soils in ALR lands, where the organic soils are uniformly greater than 40 cm, topsoil salvage will be to a depth of 30 cm.</li></ol>
<i>Stripping – Non-ALR Land</i>	<ol style="list-style-type: none"><li>6. With the exception of the Minimal Disturbance Zones (MDZ), where full width strip is required, the upper surface material (10-20 cm) consisting of approximately 50% organic matter (duff layer) and 50% mineral soil, will be stripped and stored along the ROW.</li><li>7. Where soil mixing has occurred on previously disturbed non-agricultural land, the EI can provide guidance on the need for topsoil stripping.</li><li>8. In muskeg areas where the organic soils are uniformly greater than 40 cm, topsoil salvage is not required, unless specified by Westcoast.</li></ol>
<i>Topsoil (Root Zone)</i>	<ol style="list-style-type: none"><li>9. Unless otherwise indicated on the Environmental Alignment Sheets or by the EI, topsoil will be stripped from the ROW or other work areas and stored until it is returned during clean-up (Appendix E; Drawings 9 and 11, depending on requirement).</li><li>10. Topsoil will be stripped and stored in such a way as to reduce the mixing of topsoil with sub-surface soils.</li><li>11. Topsoil stripping and/or replacement will be suspended during excessive wet weather or high winds to prevent loss of topsoil if practical.</li><li>12. Where persistent high winds are eroding topsoil piles or removing topsoil from the working side of the ROW, measures will be employed to limit loss of topsoil.</li><li>13. Topsoil will not be used as padding material.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-2 Environmental Protection Measures for Soil Stripping and Grading**

Activity/Concern	Mitigation Measures
<i>Soil Storage</i>	<ul style="list-style-type: none"> <li>14. Topsoil will be stored on unstripped ground.</li> <li>15. Topsoil piles will be marked with T/S stakes where indistinguishable from subsoil.</li> <li>16. Storage of material will involve maintaining a toe-to-toe separation between the topsoil and sub-surface soil stockpile(s) where practical.</li> <li>17. The subsoil will be stockpiled in such a manner that it does not encroach onto the topsoil piles to the extent possible.</li> <li>18. Graded material will not be stored on sloping areas with potential instability where "loading" from the spoil may trigger slide action or erosion into a watercourse.</li> <li>19. Soil stockpiles will be located a minimum of 30 m away from streams where practical and protected from erosion by tarps, sumps, berms, or sufficient erosion mitigation identified by the Environmental Inspector. Soil will not be stored in wetland or riparian areas where practical.</li> </ul>
<i>Grading</i>	<ul style="list-style-type: none"> <li>20. Grading will be limited throughout the route where practical, especially at watercourses and wetlands. Reduce the width of grading in order to limit the potential for erosion and subsoil compaction and rutting where practical. Limit grading on steep watercourse approach slopes. Use approved access where available to limit equipment and vehicle traffic on steep approaches.</li> <li>21. With the exception of an approved end haul disposal site, graded material will not be spread off ROW.</li> <li>22. Temporary berms will be installed on approach slopes to watercourses where practical and sediment barriers erected near the base of approach slopes to watercourses following grading (Appendix E; Drawings 2-3). The EI will inspect the temporary erosion control structures regularly and initiate repair as soon as practical.</li> </ul>
<i>Stones</i>	<ul style="list-style-type: none"> <li>23. On agricultural land, stones will be picked from the ROW during cleanup to off right of way conditions; stone picking will occur before and after topsoil replacement to verify that the stoniness on the ROW is comparable to conditions off-ROW.</li> </ul>
<i>Extraneous Material – Waste Rock</i>	<ul style="list-style-type: none"> <li>24. Material excavated from the ROW and not suitable as backfill, such as large rocks, will be hauled off the ROW and disposed of in an approved location. Rocks may be windrowed, buried or piled at the edge of the ROW if directed by the tenure holder.</li> </ul>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.3 WATERCOURSE AND WETLAND CROSSINGS

The environmental protection measures described in this section are intended to reduce siltation, protect fish habitat, maintain stream flow and prevent water pollution/contamination during construction in and around watercourses and wetlands. This section provides mitigation measures for activities where a watercourse or wetland requires instream work (Table 7-3), a trenched pipeline crossing (Table 7-4), a trenchless pipeline crossing (Table 7-5), or a vehicle crossing (Table 7-6). Further details see section 6.6.2 of Spectra's EMCPC.

There are 31 confirmed watercourses which will be crossed or impacted by the Project, 12 of which are classified (i.e., S1-S6 or W1-W3). Table 7-3 provides a summary of watercourse classifications.

**Table 7-3 Summary of Watercourse Classifications from 2015 Field Surveys**

<b>Mapped Watercourses<sup>1</sup></b>	<b>60</b>
<b>Fish-bearing</b>	
S1B (20-100 m)	3
S2 (>5-20 m)	7
S3 (1.5-5 m)	1
S4 (<1.5 m)	0
W2	1
<b>Total</b>	<b>12</b>
<b>Non-fish-bearing</b>	
S5 (> 3 m)	4
S6 (< 3 m)	6
NCD	9
<b>Total</b>	<b>19</b>
<b>Total Confirmed Watercourses<sup>2</sup></b>	<b>31</b>
No watercourse evident (NWE) <sup>3</sup>	<b>(29)</b>
NOTES:	
<sup>1</sup> Includes watercourses mapped using GeoBC Base Mapping TRIM data and watercourses identified in the field.	
<sup>2</sup> 31 watercourses will require an Approval Application for Changes In and About a Stream under section 11 of BC's <i>Water Sustainability Act</i> .	
<sup>3</sup> These drainages are not considered watercourses, do not provide fish habitat, and are not further assessed.	

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

Table 7-8 provides a detailed overview of the stream class, crossing method, fish-bearing status, fish species presence and riparian management area for each watercourse crossing location. Fish species and watershed codes can be found in the Fish and Fish Habitat Technical Memorandum in Appendix B1 of the ESA for the Project. Table 7-4 provides mitigation measures and BMPs for the access road and TWS watercourse crossings and the Environmental Alignment Sheets (Appendix A) provide mitigation measures and BMPs for all pipeline watercourse crossings.

There are 13 mapped wetland crossings associated with the Project (Table 7-9). There are nine wetlands that are designated by the OGC as W2, and 4 that are classified as W3. BMPs and mitigation measures for wetlands are described in Table 6-3.

### 7.3.1 Discovery of Fish Species and/or Habitat of Concern

In the event of significant pipeline reroutes not captured in the ESA or EPP, that result in new watercourse crossings or moving of a crossing to an extent that existing field data no longer applies, supplemental surveys for fish habitat and fish species of concern will be undertaken at that crossing. In addition, depending upon the pipeline construction schedule, supplemental fish and aquatic habitat studies may be required if watercourse crossing construction will occur outside of the reduced risk timing window or if the recommended watercourse crossing method(s) within the reduced risk timing window is not technically or economically practical (e.g., due to anticipated high flows during the planned watercourse crossing construction period or where subsurface materials are not suitable for a trenchless crossing). In the event that sensitive fish habitats are discovered during any additional surveys, the discovery will be assessed by a qualified fish biologist based on the following criteria:

- Location of the fish habitat feature with respect to the proposed crossing
- Timing of construction versus the timing constraints for the fish species
- Potential for an alteration of construction activities to reduce disturbance

Once the assessment is completed, DFO and MFLNRO will be notified as required to discuss site-specific mitigation options. Refer to Watercourse and Wetland Crossings (Section 7.3).



## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-4 Mitigation Measures for Work in Watercourses**

Activity/ Concern	Mitigation Measures
<i>Timing</i>	<ol style="list-style-type: none"> <li>1. Instream works for watercourse crossings will be constructed during the appropriate timing window of least risk for instream works in all flowing, fish-bearing watercourses with suspected spawners (unless otherwise permitted by DFO and MFLNRO). Refer to Table 7-7 for timing restrictions.</li> <li>2. Pipe will be welded, coated and weighted prior to commencement of instream construction.</li> <li>3. All work will be completed as quickly as practical to limit the duration of disturbance.</li> <li>4. In situations where the crossing can be completed in one day, in-stream excavation will begin in the early morning to allow for same day installation.</li> </ol>
<i>Temporary Work Space</i>	<ol style="list-style-type: none"> <li>5. TWS will be obtained and marked, if warranted, prior to initiation of instream work where practical. Where practical, TWS will not encroach into vegetated buffers.</li> <li>6. Where practical TWS will be located at least 10 m from stream channel banks.</li> </ol>
<i>Equipment</i>	<ol style="list-style-type: none"> <li>7. All required materials (e.g., silt fencing, filter cloth, polyethylene liners, granular material, rip rap, sandbags) and installation equipment (e.g., pipe, flumes, pumps, pump hoses, generators, spares, energy dissipaters) will be on-site in good working order prior to construction, and be clean and free of debris prior to instream use.</li> <li>8. General protection measures in Section 6, 7.7 and 7.8 will be reviewed and followed.</li> </ol>
<i>Notification</i>	<ol style="list-style-type: none"> <li>9. Westcoast will notify the appropriate agencies prior to the commencement of work in a watercourse in accordance with regulatory permit conditions. Identified regulatory authorities will be notified in advance of construction activities (See Table 5-2).</li> <li>10. Classified crossings will be signed with the watercourse identification number and legal location at each entry.</li> <li>11. The EI will be notified 12 hours (minimum) prior to commencement of clearing within vegetation buffers and again prior to watercourse crossing construction.</li> </ol>
<i>Sediment Control</i>	<ol style="list-style-type: none"> <li>12. Sediment barriers will be installed at all stream crossings outside the riparian buffer (Appendix E; Drawings 1, 2, 3, 23 and 24).</li> </ol>
<i>Weather</i>	<ol style="list-style-type: none"> <li>13. Prior to commencing watercourse crossings, local weather stations will be monitored to determine if precipitation is forecasted. In-stream activity will be delayed until weather conditions are favourable. Refer to Extreme Weather Plan (Appendix F.3).</li> <li>14. Work that will disturb soils will be stopped by the EI during periods of high precipitation if it is likely to lead to sediment deposition into watercourses.</li> </ol>
<i>Vehicle and Equipment Access</i>	<ol style="list-style-type: none"> <li>15. Appropriate vehicle/equipment access methods will be used across watercourses.</li> <li>16. Temporary single clear span bridges that can accommodate high water will be used on fish-bearing watercourses where appropriate.</li> </ol>
<i>Pump Intakes</i>	<ol style="list-style-type: none"> <li>17. Water intakes used in fish bearing waters will be screened in accordance with the Freshwater Intake End-of-Pipe Fish Screen Guidelines (DFO 1995).</li> </ol>
<i>Water Flow Monitoring</i>	<ol style="list-style-type: none"> <li>18. Downstream water flow will be maintained during the watercourse crossing activities, and monitored for water quality.</li> </ol>
<i>Trenching</i>	<ol style="list-style-type: none"> <li>19. Trench breakers will be installed if banks are composed of organic materials or where requested by Westcoast. Refer to Appendix E, Drawing 5.</li> </ol>
<i>Reclamation</i>	<ol style="list-style-type: none"> <li>20. Following watercourse crossing, the stream bank will be protected according to reclamation measures in Section 7.11.</li> </ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.3.2 Pipeline Crossings

**Table 7-5 Mitigation Measures for Isolated and Open Cut Watercourse Crossings**

Activity	Measures
<i>Wet (Isolated) Crossings – General Techniques</i>	<ol style="list-style-type: none"> <li>1. Isolated crossings will be carried out in a manner that effectively isolates the in-stream construction site from the natural stream flow. Isolated crossing techniques include the dam and pump (Appendix E, Drawing No. 13), and flume (Appendix E, Drawing No. 14) methods.</li> <li>2. Fish salvages will be conducted at all fish-bearing watercourses upon isolation of the crossing. Fish presence is described in Appendix B1 of the ESA.</li> </ol>
<i>Dam and Pump Method (Drawing No. 13, Appendix E)</i>	<ol style="list-style-type: none"> <li>3. As a general guide, the dam and pump method will be applied to streams where the expected maximum discharge of the watercourse does not exceed 1.0 m<sup>3</sup>/s. Adequate pump capacity will be on-site to handle anticipated water flows and potential increases in flow during the construction period, where practical. Back-up pumps with adequate capacity to handle 100% of the downstream flow will be readily available on-site for immediate replacement service should the primary operating pump(s) fail.</li> <li>4. If the streambed has adequate slope such that the pumped water does not impact the downstream side of the excavation, a downstream flume seal or dam may not be required. The length of the isolated area will be sized to verify that trench sloughing will not threaten the integrity of the dam.</li> </ol>
<i>Flume Method (Drawing No. 14, Appendix E)</i>	<ol style="list-style-type: none"> <li>5. As a general guide, the flume method will be applied to streams where the expected maximum discharge of the watercourse exceeds 1.0 m<sup>3</sup>/s. A combination of pumps and flumes may be required to bypass stream flow and to control water entrained within the isolated area. Specific methods proposed for each stream crossing will also be influenced by site specific conditions such as channel configuration, bank configuration and flow rates. Use of flume method must be approved by Westcoast.</li> <li>6. The capacity of the flume(s) will be sized to handle 150% of the anticipated flow.</li> <li>7. If the streambed has adequate slope such that water does not impact the downstream side of the excavation, a downstream dam may not be required.</li> <li>8. The upstream and downstream flume seals or dams will be set back far enough from the trench area and the flume will be of sufficient length that integrity of the dam will not be at risk during trenching.</li> </ol>
<i>Dry (Open Cut) Method (Drawing No. 16, Appendix E)</i>	<ol style="list-style-type: none"> <li>9. Open cut crossings will be used on dry channels or under frozen conditions only.</li> <li>10. Refer to the Wyndwood Project: Best Management Practices for Pipeline Stream Crossings in British Columbia (Appendix C) and the typical open cut of small watercourses in Drawing 16 (Appendix E).</li> </ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-6 Mitigation Measures for Trenchless Crossings of Waterbodies/ Water courses**

Activity	Measures
<i>Horizontal Directional Drill (See Drawings No. 18 and 19, Appendix E)</i>	<ol style="list-style-type: none"><li>1. The drilling contractor and Westcoast EIs will need to be aware of the contingency measures before drilling begins. Personnel will be prepared for an inadvertent release (Appendix F.2).</li><li>2. Drilling contractor supervisory personnel will be assigned to be on-site at all times during drilling, reaming and pullback operations to check that response measures will be implemented immediately and effectively.</li><li>3. Communications equipment, if required, will be on-site and available for use in monitoring operations.</li><li>4. Appropriate equipment and material will be maintained on-site in sufficient quantities during drilling operations to contain inadvertent drilling fluid releases.</li><li>5. The appropriate agencies will be notified prior to commencement of a drill in accordance with regulatory permit conditions.</li><li>6. Drilling equipment and staging areas will be located outside a 10 m riparian buffer zone.</li><li>7. Vegetation clearing through riparian buffer zones will be reduced to narrow hand cut slash lines where tracking sensors are used on drill path.</li><li>8. Composition of drilling fluid will be non-toxic (standard bentonite and water). Use of drilling fluid additives is not allowed without approval.</li><li>9. Both onshore drill path and watercourse will be monitored for signs of inadvertent release at all times by an EI.</li><li>10. Drilling fluids will be deposited in an area where they cannot enter a watercourse out of riparian zone. Suitable tanks, sumps, or containment berms will be installed and disposal methods identified. Further details see Section 6.11.3 of Spectra's EMCP.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.3.3 Vehicle Crossings

**Table 7-7 Mitigation Measures for Vehicle Crossings**

Activity	Measures
<i>General</i>	<ol style="list-style-type: none"><li>1. Existing access across watercourses will be used if practical.</li><li>2. Vehicle crossings of fish bearing watercourses will be designed to comply with DFO and BC standards. Necessary approvals will be obtained before crossing.</li><li>3. Structures will be capable of handling anticipated high water flows during the construction period.</li><li>4. Temporary crossing structures will be removed upon completion of construction, and the watercourse banks will immediately be restored and stabilized.</li><li>5. On the approaches to crossing structures, road ditches will be constructed for drainage control and will include sedimentation control measures.</li><li>6. Work will be conducted from the banks where practical to avoid in-stream activities and reduce disturbance to the watercourse.</li><li>7. Culverts will be designed to BC standards to maintain flows and fish passages are not obstructed.</li><li>8. Coarse cobbles, sandbags, geotextile lines, and/or curb stringers will be used to protect culvert and ramp approach fills from erosion and sedimentation into the watercourse.</li></ol>
<i>Fording (Drawing No. 23, Appendix E)</i>	<ol style="list-style-type: none"><li>9. Equipment fording will only happen as an exception and requires approval from Westcoast and applicable government agencies.</li><li>10. The number of crossings will be reduced at the fording sites.</li><li>11. Boundaries of fording sites will be marked on both ends to confine traffic.</li><li>12. Fords will be aligned at right angles to the flow wherever practical.</li><li>13. Vehicles will be cleaned prior to fording. Check for contaminants and soil, and confirm that vehicles are in good working order.</li><li>14. Bed and banks will be restored when fording is complete.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.3.4 Non-Pipeline ROW Crossings

Three classified watercourses associated with construction are not crossed by the pipeline ROW. Temporary access roads or work spaces cross these watercourses. Watercourses with site-specific mitigation measures at each crossing are provided in Table 7-8. Non-classified drainages (NCD's) and NWE's have been excluded as they don't require site specific mitigation measures other than BMPs.

**Table 7-8 Mitigation Measures for non-Pipeline ROW Crossings**

Crossing No.	Environmental Notes
A-4	<ol style="list-style-type: none"><li>1. Not fish-bearing. No restriction on the timing of instream works. Riparian setback as per the EPP, Appendix A.</li><li>2. Disturbance and clearing of vegetation within the RMA should be limited, in keeping with the Oil and Gas Activities Act Environmental Protection and Management Regulation.</li><li>3. If the work area is isolated and the watercourse requires dewatering, place the dewatering discharge in a flat, stable, vegetated area away from banks or slopes and 50 m away from any watercourse. Use a diffuser to slow and spread the discharge water and tarpaulins or sheeting over the ground to reduce direct water impact to soil.</li><li>4. Install ramp and culvert vehicle crossings over non-fish-bearing watercourses for temporary vehicle crossing. See EPP Appendix E, Drawing 21. Confirm crossing requirements in field based on site conditions.</li><li>5. For bank stabilization, soft engineering (live posts/stakes, brush layering) is preferred over riprap armoring to facilitate natural channel processes. On steep banks with no riprap, utilize brush layering or a geogrid system to stabilize soil. If stream banks must be armored, install live dormant posts of willow or dogwood between riprap and through any underlying geotextile cloth at a density of 1 post/m<sup>2</sup>, and install live stakes above riprap.</li></ol>
A-7	<ol style="list-style-type: none"><li>6. A clear span bridge will be used for this watercourse crossing and no works will occur below the high water mark. No restriction on timing for clearspan crossings.</li><li>7. See EPP Appendix C.4 for measures to protect fish and fish habitat for clear span crossings. See Appendix E for typical drawings.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-8 Mitigation Measures for non-Pipeline ROW Crossings**

Crossing No.	Environmental Notes
P-49 (HDD pullback)	<ol style="list-style-type: none"> <li>1. Fish-bearing watercourse. Riparian setbacks as per EPP, Appendix A.</li> <li>2. Keep the ROW clearing as narrow as possible within the Riparian Reserve Zone (RRZ). Where practical, the RRZ should not be entered except for stream crossing activities. Where practical, spoil piles, strippings, log decks, and temporary work areas should be located outside of the RRZ. Disturbance and clearing of vegetation within the RMA should be limited in keeping with the Oil and Gas Activities Act Environmental Protection and Management Regulation.</li> <li>3. If the work area is isolated and the watercourse requires dewatering, place the dewatering discharge in a flat, stable, vegetated area away from banks or slopes and if practical 50 m away from any watercourse. Use a diffuser to slow and spread the discharge water and tarpaulins or sheeting over the ground to reduce direct water impact to soil.</li> <li>4. Install temporary clear-span bridges or other approved methods over fish-bearing streams for vehicle crossing. See EPP Appendix A, Section C.1 for measures to avoid harm to fish and fish habitat when installing clear span bridges and Appendix E Drawing 22.</li> <li>5. Seed banks with Seed Mix C at 80 kg/ha (either by landowner or approved by landowner) and mulch with organic materials to decrease erosion and increase germination (for details see the EPP Table 7-17).</li> <li>6. For bank stabilization, soft engineering (live posts/stakes, brush layering) is preferred over riprap armoring to facilitate natural channel processes. On steep banks with no riprap, utilize brush layering or a geogrid system to stabilize soil. If stream banks must be armored, install live dormant posts of willow or dogwood between riprap and through any underlying geotextile cloth at a density of 1 post/m<sup>2</sup>, and install live stakes above riprap.</li> <li>7. Conduct all instream work within the appropriate least risk timing window where (both spring spawning fish and winter spawning fish (i.e., burbot) may be present).</li> </ol>

ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

Table 7-9 Watercourse and Wetland Crossing Table

Crossing No.	Watercourse Name	KP	Latitude	Longitude	Stream/ Wetland Class <sup>ab</sup>	Mean Channel Width (m)	Project Activity	Pipeline Crossing Method	Vehicle/Equipment Crossing Structure (crossing methods will continue to allow fish passage and water flow)	Fish-bearing	Fish Species Known to be Present at Centerline <sup>1 2</sup>	Fish Species Expected to be Present at Centerline	Regional Window of Least Risk for Instream Works <sup>3</sup>	Construction Window Exceptions	Riparian Reserve Zone (RRZ) <sup>4</sup>	Riparian Management Zone (RMZ) <sup>4</sup>	Riparian Management Area (RMA; RRZ and RMZ combined)
Pipeline Crossings																	
P-2	Tributary to Fur Thief Creek	2.2	55.64986	-122.17219	S2	5.9	Watercourse crossing	Isolated <sup>b/</sup> open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	Yes	RB	MW, GR	July 15 – August 15	Creek is very likely dry or frozen to bottom in winter, and therefore construction in spring spawner least risk window (July 15 – March 15) is acceptable.	30	20	50
P-3	Fur Thief Creek	2.4	55.65007	-122.16761	S2	5.5	Watercourse crossing	Isolated <sup>b/</sup> open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	Yes	RB	MW, GR	July 15 – August 15	Creek is very likely dry or frozen to bottom in winter, and therefore construction in spring spawner least risk window (July 15 – March 15) is acceptable.	30	20	50
P-4	Tributary to Pine River	3.6	55.64953	-122.1487	S6	1.2	Watercourse crossing	Isolated <sup>b/</sup> open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions	-	0	20	20
P-5	Tributary to Pine River	4.3	55.64799	-122.13911	S5	3.2	Watercourse crossing	Isolated <sup>b/</sup> open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions	-	0	30	30
P-7	Tributary to Pine River	5.0	55.646297	-122.12766	S6	2.2	Watercourse crossing	Isolated <sup>b/</sup> open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions	-	0	20	20
P-11	Tributary to Pine River	5.9	55.64375	-122.1147	S6	1.8	Watercourse crossing	Isolated <sup>b/</sup> open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions	-	0	20	20

ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

Table 7-9 Watercourse and Wetland Crossing Table

Crossing No.	Watercourse Name	KP	Latitude	Longitude	Stream/ Wetland Class <sup>ab</sup>	Mean Channel Width (m)	Project Activity	Pipeline Crossing Method	Vehicle/Equipment Crossing Structure (crossing methods will continue to allow fish passage and water flow)	Fish-bearing	Fish Species Known to be Present at Centerline <sup>1 2</sup>	Fish Species Expected to be Present at Centerline	Regional Window of Least Risk for Instream Works <sup>3</sup>	Construction Window Exceptions	Riparian Reserve Zone (RRZ) <sup>4</sup>	Riparian Management Zone (RMZ) <sup>4</sup>	Riparian Management Area (RMA; RRZ and RMZ combined)
P-15	Rocket Creek	8.5	55.63106	-122.08246	S2	8.1	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge	Yes	None	MW, GR	July 15 – August 15	Creek is very likely dry or frozen to bottom in winter, and therefore construction in spring spawner least risk window (July 15 – March 15) is acceptable.	30	20	50
P-17	Tributary to Pine River	8.9	55.63046	-122.07504	S5	7.7	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions	-	0	30	30
P-18	Tributary to Pine River	9.4	55.62993	-122.06798	S6	1.9	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions	-	0	20	20
P-19	Tributary to Pine River	9.8	55.62898	-122.06248	S6	1.9	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions	-	0	20	20
P-26	Tributary to Pine River	13.4	55.60475	-122.03089	W2 <sup>d</sup>	-	Watercourse crossing	Trenchless	-	Yes	LKC	SU, BB, C, NP	July 15 – August 15	Trenchless crossing method precludes instream work, and therefore work can occur outside of the regional least risk window for instream works.	10	20	30
P-27	Tributary to Pine River	13.5	55.60448	-122.02932	S2	19.0	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	Yes	LKC, WSU, BB	SU, C, NP	July 1 – January 15	-	30	20	50
P-29	Pine River	14.0	55.60310	-122.02122	S1B	78.0	Watercourse crossing	Trenchless	-	Yes	MW, WSU	GR, BT, BB, DV, LW, MW, NP, NSC, RB, SPK, WP, FDC, FHC, LKC, CSU, LNC, LSU, RSC, CCG, TP, WSU	July 15 – August 15	Trenchless crossing method precludes instream work, and therefore work can occur outside of the regional least risk window for instream works.	50	20	70



ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

Table 7-9 Watercourse and Wetland Crossing Table

Crossing No.	Watercourse Name	KP	Latitude	Longitude	Stream/ Wetland Class <sup>ab</sup>	Mean Channel Width (m)	Project Activity	Pipeline Crossing Method	Vehicle/Equipment Crossing Structure (crossing methods will continue to allow fish passage and water flow)	Fish-bearing	Fish Species Known to be Present at Centerline <sup>1 2</sup>	Fish Species Expected to be Present at Centerline	Regional Window of Least Risk for Instream Works <sup>3</sup>	Construction Window Exceptions	Riparian Reserve Zone (RRZ) <sup>4</sup>	Riparian Management Zone (RMZ) <sup>4</sup>	Riparian Management Area (RMA; RRZ and RMZ combined)
P-32	Pine River	17.4	55.60752	-121.96986	S1B	65.0	Watercourse crossing	Trenchless	-	Yes	MW, WSU	GR, BT, BB, DV, LW, MW, NP, NSC, RB, SPK, WP, FDC, FHC, LKC, CSU, LNC, LSU, RSC, CCG, TP, WSU	July 15 – August 15*	Trenchless crossing method precludes instream work, and therefore work can occur outside of the regional least risk window for instream works.	50	20	70
P-40	Commotion Creek	22.2	55.61453	-121.89816	S2	6.7	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	Yes	RB	GR, MW	July 15 – August 15*	Documented present of mountain whitefish. Whitefish spawning expected to occur in later fall (October), therefore regional least risk window for instream works may be amended.	30	20	50
P-47	Stone Creek	26.7	55.61992	-121.82628	S2	10.5	RMA Clearing	-	N/A	Yes	RB	MW, GR	July 15 – August 15	Creek is very likely dry or frozen to bottom in winter, and therefore construction in spring spawner least risk window (July 15 – March 15) is acceptable.	30	20	50
P-49	Tributary to Pine River	12.5	55.60852	-122.05359	S2	6.9	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	Yes	None	BB, NP	July 15 – January 15	-	30	20	50
P-54	Tributary to Pine River	0	55.64908	-122.20633	S3	3.7	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	Yes	None	GR, MW, RB <sup>d</sup>	July 15 – August 15	Very limited spawning potential at crossing location and downstream. No restrictions should apply to instream works as no eggs or pre-emergent fish are expected to be present.	20	20	40

ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

Table 7-9 Watercourse and Wetland Crossing Table

Crossing No.	Watercourse Name	KP	Latitude	Longitude	Stream/ Wetland Class <sup>ab</sup>	Mean Channel Width (m)	Project Activity	Pipeline Crossing Method	Vehicle/Equipment Crossing Structure (crossing methods will continue to allow fish passage and water flow)	Fish-bearing	Fish Species Known to be Present at Centerline <sup>1 2</sup>	Fish Species Expected to be Present at Centerline	Regional Window of Least Risk for Instream Works <sup>3</sup>	Construction Window Exceptions	Riparian Reserve Zone (RRZ) <sup>4</sup>	Riparian Management Zone (RMZ) <sup>4</sup>	Riparian Management Area (RMA; RRZ and RMZ combined)
P-55	Tributary to Pine River		55.60882	-122.03843	S5	3.1	Watercourse crossing	Isolated <sup>b</sup> / open cut <sup>c</sup>	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions		0	30	30
Access Road Crossings																	
A-4	Tributary to Pine River	5.9	55.64327	-122.11497	S5	3.1	Watercourse crossing	N/A	Portable temporary clear span bridge/Ramp and Culvert/Ice Bridge	No	None	None	No restrictions	-	0	30	30
A-7	Pine River	17.4	55.60849	-121.96918	S1B	73.3	Watercourse crossing	N/A	Existing Roads	Yes	MW, WSU	GR, BT, BB, DV, LW, MW, NP, NSC, RB, SPK, WP, FDC, FHC, LKC, CSU, LNC, LSU, RSC, CCG, TP, WSU	July 15 – August 15	Clear span bridge construction will involve no instream works below the high water mark, and therefore work can occur outside of the regional least risk window for instream works	50	20	70
Wetland Crossings																	
n/a	Wetland <sup>d</sup>	12.5	559776	6162876	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>d</sup>	12.7	560055	6162794	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>d</sup>	13.3	560914	6162545	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>d</sup>	13.4	561048	6162516	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>d</sup>	13.5	561138	6162484	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>d</sup>	13.6	561170	6162474	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>d</sup>	13.6	561269	6162445	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>d</sup>	13.7	561327	6162429	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>d</sup>	14.5	562043	6162221	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30

ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

Table 7-9 Watercourse and Wetland Crossing Table

Crossing No.	Watercourse Name	KP	Latitude	Longitude	Stream/ Wetland Class <sup>ab</sup>	Mean Channel Width (m)	Project Activity	Pipeline Crossing Method	Vehicle/Equipment Crossing Structure (crossing methods will continue to allow fish passage and water flow)	Fish-bearing	Fish Species Known to be Present at Centerline <sup>1 2</sup>	Fish Species Expected to be Present at Centerline	Regional Window of Least Risk for Instream Works <sup>3</sup>	Construction Window Exceptions	Riparian Reserve Zone (RRZ) <sup>4</sup>	Riparian Management Zone (RMZ) <sup>4</sup>	Riparian Management Area (RMA; RRZ and RMZ combined)
n/a	Wetland <sup>e</sup>	19.9	567226	6163059	UN	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	0	0	0
n/a	Wetland <sup>d</sup>	20.2	567492	6163120	W2	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	10	20	30
n/a	Wetland <sup>e</sup>	20.7	567966	6163272	UN	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	0	0	0
n/a	Wetland <sup>e</sup>	21.5	568670	6163485	UN	n/a	Pipeline Crossing	N/A	n/a	n/a	n/a	n/a	No restrictions	-	0	0	0
n/a	Wetland <sup>e</sup>	21.5	568699	6163501	UN	n/a	Pipeline Crossing	<sup>c</sup> N/A	n/a	n/a	n/a	n/a	No restrictions	-	0	0	0

NOTES:

<sup>a</sup> The following stream classes include those that require specific mitigation measures for crossings. NCD (non-classified drainage) and NWE (no watercourse evident) have been excluded from this table as there is no site specific mitigation measures however stream specific information can be found in Appendix B of the ESA and their locations on the alignment can be found in Appendix A.

<sup>b</sup> If flowing water is present at the time of construction.

<sup>c</sup> If watercourse is dry or frozen to the bottom at the time of construction.

<sup>d</sup> OGC Environmental Protection and Management Guideline (EPMG) Wetland Class W2

<sup>e</sup> OGC EPMG Wetland Class UN

- \* No timing restrictions for trenchless crossings as no instream work required.

SOURCES:

<sup>1</sup> Fisheries Information Summary System. Available: <http://www.env.gov.bc.ca/fish/fiss/>. Accessed: August 2015.

<sup>2</sup> BC HabitatWizard. Available: <http://maps.gov.bc.ca/ess/sv/habwiz/>. Accessed: August 2015.

<sup>3</sup> Terms and Conditions for changes in and about a stream specified by Ministry of Environment Habitat Officers, Peace Sub-Region (2010). Available: [http://www.env.gov.bc.ca/wsd/regions/nor/wateract/terms\\_conditions\\_per.pdf](http://www.env.gov.bc.ca/wsd/regions/nor/wateract/terms_conditions_per.pdf). Accessed: August 2015.

<sup>4</sup> Based on the dimensions of the Riparian Reserve Zone, Riparian Management Zone, and Riparian Management Area, as defined in the Environmental Protection and Management Guide Version 2.0, Chapter 3 (BC OGC 2016).

**ENVIRONMENTAL PROTECTION PLAN**

Pipeline Construction  
October 21, 2016

*This page intentionally left blank*

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.4 TRENCHING

Ground disturbance and interference with other land uses and wildlife movement can be reduced with implementation of the following measures.

**Table 7-10 Environmental Protection Measures for Trenching**

Activity/Concern	Mitigation Measures
<i>Timing</i>	<ol style="list-style-type: none"><li>1. Work will be completed when there is low enough soil moisture to allow construction without causing excessive rutting or soil compaction.</li><li>2. The duration of time that the trench is open will be limited by backfilling as soon as practical after lowering-in of the pipe.</li></ol>
<i>Blasting</i>	<ol style="list-style-type: none"><li>3. Approval for blasting will be obtained from the appropriate government authority. Local residents and potentially affected parties will be given advance notice of the blasting.</li><li>4. When blasting near watercourses, the following measures will be implemented (DFO 2013):</li><li>5. Time in-water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries timing windows (BC OGC 2016).</li><li>6. Isolate the work site to exclude fish from within the blast area by using cofferdams or aqua dams.</li><li>7. Backfill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.</li><li>8. Place blasting mats over top of holes to reduce scattering of blast debris around the area.</li><li>9. Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products.</li><li>10. Remove all blasting debris and other associated equipment/products from the blast area.</li><li>11. Remove fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting.</li><li>12. Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e., decking) with a minimum 25 milliseconds (1/1000 seconds) delay between charge detonations.</li><li>13. Backfill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.</li><li>14. Place blasting mats over top of holes to minimize scattering of blast debris around the area.</li><li>15. Drills will be equipped with dust collectors.</li><li>16. Ground vibration parameters will be in accordance with Westcoast blast specifications.</li><li>17. The air blast overpressure will be limited to 120 linear decibels; this represents the additional pressure above normal atmospheric pressure that is generated from a blast.</li><li>18. Blasting specifications will be provided to the contractor prior to construction.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-10 Environmental Protection Measures for Trenching**

Activity/Concern	Mitigation Measures
<i>Blasting (cont'd)</i>	<p>19. Non-potentially acid generating (non-PAG) rock will be disposed of using the following methods:</p> <ul style="list-style-type: none"> <li>a. Rock will be permanently stored in a designated area</li> <li>b. Rock will be returned to the blast area provided this will not reduce ground stability or wildlife movements</li> <li>c. Rock will be transferred down the ROW to areas where placement will not reduce ground stability. Rock will be used as armouring or as ballast for other construction operations (e.g., access road construction)</li> <li>d. Rock will be used as rip-rap at watercourse crossings where existing approvals allow for this activity</li> <li>e. Rock will be used for access control at road crossings if required.</li> </ul>
<i>Soil Conditions</i>	20. Area of soil conditions encountered along open trenches (particularly trench instability, and contamination) will be recorded.
<i>Rippable Rock</i>	21. Bedrock encountered in the trench may be crushed and used as backfill to bottom of trench.
<i>Sediment Barriers</i>	<p>22. All sediment barriers will be maintained throughout the construction period and reinstalled as necessary.</p> <p>23. Sumps and/or berms will be constructed, if required, to contain excavated materials from watercourses so that silty run-off does not re-enter the watercourse (Appendix E; Drawing 12).</p>
<i>Unstable Trench Walls</i>	24. Trenching will be suspended and the stripping of a wider area of topsoil will be undertaken if the trench walls slough into the ditch and the potential for topsoil/subsoil mixing exists. Back slope the trench walls until stable.
<i>Groundwater</i>	25. Where required, subdrains will be installed to divert shallow groundwater flow away from the pipeline trench, to improve slope stability and prevent saturation of backfilled materials (Appendix E; Drawing 6).
<i>Dewatering</i>	<p>26. Where dewatering of the trench or bell-hole is required, the water will be discharged onto stable vegetated surfaces, or into constructed containment ponds in a manner that does not cause erosion or unfiltered water to re-enter a watercourse or wetland. Water will then be disposed of in an appropriate manner.</p> <p>27. Regulator or tenure holder permission is required for any off-ROW discharge of trench water or containment pond.</p> <p>28. Discharge areas will be identified prior to use and will be monitored for erosion or flooding.</p> <p>29. Water quality monitoring will be conducted downstream of discharge areas to verify that water quality parameters are within the provincial and federal guidelines for the protection of aquatic life (CCME 2002; MOE 2015).</p>
<i>Drainage</i>	<p>30. Trench plugs will be installed and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may act as a drain.</p> <p>31. Trench breakers (ditch plugs) (Appendix E; Drawing 5) will be installed where required to control water seepage along the trench line and to prevent erosion of backfill materials.</p> <p>32. Bar ditch ramps will have pipe culverts installed to permit passage of runoff.</p>
<i>Spoil</i>	33. Trench spoil will remain within the confines of the designated ROW and work area.

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-10 Environmental Protection Measures for Trenching**

Activity/Concern	Mitigation Measures
<i>Extraneous Material</i>	<ul style="list-style-type: none"><li>34. Material excavated from the ROW that is not suitable as backfill, such as large rocks, will be windrowed along the edge of the ROW, buried on or off the ROW, or hauled off the ROW and disposed of in an approved location.</li><li>35. Rocks will not be piled or windrowed on ALR land unless it improves the agricultural capability of the surface lease, or with the permission of the landowner.</li></ul>

## 7.5 STRINGING AND LOWERING-IN

Project personnel will reduce interference with other land uses and wildlife movement during the stringing and lowering-in of pipe.

**Table 7-11 Environmental Protection Measures for Stringing and Lowering-In**

Activity/Concern	Mitigation Measures
<i>Stringing</i>	<ul style="list-style-type: none"><li>1. Where practical, stringing trucks hauling the pipe will travel along the centre of the proposed trench line to help reduce the extent of soil compaction along the ROW.</li><li>2. Gaps in set-up and welded pipe sections will be left to the extent practical to allow wildlife to cross the ROW. Gaps will be located at obvious game trails. Breaks in pipe will be coincident with gaps in topsoil and rollback windrows.</li><li>3. The pipeline will be assembled in an upland area unless the wetland is dry enough to adequately support skids and pipe.</li><li>4. Ends of pipe welded sections lying on the ground will be capped or bagged to prevent western toad or other wildlife species entry into the pipes after stringing and welding. Single lengths do not require capping or bagging.</li><li>5. Where practical, pipes will be inspected prior to welding to check that western toad and other wildlife have not entered the pipe.</li></ul>
<i>Dewatering Trench</i>	<ul style="list-style-type: none"><li>6. The trench will be dewatered, if warranted, when laying pipe in areas with high water tables or springs. Pump water onto stable and well vegetated areas, tarpaulins or sheeting and monitor to check that the discharge is not causing erosion or unfiltered or dirty water to re-enter a watercourse. Place pumps on polyethylene sheeting above the high water mark (HWM) of the watercourse/wetland.</li><li>7. Trench water discharge will not be located within 50 m of a watercourse if practical.</li><li>8. Bell holes will be pumped onto stable well-vegetated areas or constructed containment areas in a manner that does not cause erosion or sedimentation of a wetland. Pre-determine discharge locations and monitor so that flooding or erosion occurs.</li></ul>
<i>Lowering-in</i>	<ul style="list-style-type: none"><li>9. Sideboom traffic will be limited on the topsoil windrow located on the work side during lowering-in.</li></ul>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.6 BACKFILLING

Backfilling will be performed to protect the pipeline and prevent trench subsidence, verify excavated materials from the trench are properly replaced, re-establish subsurface drainage, facilitate cross ROW drainage, and facilitate reclamation.

**Table 7-12 Environmental Protection Measures for Backfilling**

Activity/Concern	Mitigation Measures
<i>Trench Breakers</i>	<ol style="list-style-type: none"><li>1. Trench breakers will be installed (sack, foam, or bentonite) where required to control water seepage along the trench and to prevent erosion of backfill materials. Refer to Appendix E, Drawing 5.</li><li>2. Exact location of breakers will be determined in the field. Location of each breaker will be marked prior to backfilling to facilitate correct placement of diversion berm immediately downslope of the breaker.</li></ol>
<i>Subdrains</i>	<ol style="list-style-type: none"><li>3. Subdrains will be installed as directed by Westcoast to divert shallow groundwater flow away from the trench, to improve slope stability and prevent saturation of backfilled materials (Appendix E; Drawing 6).</li></ol>
<i>Backfill Trench / Mud Disposal Areas</i>	<ol style="list-style-type: none"><li>4. Use of topsoil as backfill will be prohibited.</li><li>5. Backfill will be done as per Westcoast specifications.</li><li>6. Sand may be imported to be used as trench padding where bedrock is encountered, if required. All sand will be stored on subsoils (stripped ground) and excess will be removed prior to topsoil replacement.</li><li>7. Backfill will be compacted to reduce subsidence in the future, if practical, to reduce below grade trench settlement. Extra care will be taken to compact the trench at banks of watercourse crossings, intermittent drainages, and ditches.</li><li>8. Excess bedrock will be disposed of at approved locations.</li><li>9. Prior to backfilling, disposal mud will be tested for contaminants and disposed of at an approved facility or location. Uncontaminated material will be buried to the appropriate standards and specifications with clean fill placed on top and reclaimed.</li></ol>
<i>Crown Trench</i>	<ol style="list-style-type: none"><li>10. If work extends into frozen conditions, the trench will be crowned upon backfilling to allow for settlement, unless otherwise directed by the appropriate agency. Gaps in the crown will be located at obvious drainage channels to avoid altering the natural drainage patterns.</li><li>11. On agricultural lands, to decrease the potential for localized trench subsidence, the trench will be crowned upon backfilling to allow for settlement unless alternative measures are arranged with the landowner. Gaps in the crown will be located at obvious drainage channels to avoid altering the natural drainage patterns.</li></ol>
<i>Excess Trench Spoil</i>	<ol style="list-style-type: none"><li>12. Excess spoil will be feathered-out over the stripped portion of the ROW to reduce the creation of a permanent mound. Excess spoil will not be feathered-out over the stripped area to an extent that may cause excessive subsidence of the trench.</li></ol>



## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.7 SPILL PREVENTION AND RESPONSE PLAN

Guidelines for the safe handling, storage, use and disposal of potentially hazardous materials as well as spill prevention measures and guidelines for the refueling and servicing of equipment are provided in General Project and Resource-Specific Mitigation Measures (Section 6). Westcoast requires that all spills be reported to the Fort St. John Gas Control at 1-800-663-9931, who in turn will notify regulatory agencies if the spill is of reportable quantity. Further details see section 6.11.2 of Spectra's EMCP.

#### 7.7.1 Prevention

To prevent spills, Westcoast will implement the following measures:

1. Provide awareness to contractors and the construction team of the importance of spill prevention. Spill prevention will be outlined at the construction kick-off meeting and pre-job meetings.
2. Contractor or EI will check and monitor equipment for signs of leaks.
3. Availability of absorbent material on equipment or at specific locations on site.

#### 7.7.2 Response

In the event of a spill, the first person on the scene will:

1. Control danger to human life (e.g., remove ignition sources) if safe to do so
2. Identify the material spilled and implement appropriate safety procedures based on the nature of the hazard, as described on the product Material Safety Data Sheet
3. Cut off the source of the spill if possible and safe to do so
4. Immediately obtain the assistance of others and begin to contain and clean-up the spill
5. Notify the CI and EI

All necessary personnel and equipment will be made available to contain and clean up the spill, using the following measures:

1. If the spill source is a leaking fuel truck, pump the tanker dry and fuel will be transferred to another tanker or appropriate container.
2. Contractor or EI will check and monitor equipment for signs of leaks.
3. Nearby culverts will be blocked to limit spill migration, if required.
4. If certain that there are no underground pipelines or utilities, a shallow depression will be excavated, or a surface berm constructed in the path of the spill to stop and contain flow, especially in the event of possible entry into a watercourse or wetland.
5. For spills on water, floating containment booms, sorbent booms and pads, or straw bale filter dams will be used.
6. All free products will be collected with a vacuum truck or absorbents, and transferred to an approved waste management facility.
7. Suitable commercial sorbent materials (carried in fuel and service vehicles) will be applied to contain and recover spilled material.

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

8. Contaminated soil and vegetation and spent sorbent material will be collected and disposed of waste at an approved facility.
9. Vehicles will avoid soils contaminated by a spill.
10. The public, personnel, livestock and wildlife will be restricted from the affected area, if necessary, with fencing.
11. Final clean-up and reclamation will be conducted following an assessment of soil conditions. Conduct in situ remediation only if approved by Westcoast and appropriate regulatory authorities.

### Reporting

The CI and EI will immediately notify Westcoast Fort. St. John Gas Control at 1-800-663-9931 who in turn will notify the applicable provincial and federal government agencies and the NEB of a spill as required by law when a reportable event occurs during the construction of any component of the Project. Refer to Emergency and General Project Contacts (Appendix D). If this is not possible, notification will be made as soon as practical.

Reportable spills will be documented in a sketch with dimensions to show the location, and a report including type, cause, and clean-up and reclamation procedures.

Reporting requirements for BC are defined in the *Environmental Management Act* Spill Reporting Regulation and are provided below.

Authority	Notes
Westcoast Energy Gas Control BC Pipeline, BC Field Services and Midstream Divisions	1-800-663-9931
Clean Harbors Environmental Services Dwayne Stone Fort St. John	(250) 785-8500
NEB Emergency Contact Number	(403) 807-9473
Environmental Emergencies in BC 1-800-663-3456	A spill, release, or emergency that is released into a watercourse or into groundwater or surface water (see notes)
Environment Canada Spill Reporting (780) 422-4505	Any spill, release, or emergency that might cause, is causing, or has caused an adverse effect to the environment, including both aquatic and terrestrial environments
Department of Fisheries and Oceans 1-800-465-4336	Any substance that if added to water, would degrade, or alter or form part of a process of degradation or alteration of the quality of water so it is rendered or is likely to be rendered deleterious to fish or fish habitat
Transport Canada – Dangerous Goods Incidents	Emergencies: (613) 996-6666
MFLNRO Wildfire Management Branch	Emergencies: 1-800-663-5555 Info: 1-888-3FOREST
BC One Call	1-800-474-6886

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

Community	RCMP	Ambulance and Fire	Hospital or Health Centre
Chetwynd	911, 250-788-9221	911	(250) 788-2236
Hudson's Hope	911, 250-783-5241	911	(250) 783-5221

A spill of a hazardous substance must be reported to the BC Environmental Emergency hotline if it reaches the amount specified in Table 7-13.

**Table 7-13 Westcoast BC Pipeline and Field Services Spill/Leak Reporting Requirements and Reportable Quantities**

TDG Class	SUBSTANCE SPILLED NOTE: This list is not all-inclusive. Refer to the Transportation of Dangerous Goods (TDG) Regulations, material safety data sheet (MSDS), or check with EHS Dept.	Minimum Reportable Quantity (Threshold) (Also see note**)
2	<b>NATURAL GAS (SWEET)</b> – ONLY reportable IF the release results from pipeline breakages on lines operated above 100 psi and the release is sudden and uncontrolled.	500 scf (equals 10 kg)
2.1 and 2.2	<b>FLAMMABLE AND NON-FLAMMABLE GASES</b> – Ethane, Butane, Propane, Acetylene, Unplanned CO <sub>2</sub> (fire suppression) release.	≥10 (kg or L)
2.3	<b>TOXIC GASES</b> – Sour Gas (H <sub>2</sub> S), Sulphur Dioxide (SO <sub>2</sub> ).	5 (kg or L)
3	<b>FLAMMABLE LIQUID</b> (to 61°C Flashpoint) – Condensate, Fuel (diesel, gasoline, jet fuel, kerosene), Mercaptan, Methanol, Paint, Pigging Liquid, Scrubber Fluids, Solvents.	100 L
4	<b>FLAMMABLE SOLIDS</b> – Pyroforics, e.g., Iron Sulphide, Sulphur.	25 kg
5.1 and 5.2	<b>OXIDIZING SUBSTANCES AND ORGANIC PEROXIDES</b> – e.g., Hydrogen peroxide, Nitric acid.	50 (kg or L)
6.1 and 6.2	<b>TOXIC AND INFECTIOUS SUBSTANCES</b> – Some cleaners, Resin, Biocides.	5 (kg or L)
8	<b>CORROSIVE SUBSTANCE</b> – Acids (includes Battery fluid), pure Amine (e.g., pure MEA), Caustic (e.g., NaOH, KOH), Lime (may include sludges), Mercury.	5 (kg or L)
9	<b>MISCELLANEOUS</b> (Environmentally Hazardous) – Includes asbestos, heavy metals >100 ppm in waste, BTEX.	25 (kg or L)
Other	<b>LEACHABLE WASTE</b> – Includes leachable heavy metals in soil or filter media, oily sludge.	25 (kg or L)
Other	<b>WASTE OIL</b> – Includes wastes with greater than 3% oil (e.g., hydrocarbon contaminated soil, oily rags), Filters (oil and gas production filters), Lube oil.	100 (kg or L)
Other	<b>ANY OTHER SUBSTANCE</b> not captured above that has potential to cause pollution, e.g., dilute solutions such as glycol (EG, TEG), amine solutions (DEA, MEA, MDEA, Sulphinol, and Morphysorb).	200 (kg or L)
NOTE: ** Any spill to water body/course must be reported to Emergency Management BC.		

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.8 FUEL STORAGE AND HANDLING PLAN

**Table 7-14 Fuel Storage and Handling Mitigation Measures**

Activity/Concern	Mitigation Measures
<i>Refueling</i>	<ol style="list-style-type: none"><li>1. Equipment refueling will be performed at approved locations using drain trays to contain fluid release.</li><li>2. Refueling will not be permitted within 20 m of a watercourse or wetland.</li><li>3. Refueling activities will be monitored at all times; vehicles and equipment will not be left unattended while being refueled. All containers, hoses and nozzles will be free of leaks. All fuel nozzles will be equipped with functional automatic shut-offs.</li></ol>
<i>Stationary Equipment</i>	<ol style="list-style-type: none"><li>4. Where stationary equipment cannot be relocated 20 m from a watercourse or wetland, it will be situated in a designated area that has been bermed and lined with an impermeable barrier or other approved containment.</li></ol>
<i>Storage</i>	<ol style="list-style-type: none"><li>5. On-site fuel tanks will be situated in a designated area that has been bermed and lined with an impermeable barrier or other approved containment (i.e. double wall). On-site fuel storage tanks larger than 1,000 L will be located where leakage will not enter a waterbody or wetland and will be contained within a bermed area with a holding capacity equal to at least 110% of the largest tank within the berm.</li></ol>
<i>Spill</i>	<ol style="list-style-type: none"><li>6. In the event of a spill, refer to Section 7.7 Spill Prevention and Response.</li></ol>
<i>Disposal</i>	<ol style="list-style-type: none"><li>7. Used oil, filters and grease cartridges and other products of equipment maintenance will be collected and disposed of at an approved waste site. Proper containment and documentation will be completed for the transportation of such material.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.9 WASTE MANAGEMENT

**Table 7-15 Construction Waste Management**

Activity/Concern	Mitigation Measures
<i>General Construction Waste</i>	<ol style="list-style-type: none"><li>1. Waste materials will be placed and disposed of so as to not impact soils, surface water drainages or groundwater within the PDA.</li><li>2. Inorganic waste will be disposed of in approved waste handling facilities in accordance with the applicable regulations.</li><li>3. Construction waste will be regularly cleaned up and disposed of to avoid accumulation.</li><li>4. Waste will be placed in suitable containers.</li><li>5. Westcoast's Waste Management Program requires the contractor to collect, separate, store, transport and dispose of materials by tracking and by reporting to Westcoast.</li></ol>
<i>Excavated Material</i>	<ol style="list-style-type: none"><li>6. All waste and surplus material will be disposed of in designated areas and so as to not impact watercourses, wetlands, or groundwater.</li><li>7. All construction waste subject to leaching will be covered with sheeting or suitable tarp materials immediately after creation.</li><li>8. All temporary stockpile areas will be inspected on a regular basis to check environmental compliance.</li></ol>
<i>Food Wastes</i>	<ol style="list-style-type: none"><li>9. All food waste and domestic garbage from all work will be collected daily and placed in an appropriate receptacle in a manner that does not attract nuisance animals.</li></ol>
<i>Sewage Disposal</i>	<ol style="list-style-type: none"><li>10. Sanitary facilities in the form of portable toilets will be provided for the use of workers. Sanitary facilities will be secured and located at least 30 meters from any drainage feature or wetland.</li></ol>
<i>Waste Water</i>	<ol style="list-style-type: none"><li>11. Treatment and discharge equipment for wastewater and runoff management is properly maintained and monitored.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.10 HYDROSTATIC TESTING

The withdrawal and release of hydrostatic test water will occur in accordance with applicable regulations and in a manner which controls erosion and prevents the contamination of surface waters during dewatering activities. Further details see section 6.5.2 of Spectra's EMCPC.

**Table 7-16 Environmental Protection Measures for Hydrostatic Testing**

Activity/Concern	Mitigation Measures
Approval Conditions	<ol style="list-style-type: none"><li>1. A copy of approval conditions will be maintained onsite.</li><li>2. Approved water sources and withdrawal rates will be followed.</li><li>3. Water withdrawal for hydrostatic testing will be restricted as required by approval conditions.</li></ol>
Water Sources	<ol style="list-style-type: none"><li>4. Water withdrawal from natural waterbodies will not exceed maximum withdrawal rates specified by the section 10 Water Sustainability Act approval.</li><li>5. Test water will be shunted from test section to test section to the extent practical to limit water hauling, and water usage.</li></ol>
Reference Monitoring	<ol style="list-style-type: none"><li>6. Hydrostatic test waters will be sampled during filling and analyzed for identified water quality parameters in compliance with provincial water quality criteria (MOE 2015). Copies of field test results, laboratory reports and other test documentation will be included in the Project files.</li></ol>
Equipment and Workers	<ol style="list-style-type: none"><li>7. A sufficient number of workers and equipment will be available onsite to repair any rupture, leak or erosion problem that arises during testing.</li></ol>
Water Trucks	<ol style="list-style-type: none"><li>8. Water trucks and any storage tanks and piping, if used to transport test water to the fill site, will be clean and free of hydrocarbon contamination.</li></ol>
Pump Intakes	<ol style="list-style-type: none"><li>9. Pump intakes used in fish bearing waters will not disturb the streambed and will be screened in accordance with the Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO 1995).</li><li>10. Pump screens will be maintained so they are clear of debris.</li></ol>
Isolate Pumps	<ol style="list-style-type: none"><li>11. Pump lines will be inspected for leaks to limit the potential for erosion.</li><li>12. Test pumps, storage tanks, and generators will be isolated with an impermeable lined dike or depression to prevent spills of fuels or lubricants.</li><li>13. Where chemical additives (e.g., methanol) are used during testing, secondary containment will be placed about hose and vessel fittings to prevent chemical spills where practical.</li></ol>
Dewatering	<ol style="list-style-type: none"><li>14. Dewatering will be conducted in accordance with the requirements specified in the section 10 Water Sustainability Act Approval for Short Term Use that will be obtained for the Project.</li><li>15. Test water will be discharged back into the same watershed or river basin system from which it was withdrawn, unless otherwise approved by the applicable government agency. Discharge will not be located within 50 m of a watercourse where practical.</li><li>16. At dewatering points, discharge piping will be free of leaks and properly anchored to prevent bouncing or snaking during surging. The rate of discharge will not exceed the rate of filling or the rate stipulated in the water use permit.</li><li>17. Water will be discharged into well-vegetated areas.</li><li>18. If required, scour protection (riprap, sheeting, tarpaulins) or equivalent will be provided to dissipate the energy of the discharged water to reduce soil erosion during dewatering. Discharge locations will be pre-determined and monitored for erosion or flooding. If energy dissipation measures are found to be inadequate, the rate of dewatering will be reduced or ceased until satisfactory mitigation measures are in place.</li><li>19. Prior to discharge, water will be tested and compared to the Water Quality Guidelines are being met. If exceedances are present, proper remedial action will be taken prior to discharge.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

### 7.11 CLEAN-UP AND RECLAMATION

Clean-up and reclamation measures aim to restore land capability, reclaim disturbed surfaces, establish vegetation that is compatible with the surrounding area and land use, and control erosion.

**Table 7-17 Environmental Protection Measures for Clean-Up and Reclamation**

Activity/Concern	Mitigation Measures
<i>Scheduling</i>	<ol style="list-style-type: none"><li>1. Mechanical and final clean-up will be completed as quickly as practical following completion of construction.</li><li>2. On agricultural land, site plans and schedules for reclamation work will be developed as required with affected landowners and tenants. Restoration measures include the re-establishment of final grades and drainage patterns, stone picking and chisel ploughing for decompaction if required.</li><li>3. If final clean-up is delayed to Q4 2018, the Final Clean-up Delay Contingency Plan (Appendix F.5) will be executed.</li></ol>
<i>Grade Replacement</i>	<ol style="list-style-type: none"><li>4. Grades will be restored to preconstruction contours or stable grade unless otherwise directed by Westcoast.</li><li>5. Surfaces will be regraded after backfilling and surface water drainage patterns re-established to maintain drainage onto, across, and off the work area, and to prevent conduits for surface water flow.</li><li>6. Final grade of agricultural lands will allow that the surface flow of water is not impeded.</li><li>7. All ramps and culverts will be removed and drainage restored to pre-construction profile.</li><li>8. The Project work area and areas around facilities will be re-contoured to be compatible with surrounding drainage patterns to prevent the concentration of run-off down a slope or parallel to the trench line.</li></ol>
<i>Restore Watercourses and Wetlands</i>	<ol style="list-style-type: none"><li>9. All temporary crossing structures will be removed, including ramps and culverts, from all watercourses.</li><li>10. Streambanks and approaches will be regraded and restored as soon as practical following construction of watercourse crossings. Stream banks will be re-planted with vegetation and restored to closely resemble the pre-construction condition.</li><li>11. Engineered (e.g., rip rap) or bioengineered (e.g., wattle fence, modified brush layers) structures may be used to stabilize banks where instability is causing sediment to enter watercourses, and where streambank soils have been rated at high risk for water erosion, as shown on the Environmental Alignment Sheets (Appendix A).</li><li>12. Sediment control measures will be left in place until permanent revegetation measures are successful and the upland areas adjacent to waterbodies are stabilized.</li><li>13. Within designated wetlands, original contours and drainage patterns will be restored as practical.</li><li>14. Requests for livestock access across watercourses will be accommodated where practical.</li></ol>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-17 Environmental Protection Measures for Clean-Up and Reclamation**

Activity/Concern	Mitigation Measures
<i>Sediment and Erosion Control</i>	<ol style="list-style-type: none"> <li>1. Potentially erodible areas will be inspected by the EI, and mitigation for new erosion or siltation will be applied as required.</li> <li>2. Permanent diversion berms will be installed in conjunction with final clean-up and reclamation as directed by Westcoast on moderate and steep slopes to divert surface water off the ROW.</li> <li>3. Sediment barriers will be left in place, or reinstalled as necessary (such as after backfilling of the trench), until permanent revegetation measures are successful and the upland areas adjacent to waterbodies are stabilized. Further details see section 6.2.2 of Spectra's EMCPC.</li> <li>4. Silt fences (i.e., non-bio-degradable barriers) will be removed by the Project cleanup crews. If adequate sediment control has not been achieved upslope of these features, they will be replaced by bio-degradable options (e.g., fibre logs, hay bales). Refer to Appendix E; Drawings 3 and 24. Further details see section 6.2.2 of Spectra's EMCPC.</li> </ol>
<i>Corduroy, Mats or Equivalent</i>	<ol style="list-style-type: none"> <li>5. Corduroy, wooden mats or equivalent will be removed from wet areas.</li> <li>6. Removed corduroy, slash and remaining leaning trees will be burned or chipped, or incorporated into rollback.</li> </ol>
<i>Swamp Mats, Matting, Geotextiles</i>	<ol style="list-style-type: none"> <li>7. Geotextiles, swamp mats and matting will be removed from all locations on the ROW.</li> </ol>
<i>Slash Disposal</i>	<ol style="list-style-type: none"> <li>8. Slash material will be disposed of by burning, mulching, chipping, or hauling away to an approved disposal location.</li> <li>9. In the event burning is precluded, all slash will be mulched (no deeper than 5cm) or piled on stripped, cleared upland mineral soil where access will accommodate burning at a later date.</li> <li>10. In selected areas, slash debris may be utilized as rollback for erosion control in combination with cross slope ditch/berms, where pre-approved by Westcoast.</li> <li>11. No large wood debris that could be removed with a brush rake is allowed for cultivated land, unless permitted in writing by the landowner.</li> </ol>
<i>Burning</i>	<ol style="list-style-type: none"> <li>12. Provincially accepted guidelines will be followed for controlled open burning to increase burning efficiency. These guidelines may include the Open Burning Smoke Control Regulation of the Environmental Management Act, the Wildfire Act, and the Wildfire Regulation.</li> <li>13. Prior to burning, a burning permit will be obtained from the appropriate government agency.</li> <li>14. Burning will be scheduled to avoid high fire hazard periods.</li> <li>15. Westcoast's Forest Fire Prevention Risk Assessment will be implemented prior to burning slash.</li> <li>16. Firebreaks will be constructed and maintained along the work area where there is a risk of spreading fire.</li> <li>17. Burning of slash will be restricted to subsoil areas by pre-stripping topsoil.</li> <li>18. Techniques will be implemented to limit smoke production including limiting pile size, minimizing moisture content, and maintaining loose burning piles free of soil.</li> <li>19. Westcoast site personnel and the contractor will be fully prepared to implement the Fire Contingency Plan (Appendix F.1).</li> </ol>



## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-17 Environmental Protection Measures for Clean-Up and Reclamation**

Activity/Concern	Mitigation Measures
<i>Debris</i>	<p>20. All remaining garbage and surplus material will be removed from the ROW.</p> <p>21. Small diameter slash will be retained in wooded areas with erodible soils.</p> <p>22. Piging debris will be collected and disposed of at an acceptable location (e.g., landfill) in accordance with BC Oil and Gas Waste Regulation.</p>
<i>Subsoil Preparation</i>	<p>23. On ALR land, where warranted, the subsoil on the stripped portion of the ROW will be chisel ploughed during the clean-up to alleviate compaction. Travel on the ROW after chisel ploughing will be reduced to avoid compaction.</p>
<i>Topsoil Replacement</i>	<p>24. On non-ALR land, the salvaged duff layer will be returned and graded within the ROW after the trench has been backfilled and crowned.</p> <p>25. On ALR land, salvaged topsoil will be replaced evenly over stripped areas following subsoil preparation.</p>
<i>Revegetation</i>	<p>26. Wetlands, wet areas, and ecosystems at-risk will be allowed to naturally revegetate with native plant species (e.g., no seeding) where soil stability conditions permit, as specified in the Environmental Alignment Sheets (Appendix A). Natural recovery (e.g., no seeding) will be undertaken in wetland areas. The ROW in these areas will only be reseeded if specified by the applicable government agency.</p> <p>27. If reseeding is necessary to control erosion in wetlands, and in areas plant species or ecosystems at-risk occur then only non-competitive species native to the region will be used. Seeding densities will be low to allow for native plant encroachment. This will be in accordance with the BC Peace Liard Revegetation Manual (NEIPC 2010)</p> <p>28. Reclamation and revegetation activities will be coordinated to limit interference with, or disturbance from other land users (e.g., forestry operations).</p> <p>29. A revegetation program will be initiated along the ROW and in other work areas as designated by Westcoast as soon as practical after construction. See section 6.4.2 of Spectra's EMCPC for further details.</p> <p>30. The Company will arrange to have landowners seed and fertilize cultivated segments of the ROW as part of their normal farming operations.</p> <p>31. Reclamation sequence and scheduling will address requirements for growing seasons, short and long term site stabilization, potential follow-up inspections (e.g., checking of backfill and erosion control following spring thaw).</p> <p>32. Replanting will be conducted in forested areas where erosion control is required, or as required in caribou habitat to meet Caribou Management objectives, as outlined in the CRRP. No seeding will be undertaken except on steep slopes or as otherwise required for erosion control in caribou habitat.</p> <p>33. Where seeding is conducted by Westcoast, the typical seed mix used will be Certified Canada #1 seed, and free, to the extent practical, of noxious or restricted weed species. Seed certificates of analysis will be obtained and copies made available for inspection.</p>

## ENVIRONMENTAL PROTECTION PLAN

Pipeline Construction  
October 21, 2016

**Table 7-17 Environmental Protection Measures for Clean-Up and Reclamation**

Activity/Concern	Mitigation Measures
<i>Revegetation (cont'd)</i>	<p>34. Where forest native seed mixes are to be used, they will be applied to valley slopes and breaks, and watercourse banks according to site terrain and soil drainage conditions as described below, unless otherwise requested by the applicable regulator or tenure holder:</p> <ul style="list-style-type: none"> <li>a. Seed Mix A (level and gently sloping terrain - poorly drained): Tufted hair grass 25%, Fowl bluegrass 25%, Awned wheatgrass 20%, Fringed brome 20%, and June grass 10%. Drill (with a range drill) at 15 kg/ha or broadcast at 20–25 kg/ha and harrow in if seeding during non-frozen conditions. Broadcast at 20–25 kg/ha if seeding during frozen conditions.</li> <li>b. Seed Mix B (upland and level terrain - better drained mineral soils): Fringed brome 30%, Hairy wild rye 20%, Awned wheatgrass 20%, June grass 10%, Rough hair grass 10%, and Tufted hair grass 10%. If hairy wild rye is not available, blue (smooth) wild rye is an acceptable replacement. Drill (with a range drill) at 15 kg/ha or broadcast at 25–30 kg/ha and harrow in if seeding during non-frozen conditions. Broadcast at 25–30 kg/ha if seeding during frozen conditions.</li> <li>c. Seed Mix C (moderate and steep slopes, wind erodible soils and the banks of watercourses): Seed mix B at 35 kg/ha and a nurse crop (e.g., fall rye) at 45 kg/ha. Total @ 80 kg/ha hand broadcast at 80 kg/ha and hand rake if seeding during non-frozen conditions. Broadcast at 80 kg/ha if seeding during frozen conditions.</li> </ul> <p>35. Avoid the use of fertilizer within 15 m of stream banks and wetlands.</p>
<i>Temporary Locations</i>	<p>36. Reclaim temporary, off-easement work locations (e.g., pipe storage, office, and equipment material storage).</p>

## ENVIRONMENTAL PROTECTION PLAN

Post-Construction Activities and Monitoring  
October 21, 2016

### 8.0 POST-CONSTRUCTION ACTIVITIES AND MONITORING

Post-construction inspection and monitoring is intended to monitor the condition of the ROW following implementation of final reclamation and establishment of erosion and sediment control measures. Monitoring will also continue during operations. Further information is found in section 7 of Spectra's EMCPC (Spectra 2014).

**Table 8-1 Environmental Protection Measures for Post-Construction Activities**

Activity/Concern	General Measures
<i>Clean-Up Inspection</i>	<ol style="list-style-type: none"><li>1. Results of mechanical clean-up will be inspected and the work plan updated prior to final clean-up.</li><li>2. Results of final clean-up will be inspected and corrective actions undertaken as required.</li></ol>
<i>Revegetation Inspection</i>	<ol style="list-style-type: none"><li>3. Revegetation success will be inspected in the first and third years following clean-up (potentially 2019 and 2021).</li><li>4. Revegetation will be considered successful when the vegetative ground cover is sufficient to inhibit erosion of soils on the disturbed ROW, including the banks of disturbed watercourses.</li><li>5. On agricultural lands, seed mixtures must not increase the frequency or distribution of weed species on the surface lease or on adjacent undisturbed ground</li><li>6. Where natural regeneration is planned, progress will be monitored and reported upon, according to a post-construction monitoring plan developed by Westcoast.</li></ol>
<i>Operation and Maintenance</i>	<ol style="list-style-type: none"><li>7. The Spectra EMCPC (Section 7) will be followed for the operation and maintenance of the pipeline.</li><li>8. These are accessible electronically to all Westcoast personnel and contractors via Westcoast's intranet, the Source.</li><li>9. Westcoast will comply with all applicable Safe Operating Procedures in the operation and maintenance of the Project. The Project will be designed to accommodate in-line inspection tools (smart pigs).</li><li>10. Applicable measures (e.g., for trenching and trench dewatering) will be followed if exposure (daylighting) of the pipe is needed for inspection or repairs.</li><li>11. The Best Management Practices for Pipeline Stream Crossings in BC (EPP Appendix C) will be adhered to during vegetation maintenance activities in riparian areas.</li></ol>



References  
October 21, 2016

### 9.0 REFERENCES

- British Columbia Ministry of Forests, Lands, and Natural Resource Operations (BC MFLNRO). 2014. A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia. Available at: <http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do;jsessionid=brggXvkSzz0787K2R3N21GbvyhWt1T80JDsDkGnTSwzwpSB3Qwk4!1219224633?subdocumentId=9921>. Accessed September 2016.
- British Columbia Oil and Gas Commission (BC OGC). 2016. Environmental Protection and Management Guide. Available at: <http://www.bcogc.ca/node/5899/download>. Accessed September 2016.
- Canadian Council of Ministers of the Environment (CCME). 2002. Canadian Environmental Water Quality Guidelines. Available at: <http://ceqg-rcqe.ccme.ca/download/en/217>. Accessed January 2016.
- Canadian Pipeline Water Crossing Committee. 2005. Watercourse Crossings. 3rd ed. Canadian Pipeline Water Crossing Committee, Calgary, Alberta.
- Delong, C. S., A. Banner, W. H. MacKenzie, B. J. Rogers and B. Kaytor. 2011. A Field Guide to Ecosystem Identification for the Boreal White and Black Spruce Zone of British Columbia. Ministry of Forests and Range, Forest Science Program, Victoria, BC. Land Management Handbook No. 65. <https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh65.pdf>.
- Environment Canada. 2014. General Nesting Periods of Migratory Birds in Canada. Accessed 2014. [http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1#\\_01\\_4](http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1#_01_4).
- Fisheries and Oceans Canada (DFO). 1995. Freshwater Intake End-of-Pipe Fish Screen Guideline. Department of Fisheries and Oceans, Communications Directorate, Ottawa, Ontario.
- Fisheries and Oceans Canada (DFO). 2013. Measures to Avoid Causing Harm to Fish and Fish Habitat. Available at: <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html>. Accessed: November 2015.
- Ministry of Environment (MOE). 2015. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Summary Report. Accessed 2015. [http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/waterqualityguidesobj/approved-wat-qual-guides/approved\\_wqg\\_summary\\_dec\\_2\\_2015.pdf](http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/waterqualityguidesobj/approved-wat-qual-guides/approved_wqg_summary_dec_2_2015.pdf).
- Ministry of Water, Land, and Air Protection (MWLAP). 2004. Standards and Best Practices for Instream Works. Ecosystems Standards and Planning, Biodiversity Branch. March 2004.

## ENVIRONMENTAL PROTECTION PLAN

### References

October 21, 2016

National Energy Board (NEB). 1999. Onshore Pipeline Regulations. Last amended March 21, 2013.  
<http://laws-lois.justice.gc.ca/PDF/SOR-99-294.pdf>.

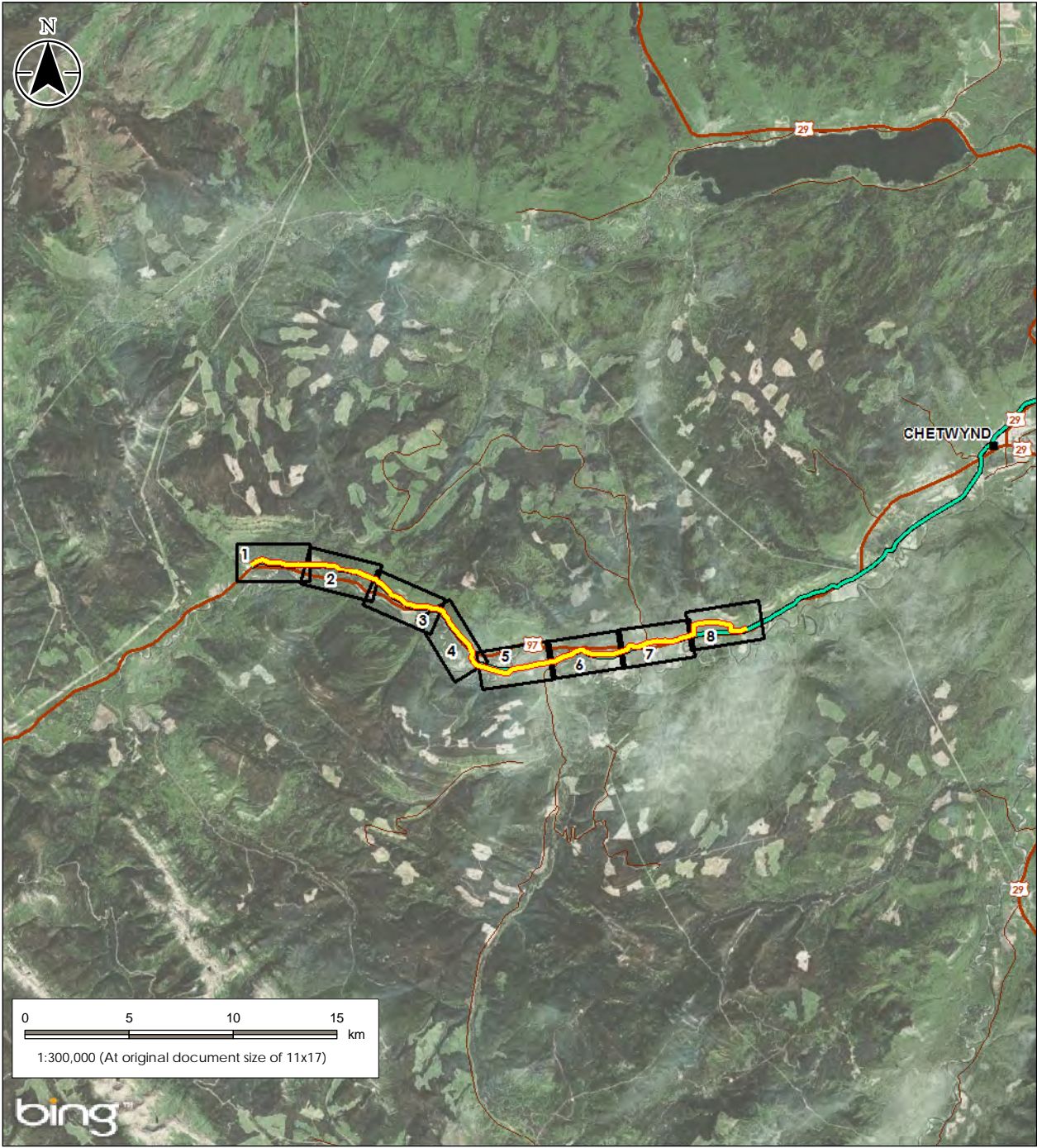
Northeast Invasive Plant Council (NEIPC). 2010. Peace Liard Revegetation Manual.  
[http://prrd.bc.ca/wp-content/uploads/2014/12/NEIPC\\_Reveg\\_manual\\_PeaceLiard\\_April2010\\_002.pdf](http://prrd.bc.ca/wp-content/uploads/2014/12/NEIPC_Reveg_manual_PeaceLiard_April2010_002.pdf).

Spectra Energy Transmission (Spectra). 2014. Environmental Manual for Construction Projects in Canada (EMCPC), 3rd Edition. March 2015.

# **APPENDIX A ENVIRONMENTAL ALIGNMENT SHEETS**







- City or Town
- Road
- Highway
- Existing Westcoast FSJ Mainline
- Proposed Loop
- Alignment Sheet Extent

Notes

- Coordinate System: NAD 1983 UTM Zone 10N
- Data Sources Include: DataBC, Government of British Columbia (GovBC); Terrain Resource Information Management, GovBC; National Topographic System, GovBC; BC Stats, GovBC; BC Oil & Gas Commission, GovBC; CanVec v12, Government of Canada (GC); National Hydrology Network, GC; Atlas of Canada National Framework, GC; Fisheries and Oceans Canada, GC; Environment Canada; Natural Resources Canada; Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation;
- Orthophotography: © Harris Corp, Earthstar Geographics LLC Earthstar Geographics SIO © 2016 Microsoft Corporation

Disclaimer: Contains information licensed under the Open Government License - British Columbia, Canada. Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

## Environmental Notes

- Fisheries:
- F1 No visible channel or no watercourse evident at mapped watercourse. No timing restrictions or riparian setbacks for this location. Apply mitigation measures from the Environmental Protection Plan (EPP) for normal clearing, grading, trenching, pipe installation, and post-construction.
  - F2 Non-classified drainage and not fish-bearing. The watercourse has no connection to fish-bearing waters; not fish habitat. No restriction on the timing of instream works and no requirements for riparian setbacks.
  - F3 Not fish-bearing. No restriction on the timing of instream works. Riparian setback as per the EPP, Appendix A.
  - F4 Fish-bearing watercourse. Riparian setbacks as per EPP, Appendix A.
  - F5 No restriction on the timing of instream works (poor/no spawning habitat).
  - F6 Conduct all instream work between July 15 and March 31 (spring spawning fish may be present).
  - F7 Conduct all instream work between July 15 and August 15 (both spring and fall spawning fish may be present).
  - F8 Disturbance and clearing of vegetation within the Riparian Management Area (RMA) should be reduced. In keeping with the Oil and Gas Activities Act Environmental Protection and Management Regulation.
  - F9 Use an open cut crossing method if dry or frozen completely to the bottom at the time works are conducted. Use an isolated crossing method (dam and pump or flume) if flowing water is present. See the EPP, Appendix C for measures to avoid harm to fish and fish habitat for open cut and isolated stream crossing methods. See Appendix E for typical drawings.
  - F10 If using an isolated crossing method, rescue fish from isolated work area before dewatering and starting instream work. Install screen intakes on dewatering pump and diversion pump.
  - F11 Keep the right-of-way (ROW) clearing as narrow as possible within the Riparian Reserve Zone (RRZ). The RRZ should not be entered except for stream crossing activities. Spoil piles, strippings, log decks, and temporary work areas should be located outside of the RRZ. Disturbance and clearing of vegetation within the Riparian Management Area (RMA) should be reduced. In keeping with the *Oil and Gas Activities Act* Environmental Protection and Management Regulation.
  - F12 If using an isolated crossing method that requires dewatering, place the dewatering discharge in a flat, stable, vegetated area away from banks or slopes and 50 m away from any watercourse. Use a diffuser to slow and spread the discharge water and tarpaulins or sheeting over the ground to reduce direct water impact to soil.
  - F13 Install temporary clear-span bridges over fish-bearing streams for vehicle crossing. See EPP Appendix A, Section C.1 for measures to avoid harm to fish and fish habitat when installing clear span bridges and Appendix E Drawing 22.
  - F14 Install ramp and culvert vehicle crossings over non-fish-bearing watercourses for temporary vehicle crossing. See EPP Appendix E, Drawing 21. Confirm crossing requirements in field based on site conditions.
  - F15 Seed banks with Seed Mix C at 80 kg/ha (either by landowner or approved by landowner) and mulch with organic materials to decrease erosion and increase germination (for details see the EPP Table 14-1).
  - F16 For bank stabilization, soft engineering (live posts/stakes, brush layering) is preferred over riprap armoring to facilitate natural channel processes. On steep banks with no riprap, utilize brush layering or a geogrid system to stabilize soil. If stream banks must be armored, install live dormant posts of willow or dogwood between riprap and through any underlying geotextile cloth at a density of 1 post/m², and install live stakes above riprap.
  - F17 Conduct all instream work between July 15 and January 15 (both spring spawning fish and winter spawning fish (i.e., burbot) may be present).
  - F18 Conduct all instream work between July 1 and January 15 (winter spawning fish (i.e., burbot) may be present).
  - F19 Trenchless crossing method will be used for this watercourse crossing. No restriction on timing for trenchless crossings.
  - F20 See EPP Appendix C.4 for measures to protect fish and fish habitat for trenchless crossings. See Appendix E for typical drawings.
- Soil:
- S1a Topsoil water erosion: High water erosion risk in topsoil when bare conditions; priority areas for installation of sediment barriers and other erosion control measures when stockpiling or replacing.
  - S1b Subsoil water erosion: High water erosion risk in subsoil once topsoil is salvaged; priority areas for installation of sediment barriers and other erosion control measures.
  - S2a Topsoil wind erosion: High wind erosion risk rating for topsoil when bare conditions; priority areas for installation of silt fences for wind breaks, tackifiers/hydroseeding or water spraying for dust suppression of stockpiles or when soil replaced.
  - S2b Subsoil wind erosion: High wind erosion risk rating for topsoil when bare conditions; priority areas for installation of silt fences for wind breaks, tackifiers/hydroseeding or water spraying for dust suppression of stockpiles or when soil replaced.
  - S3 Subsoil compaction: High compaction or rutting risk rating for subsoils once topsoil is salvaged or replaced; priority areas for installation of corduroy or swamp mats during salvage and decompaction in work space areas only prior to topsoil replacement.
  - S4 Shallow bedrock: Bedrock within trench depth.
  - S5 Gravel: High coarse fragment content within trench depth.
  - S6 Unstable trench: Sand, organics or other non-cohesive soil textures. Potentially unstable trench.
  - S7 High water table or seepage: Seepage or high water table may be encountered within trench depth. Potentially unstable trench.
  - S8 Deep peat: Deep organics (greater than 40 cm of peat).
  - S9 Surface Stoniness: High surface stoniness.
  - S10 Blade strip: Well-sodded hayland and improved pasture, may use blade-width stripping and stockpile topsoils on undisturbed soil.
  - S11 Calcareous soil: Separate trench material from salvaged topsoil. Calcareous soil at depth.
- Vegetation:
- V1 Follow weed management in accordance with SET Environmental Manual for Construction Projects in Canada, 3rd Edition (Spectra 2015).
  - V2 Acquire appropriate regulatory permits and/or authorizations for crossing, or working in or around a wetland.
  - V3 Avoid the use of deleterious materials near wetlands.
  - V4 Avoid placing work areas in or around wetlands, if possible. If not possible, a 20m buffer applies.
  - V5 Pump bell holes onto stable well-vegetated areas or constructed containment areas in a manner that does not cause erosion or sedimentation of a wetland. Pre-determine discharge locations and monitor to verify no flooding or erosion occurs.
  - V6 Limit temporary workspace and narrow ROW if possible. The use of blade width clearing will be used, where practical.
  - V7 Engage in a post-construction monitoring plan that seeks to restore identified wetlands to baseline conditions and function.
  - V8 Confirm presence/absence of red-listed ecosystems at risk within clearing areas; stake boundaries and reduce disturbance to these ecosystem occurrences where practical.
  - V9 Where practical, maintain buffers at wetlands and riparian ecosystems as prescribed in Section 8.0 Fish and Fish Habitat Table 8-6.
  - V10 Clearly delineate the boundaries of wetlands in proximity of planned disturbances to facilitate avoidance during construction.
  - V11 Stake and flag known locations of plant species at risk and maintain a 20m vegetation buffer.
- Wildlife:
- W1 Observe ROW and work site dimensions and lessen disturbance to vegetation, wildlife habitat, and sensitive areas.
  - W2 Where clearing work is to occur during the breeding bird window (April 25-August 8), a nesting survey will be completed as specified in the EPP. All other clearing will be completed outside the breeding bird window.
  - W3 Wetland will be assessed for use by breeding western toad if construction is to take place between early May and mid-August.
  - W4 Where feasible, construction will be avoided in wetlands containing western toad egg masses and tadpoles during the breeding period for western toad (early May to mid-August).
  - W5 If construction cannot be avoided during the breeding period for western toad, an amphibian survey will be conducted prior to construction within previously identified breeding wetlands to identify the presence of western toad individuals, eggs or tadpoles.
  - W6 During the pre-construction survey if breeding habitat is identified within 30 m of the project development area (PDA), project activities are likely to affect western toad juvenile dispersal. Silt fencing will be used to prevent dispersing juvenile toads from moving into project clearing or construction areas from nearby wetlands. A qualified biologist will inspect project ROW 5 to 7 days in advance of construction activities for presence of adult western toads. The EI will conduct daily toad sweeps prior to start of daily construction activities. Capture and relocation (if applicable) will be conducted under the supervision of a qualified biologist and based on the requirements of a Wildlife Salvage Permit.
  - W7 During the pre-construction survey if avoidance of potential western toad breeding habitat is identified as not feasible, western toad egg, tadpole, juvenile, and/or adult salvage will be implemented to mitigate mortality risk. Westcoast will contact the appropriate regulator, acquire the necessary permits, and use best practices for salvage and relocation.
  - W8 Maintain a 60 m buffer on active bear dens during construction (between November 15 and May 1, depending on the season).
  - W9 Westcoast will develop and implement a Preliminary Caribou Habitat Restoration Plan (CHRP) that will include construction and post-construction mitigation measures to avoid and reduce habitat loss, and restore on-site when working within caribou herd range. Westcoast will develop a monitoring program using an adaptive management framework to monitor the implementation and effectiveness of the mitigation measures.
  - W10 To avoid effects to mineral licks, maintain 100 m buffer, where feasible, from April to October. If it is not possible to maintain 100 m setback, additional mitigation measures, such as maintaining trees to provide buffer, or snow fencing between ROW and lick to prevent encroachment by construction crews.
  - W11 Clearing of trees identified as potential fisher den trees will be avoided during the critical period for fisher natal denning and early rearing (March 15 to June 30; BC MFLNRO 2014). If clearing of these trees cannot be avoided during this period, a qualified biologist will conduct an assessment of the potential fisher dens early on in the denning season to determine if the dens identified in the PDA are active and whether or not they are fisher dens. If the dens are determined to be fisher dens and they are active, clearing will be avoided within 200 m of these dens until kits have left the dens.
  - W12 Assess nest prior to construction. If nest is active, appropriate timing restrictions and setbacks will be applied as per provincial regulations where feasible. If removal is required, it will be conducted outside the active nesting period.
  - W13 Construction will be avoided, where feasible, during the critical period identified for trumpeter swan (April 1 to August 31, BC MFLNRO 2014) within 200 m from the high water mark of active trumpeter swan breeding sites (BC OGC 2016b). If not feasible, the duration of work in within the buffer will be reduced to the greatest extent possible.
- Reclamation:
- R1 Rollback slash and small diameter, non-merchantable timber, if available.
  - R2 Revegetation will be completed as per Table 7-15 in the EPP.



Project Location	123220406
North-Eastern British Columbia	Prepared by S.Sun on 2016-09-30 Technical Review by Independent Review by I. Levitt
Client/Project	Spectra Energy Transmission Wyndwood Expansion Project Environmental Protection Plan
Figure No.	Index
Title	

ALIGNMENT SHEET - INDEX MAP





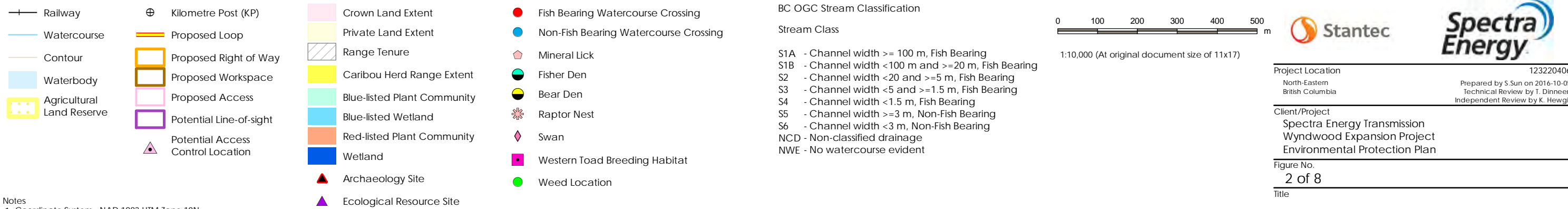
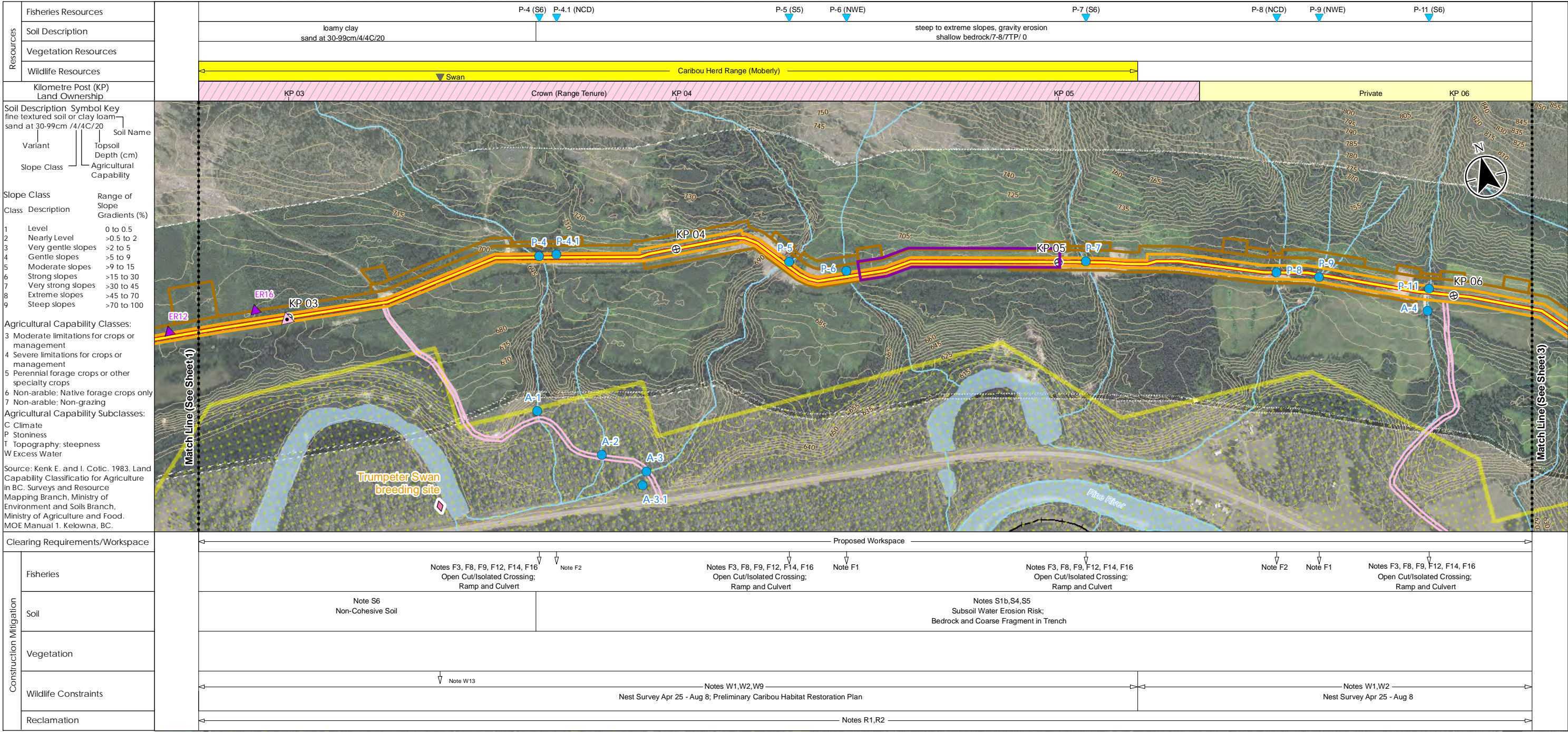








S:\1232\project\123220406\Nature\Reports\EP\alignment\_sheets\N123220406\_000\_alignment\_mapbook.mxd      Revised: 2016-10-08 By: s.un



Notes  
1. Coordinate System: NAD 1983 UTM Zone 10N  
2. On the alignment sheets refer to the environmental notes located on the index sheet. All section references on the index sheet refer to the Environmental Protection Plan (EPP), located in Appendix A of the Environmental and Socio-economic Assessment (ESA).  
3. Data Sources Include: DataBC, Government of British Columbia (GovBC); Terrain Resource Information Management, GovBC; National Topographic System, GovBC; BC Stats, GovBC; BC Oil & Gas Commission, GovBC; CanVec v12, Government of Canada (GC); National Hydrology Network, GC; Atlas of Canada National Framework, GC; Fisheries and Oceans Canada, GC; Environment Canada; Natural Resources Canada; Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation;

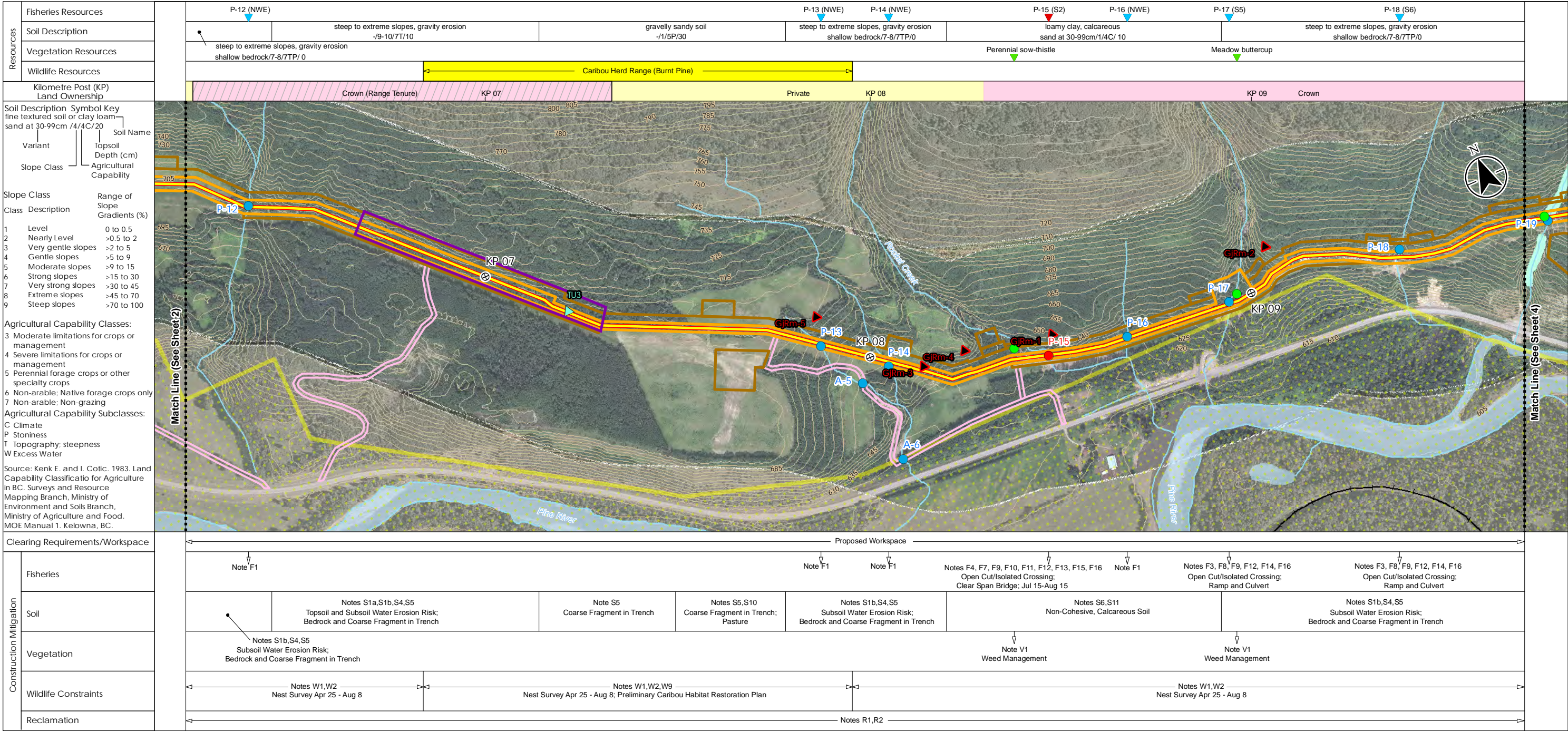
Disclaimer: Contains information licensed under the Open Government License - British Columbia, Canada. Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.







S:\1232\Projects\123220406\Natures\Reports\EP\alignment sheet\N123220406\_00p\_alignment mapbook.mxd      Revised: 2016-10-05 By: sun

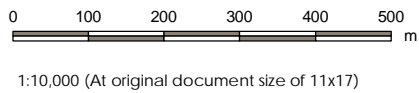


- |                           |                                   |                             |                                       |
|---------------------------|-----------------------------------|-----------------------------|---------------------------------------|
| Railway                   | Kilometre Post (KP)               | Crown Land Extent           | Fish Bearing Watercourse Crossing     |
| Watercourse               | Proposed Loop                     | Private Land Extent         | Non-Fish Bearing Watercourse Crossing |
| Contour                   | Proposed Right of Way             | Range Tenure                | Mineral Lick                          |
| Waterbody                 | Proposed Workspace                | Caribou Herd Range Extent   | Fisher Den                            |
| Agricultural Land Reserve | Proposed Access                   | Blue-listed Plant Community | Bear Den                              |
|                           | Potential Line-of-sight           | Blue-listed Wetland         | Raptor Nest                           |
|                           | Potential Access Control Location | Red-listed Plant Community  | Western Toad Breeding Habitat         |
|                           | Traditional Use Site              | Wetland                     | Weed Location                         |
|                           |                                   | Archaeology Site            |                                       |

BC OGC Stream Classification

Stream Class

- S1A - Channel width  $\geq 100$  m, Fish Bearing  
S1B - Channel width  $< 100$  m and  $\geq 20$  m, Fish Bearing  
S2 - Channel width  $< 20$  and  $\geq 5$  m, Fish Bearing  
S3 - Channel width  $< 5$  and  $\geq 1.5$  m, Fish Bearing  
S4 - Channel width  $< 1.5$  m, Fish Bearing  
S5 - Channel width  $\geq 3$  m, Non-Fish Bearing  
S6 - Channel width  $< 3$  m, Non-Fish Bearing  
NCD - Non-classified drainage  
NWE - No watercourse evident



Project Location		123220406
North-Eastern British Columbia		Prepared by S.Sun on 2016-10-05 Technical Review by T. Dinneen Independent Review by K. Hewgill
Client/Project		
Spectra Energy Transmission Wyndwood Expansion Project Environmental Protection Plan		
Figure No.		
3 of 8		
Title		

- Notes
- Coordinate System: NAD 1983 UTM Zone 10N
  - On the alignment sheets refer to the environmental notes located on the index sheet. All section references on the index sheet refer to the Environmental Protection Plan (EPP), located in Appendix A of the Environmental and Socio-economic Assessment (ESA).
  - Data Sources Include: DataBC, Government of British Columbia (GovBC); Terrain Resource Information Management, GovBC; National Topographic System, GovBC; BC Stats, GovBC; BC Oil & Gas Commission, GovBC; CanVec v12, Government of Canada (GC); National Hydrology Network, GC; Atlas of Canada National Framework, GC; Fisheries and Oceans Canada, GC; Environment Canada; Natural Resources Canada; Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation;
- Disclaimer: Contains information licensed under the Open Government License - British Columbia, Canada. Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

ALIGNMENT SHEET 3





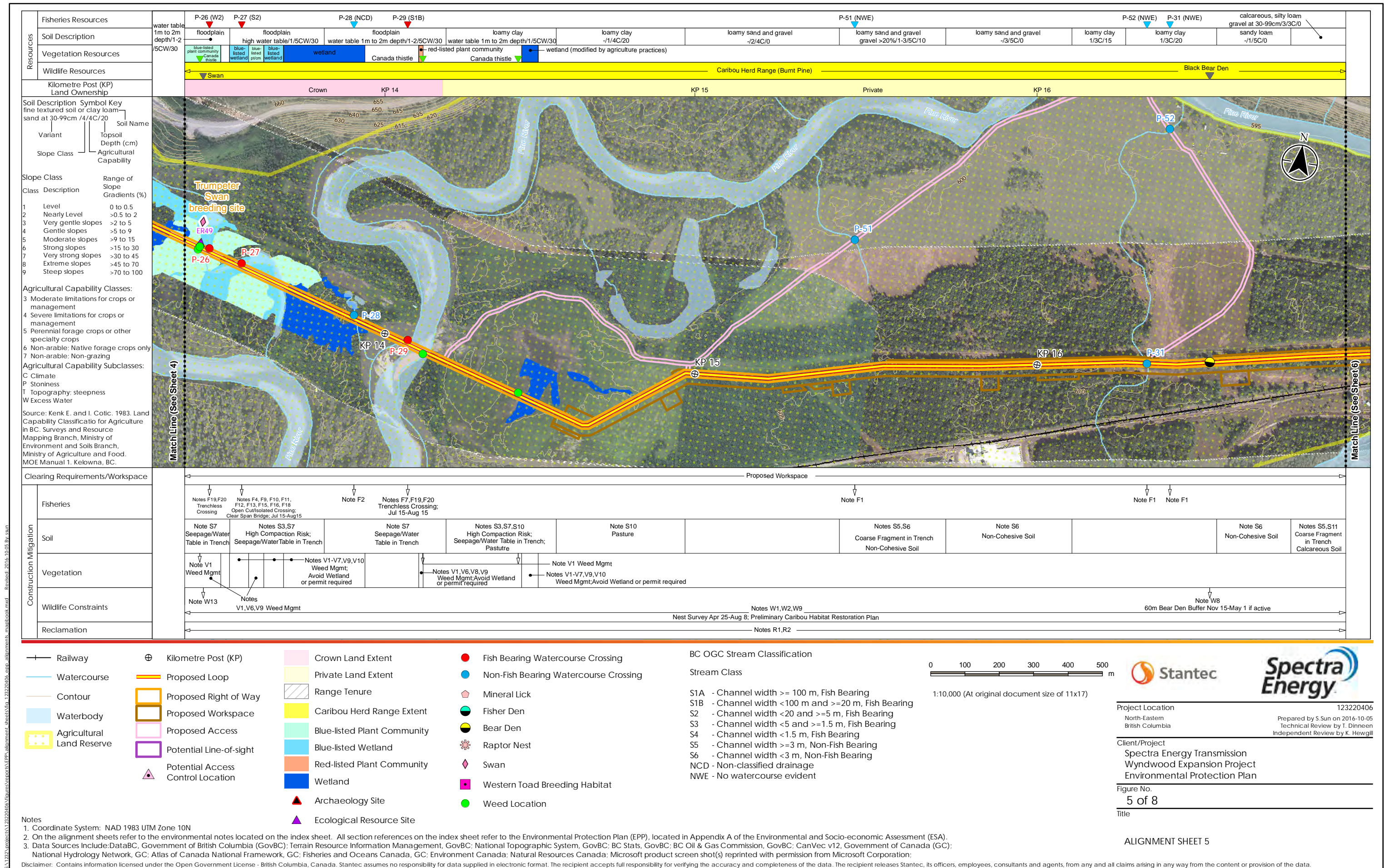
















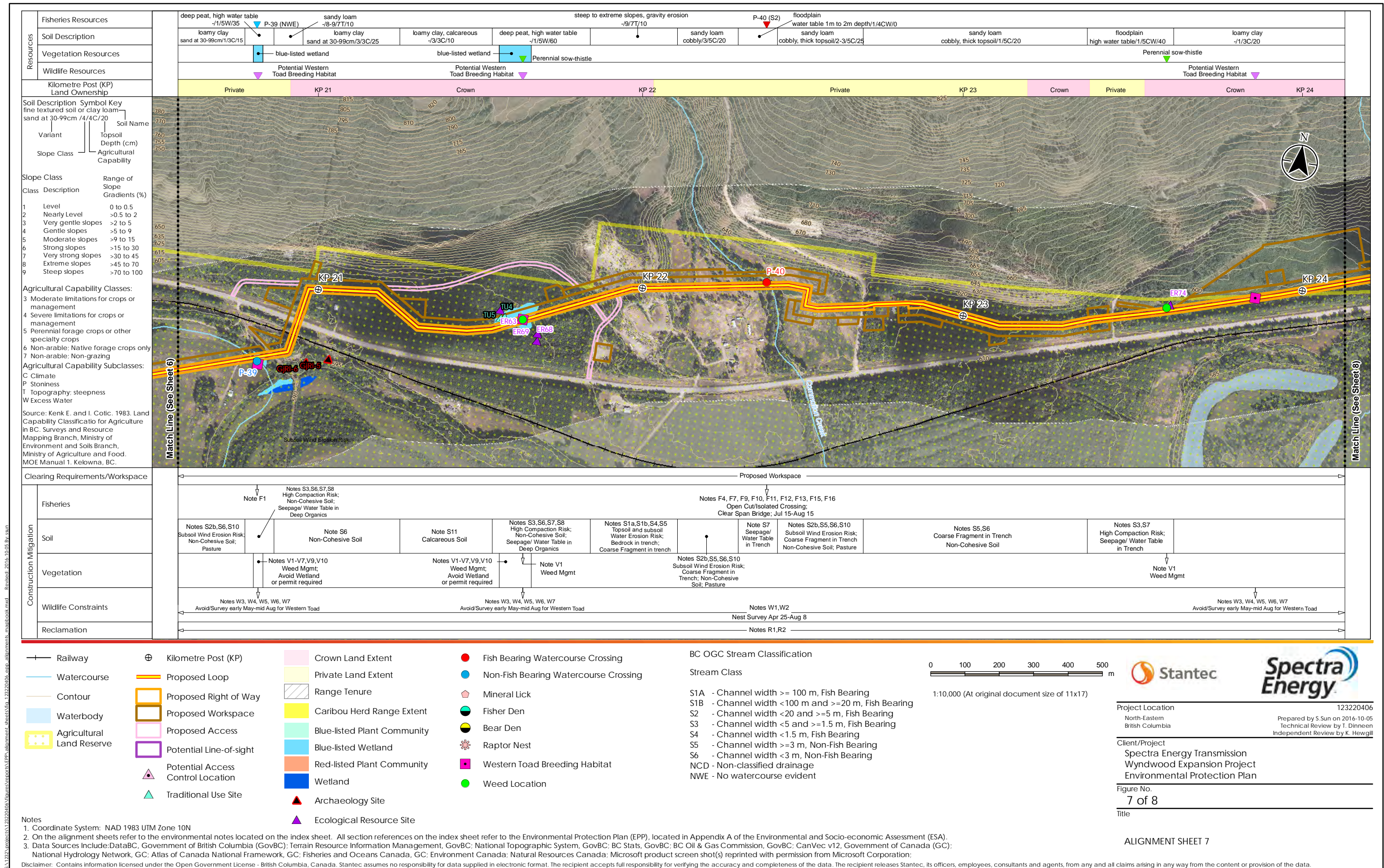








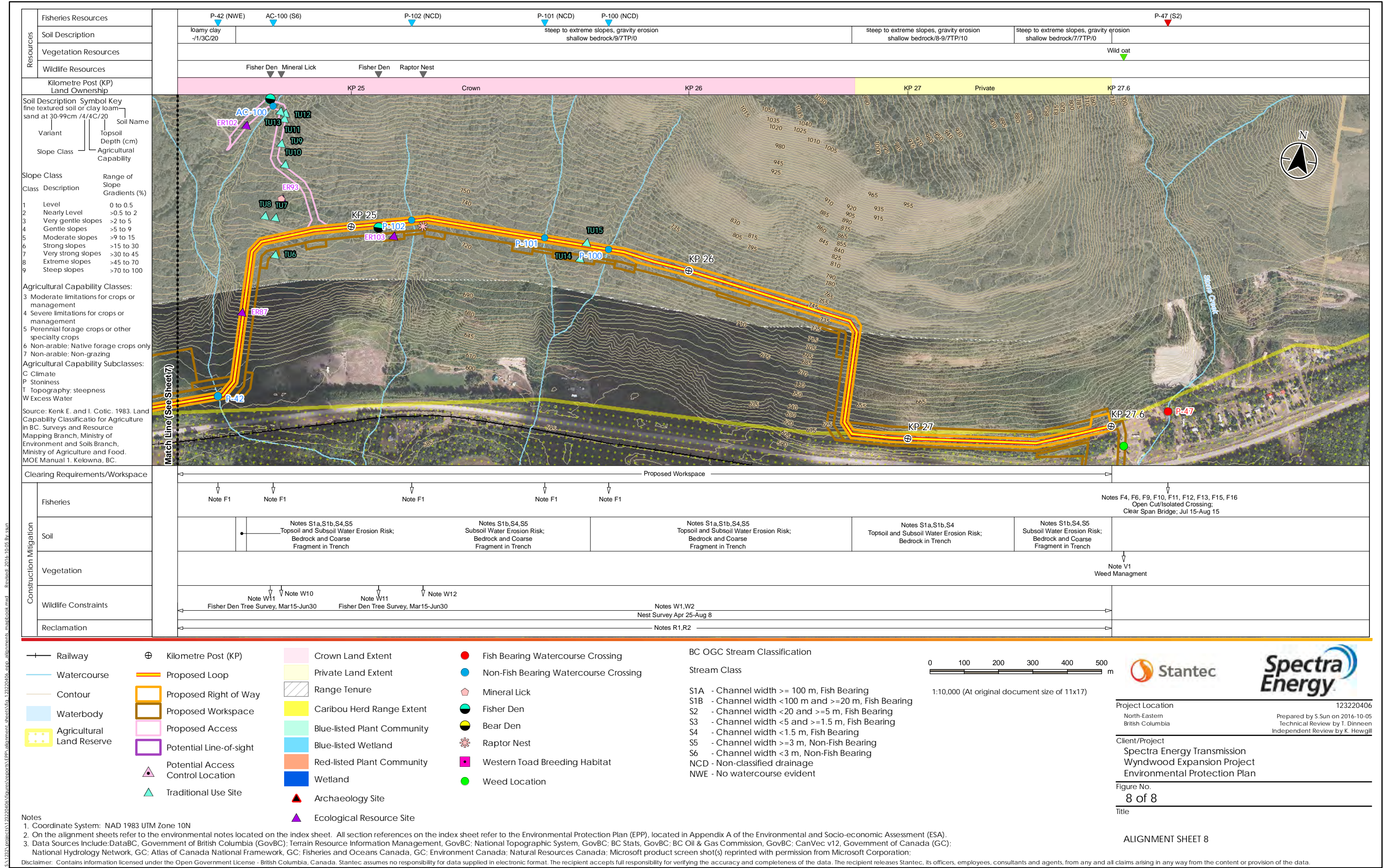
















**APPENDIX B**  
**ENVIRONMENTAL APPROVALS/  
PERMIT LIST**



## ENVIRONMENTAL PROTECTION PLAN

Appendix B Environmental Approvals/Permit List  
October 21, 2016

### Appendix B ENVIRONMENTAL APPROVALS/PERMIT LIST

**Table B-1 Potential Permits Required Before Construction**

Permit or Consent	Legislation	Responsible Agency	Project Details
<b>Provincial</b>			
Occupant license to cut	<i>Forest Act</i> , section 47	MFLNRO	Dependent on timber ownership
Temporary occupation of Crown Land and license of occupation (construction ROW and ROW)	<i>Land Act</i> , section 14/39	OGC	Applicable
Approval for changes in and about a stream	<i>Water Sustainability Act</i> , section 11	OGC	Applicable; Stantec or Westcoast to obtain
Prescribed roads (private land)	<i>Oil and Gas Activities Act</i>	OGC	Applicable
Archaeology site alteration permit	<i>Heritage Conservation Act</i> , section 12	OGC	Applicable
Forest service road use	<i>Forest Act</i> , section 117	OGC	Applicable
Use or occupancy permits to cross or use highway ROW	<i>Transportation Act</i> , section 62	BC Ministry of Transportation and Infrastructure	Applicable – Access Road 230
<b>Federal</b>			
Ministerial authorization, with conditions, to carry on a work, undertaking, or activity that may cause serious harm to fish that are part of a commercial, recreational, or Aboriginal (CRA) fishery, or to fish that support such a fishery	<i>Fisheries Act</i> , paragraph 35(2)(b)	DFO	NEB ESA Application will involve discussions with DFO to cover off section 35

## ENVIRONMENTAL PROTECTION PLAN

Appendix B Environmental Approvals/Permit List  
October 21, 2016

**Table B-2 Potential Environmental Permits Required During Construction**

Permit or Consent	Legislation	Responsible Agency	Project Details
<b>Provincial</b>			
Approval for short term use of water	<i>Water Sustainability Act, section 10</i>	OGC	Applicable unless municipal water source is used; Stantec to obtain for Crown surface sources (excluding borrow pits)
Fish collection permit (for fish salvage)	<i>Wildlife Act</i>	MFLNRO	Applicable
Wildlife sundry permits (beaver dam removal, wildlife salvage, amphibian relocation)	<i>Wildlife Act</i>	MFLNRO	Applicable – amphibian salvage
Burning permits	<i>Forest Act</i>	MFLNRO	Applicable
Water discharge permit (hydrotesting)	<i>Environmental Management Act</i>	OGC	Applicable

**APPENDIX C**  
**BEST MANAGEMENT PRACTICES FOR**  
**PIPELINE STREAM CROSSINGS IN**  
**BRITISH COLUMBIA**





# Appendix C BEST MANAGEMENT PRACTICES FOR PIPELINE STREAM CROSSINGS IN BRITISH COLUMBIA

## C.1 INTRODUCTION

The *Fisheries Act* requires that proponents avoid effects on fish and fish habitat and avoid causing serious harm to fish and fish habitat when executing their projects, unless authorized by DFO.

The Department interprets serious harm to fish as:

- The death of fish
- A permanent alteration to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes
- The destruction of fish habitat of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes. (DFO 2013b)

The DFO may issue a section 35 authorization to allow an applicant to undertake an activity that may result in serious harm to fish under appropriate terms and conditions (DFO 2013a). A permit from DFO will be required to relocate any aquatic species that are listed as either endangered or threatened under the *Species at Risk Act* (SARA). Westcoast will contact the DFO office in the area to determine if an aquatic species at risk is in the vicinity of the Project and, if appropriate, use the DFO website at [www.dfo-mpo.gc.ca/species-especes/permits-permis/application-eng.htm](http://www.dfo-mpo.gc.ca/species-especes/permits-permis/application-eng.htm) to apply for a permit.

This document details methods and measures to protect fish and fish habitat on the Wyndwood Project in BC, when working near water or during installation of pipeline crossings, and includes procedures for:

- Dry open-cut crossings
- Isolated crossings
- Temporary ford stream crossings
- Maintenance of riparian vegetation in existing ROW
- Clear span bridges
- Trenchless Method
- Ice bridges
- Ramp and culvert

Measures included in this section should be considered and implemented along with other mitigation measures such as contingency plans. A qualified environmental professional should be consulted when conducting work near water or instream work.

### C.2 DRY OPEN-CUT CROSSINGS

(Adapted from DFO Pacific Region Operational Statement – Dry Open-Cut Stream Crossings, Version 1.0.)

For the purpose of this document, the term “Dry Open-cut Crossing” means a pipeline stream crossing installation that is carried out during a period when the entire stream width is seasonally dry or is frozen to the bottom. Typically, these conditions are found in ephemeral streams or in portions of smaller streams in northern BC in mid-winter.

Dry open-cut crossings pose a risk to fish and fish habitat due to potential harm to substrates, destabilization of stream banks and channels, loss of riparian habitat, and release of excessive sediment once stream flows resume. Trenching through stream banks and channels alters their habitat and substrate characteristics and hence their productivity. Trenching may also cause the proportion of surface and subsurface flows to shift, altering stream hydrology.

The purpose of this section is to describe the conditions under which it is applicable to the Project and the measures to incorporate into the Project in order to avoid negative impacts to fish habitat. A dry open-cut stream crossing may proceed without a DFO review when the following conditions are met:

- The watercourse is seasonally dry or frozen completely to the bottom at the site during the time works are conducted.
- The site does not occur at a stream location involving known fish spawning habitat.
- Physical works below the HWM are restricted to the crossing construction ROW.
- The use of explosives is not required to complete the crossing.
- The Measures to Protect Fish and Fish Habitat when Carrying Out a Dry Open-cut Crossing listed below are incorporated.

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-1 Measures to Protect Fish and Fish Habitat when Carrying Out a Dry Open-cut Crossing**

Activity/Concern	Measures
<i>Timing</i>	<ol style="list-style-type: none"> <li>1. Complete the crossing in a manner that limits the duration of work in the channel.</li> <li>2. Avoid construction during unusually wet, rainy or winter thaw conditions to reduce likelihood of flows beginning during the crossing.</li> </ol>
<i>Equipment</i>	<ol style="list-style-type: none"> <li>3. Operate equipment in a manner that limits disturbance to the watercourse bed and banks.</li> <li>4. Protect entrances at machinery access points (e.g., using swamp mats) and establish single site entry and exit.</li> <li>5. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks, invasive species, and noxious weeds.</li> <li>6. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the watercourse to prevent deleterious substances from entering the water.</li> <li>7. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery. The kit should be appropriate for the type and quantity of deleterious substances on site. All staff should be trained on proper deployment and use of emergency spill response equipment.</li> <li>8. Develop an emergency response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance.</li> </ol>
<i>Disturbance Area</i>	<ol style="list-style-type: none"> <li>9. Limit disturbance to riparian vegetation (i.e., vegetation that occurs adjacent to the watercourse) by using existing trails, roads or cut lines wherever practical and prevent soil compaction.</li> <li>10. Locate crossings at straight sections of the stream, perpendicular to the banks, whenever practical. Avoid crossing on meander bends, braided streams, alluvial fans, active floodplains, or other area that is inherently unstable and may result in the erosion and scouring of the stream bed.</li> <li>11. Select a site with early stage forest, or shrub and grass riparian vegetation. Avoid thick riparian canopies and mature growth.</li> </ol>
<i>Erosion and Sediment control</i>	<ol style="list-style-type: none"> <li>12. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during construction and make all necessary repairs if damage occurs.</li> </ol>
<i>Riparian Vegetation</i>	<ol style="list-style-type: none"> <li>13. The removal of select plants may be necessary to access the construction site. Keep vegetation removal to a minimum and within the utility ROW. Prune or top the vegetation. Where practical, grubbing may be limited to trench line only. Locate temporary work spaces (e.g., laydown and assembly areas) at least 15 m from the streambank. Ongoing vegetation maintenance in the ROW across the riparian areas should foster a sustained vegetative cover.</li> </ol>
<i>Trenching</i>	<ol style="list-style-type: none"> <li>14. Inspect watercourse substrates in advance of operations to confirm substrate and habitat conditions for trenching and determine whether machine pads and/or frozen substrate conditions would be required to limit streambed disturbance. Avoid areas of groundwater upwelling or locations directly upstream of sensitive fish rearing or spawning areas.</li> <li>15. Design the trenching for an appropriate depth below the watercourse to prevent the pipeline from becoming exposed due to natural scouring of the stream bed. Trench widths should be as narrow as practical to accommodate the pipeline and achieve the required depth.</li> </ol>

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-1 Measures to Protect Fish and Fish Habitat when Carrying Out a Dry Open-cut Crossing**

Activity/Concern	Measures
<i>Backfilling</i>	<ul style="list-style-type: none"> <li>16. Segregation and storage of waste trench materials to facilitate trench backfill and site restoration to original conditions.</li> <li>17. Make every effort to backfill the trench so that the first layer excavated is the last to be replaced. This is particularly important if the initial surface material is rocky material.</li> <li>18. Upon completion of backfilling where directed by Westcoast, cover the disturbed area with a shallow layer of clean, washed gravel. This rock layer should be 1–2 rocks deep (or matching depth if original substrate was gravel) and bring the substrate up to the previous grade.</li> </ul>
<i>Clean-up and Reclamation</i>	<ul style="list-style-type: none"> <li>19. All work areas below the HWM should be left in a smooth condition free of depressions that may entrap juvenile fish. Original streambed contours should be restored.</li> <li>20. Remove excess excavated materials from the work site to beyond 15 m where practical from the HWM and stabilize to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or planting them with grass or shrubs.</li> <li>21. Banks will be stabilized, restored to original shape, adequately protected from erosion and, where required, revegetated with shrub or grass species.</li> <li>22. No debris is to remain within the HWM or placed into a stream.</li> <li>23. Revegetate disturbed areas by planting and, where required and where prior brush existing, seeding with shrubs and grasses, and cover such areas with mulch or suitable organics to prevent soil erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and revegetate the following spring.</li> <li>24. Maintain effective sediment and erosion control measures until revegetation of disturbed areas is achieved.</li> <li>25. Stabilize the streambed and restore the original channel shape, bottom gradient and substrate to pre-construction condition.</li> </ul>

## C.3 ISOLATED CROSSINGS

For the purpose of this document, the term “Isolated Crossing” means a pipeline stream crossing installation that is carried out “in-the-dry” by diverting the natural streamflow around the site during construction. This will result in all upstream flows conveying downstream during construction with no change in quality or quantity.

These types of crossings are isolated using a flume or dam and pump technique.

Construction may proceed on an isolated crossing without a DFO review when the following conditions are met:

- Flow at the time of installation is not expected to exceed 1.0 m<sup>3</sup>/s for a dam and pump technique or flume technique.
- It does not involve the construction or use of an off-stream diversion channel, or the use of earthen dams.
- The site does not occur at a stream location involving known fish spawning habitat, particularly if it is dependent on groundwater upwelling.
- The use of explosives is not required to complete the crossing.
- The following (Table C-2) Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated Crossing are incorporated.

**Table C-2 Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated Crossing**

Activity/Concern	Measures
<i>Timing</i>	<ol style="list-style-type: none"> <li>1. Complete the crossing in a manner that limits the duration of instream work.</li> <li>2. Construction should be avoided during unusually wet, rainy or winter thaw conditions.</li> <li>3. Time isolated crossings to protect sensitive fish life stages by adhering to fisheries timing windows (periods of least risk).</li> </ol>
<i>Equipment</i>	<ol style="list-style-type: none"> <li>4. Refer to Temporary Ford Stream Crossings for machinery fording measures (Section C.5).</li> <li>5. Operate machinery in a manner that limits disturbance to the watercourse bed and banks.</li> <li>6. Protect entrances at machinery access points (e.g., using swamp mats) and establish single site entry and exit.</li> <li>7. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.</li> <li>8. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.</li> <li>9. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.</li> </ol>
<i>Disturbance Area</i>	<ol style="list-style-type: none"> <li>10. Use existing trails, roads or cut lines wherever practical as access routes to avoid disturbance to the riparian vegetation.</li> <li>11. Locate crossings at straight sections of the stream, perpendicular to the banks, whenever practical. Avoid crossing on meander bends, braided streams, alluvial fans, active floodplains, or other area that is inherently unstable and may result in the erosion and scouring of the stream bed.</li> </ol>

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-2 Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated Crossing**

Activity/Concern	Measures
<i>Erosion and Sediment Control</i>	<p>12. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during construction and make all necessary repairs if damage occurs.</p> <p>13. Stabilize waste materials removed from the work site, above the HWM, to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.</p>
<i>Riparian Vegetation</i>	<p>14. The removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the pipeline ROW.</p>
<i>Dam Installation</i>	<p>15. Use dams made of non-earthen material, such as water inflated portable dams, pea gravel bags, concrete blocks, steel or wood wall, clean rock, sheet pile or other appropriate designs, to separate the dewatered work site from flowing water.</p> <p>16. If granular material is used to build dams, use clean or washed material that is adequately sized (i.e., moderately sized rock and not sand or gravel) to withstand anticipated flows during the construction. If necessary, line the outside face of dams with heavy poly-plastic to make them impermeable to water. Material to build these dams should not be taken from below the HWM of any water body.</p> <p>17. Design dams to accommodate expected high flows of the watercourse during the construction period.</p>
<i>Pumped Diversions</i>	<p>18. Intakes are operated in a manner that prevents streambed disturbance and fish mortality. Guidelines to determine the appropriate mesh size for intake screens may be obtained from DFO (e.g., Freshwater Intake End-of-Pipe Fish Screen Guideline (1995)).</p> <p>19. The pumping system is sized to accommodate expected high flows of the watercourse during the construction period. Pumps should be monitored at all times, and back-up pumps should be readily available on-site in case of pump failure.</p> <p>20. Protect pump discharge area(s) to prevent erosion and the release of suspended sediments downstream, and remove this material when the works have been completed.</p>
<i>Flume Diversions</i>	<p>21. The flume is sized to accommodate the expected high flows of the watercourse during the construction period. Additional flumes or back up pumps should be available in the event that flows exceed the capacity of the flume.</p>
<i>Dewatering</i>	<p>22. Before dewatering, rescue fish from within the isolated area and return them safely immediately downstream of the worksite.</p> <p>23. Pump sediment laden dewatering discharge into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering a water body.</p>

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-2 Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated Crossing**

Activity/Concern	Measures
<i>Clean-up and Reclamation</i>	<ul style="list-style-type: none"><li>24. Remove accumulated sediment and excess spoil from the isolated area before removing dams.</li><li>25. Vegetate disturbed areas by planting and, where required and where prior brush existed, seeding, preferably with shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.</li><li>26. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.</li><li>27. Stabilize the streambed and restore the original channel shape, bottom gradient and substrate to pre-construction condition before removing dams.</li><li>28. Banks are stabilized, restored to original shape, adequately protected from erosion, and re-vegetated, where required.</li><li>29. If rock is used to stabilize banks, it should be clean, free of fine materials, and of sufficient size to resist displacement during peak flood events. The rock should be placed at the original stream bank grade to verify there is no infilling or narrowing of the watercourse.</li><li>30. Gradually remove the downstream dam first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle.</li><li>31. During the final removal of dams, restore the original channel shape, bottom gradient and substrate at these locations.</li></ul>

### C.4 TRENCHLESS CROSSING

Trenchless (Horizontal Directional Drill [HDD]) is a method where high pressurized inert material to drill a pilot hole which allows for the back reaming and pulling of the pipe under a watercourse. This method is preferable to open-cut and isolated crossings since the pipeline is drilled underneath the watercourse with little disturbance to the bed or banks.

One of the minor risks associated with direct piping is the possibility of surface water disturbance as a result of a spill, tunnel collapse or the rupture of drilling fluid to the surface, known as “inadvertent release”. An inadvertent release is caused when excessive drilling pressure results in drilling fluid propagating toward the surface. This can be managed through proper monitoring, preparing a response plan, and having the appropriate equipment on site in case of a release.

Construction may proceed on an isolated crossing without a DFO review when the following conditions are met:

- The crossing technique will not damage the stream bed and thereby negatively impact fish or fish habitat
- The crossing is not a wet open-cut crossing
- There is an emergency inadvertent release response plan and a contingency crossing plan in place that outline the protocol to monitor, contain and clean-up a potential inadvertent release and an alternative method for carrying out the crossing. The following *Measures to Protect Fish and Fish Habitat* listed below (Table C-3) are incorporated.

**Table C-3 Measures to Protect Fish and Fish Habitat when Carrying Out a Direct Piping and HDD Stream Crossing**

Activity/Concern	Measures
Timing	1. Construction should be avoided during unusually wet, rainy or winter thaw conditions.
Equipment	2. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. Refer to Temporary Ford Stream Crossings for machinery fording measures (Section C.5). 3. Operate machinery in a manner that limits disturbance to the watercourse bed and banks. 4. Protect entrances at machinery access points (e.g., using swamp mats) and establish single site entry and exit. 5. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks. 6. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water. 7. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.



## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-3 Measures to Protect Fish and Fish Habitat when Carrying Out a Direct Piping and HDD Stream Crossing**

Activity/Concern	Measures
<i>Equipment (cont'd)</i>	<ul style="list-style-type: none"> <li>8. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.</li> <li>9. Grading of the stream banks for the approaches should not occur.</li> <li>10. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.</li> <li>11. Operate machinery on land above the ordinary HWM (see definition below) and in a manner that reduces disturbance to the banks of the watercourse.</li> </ul>
<i>Development Area</i>	<ul style="list-style-type: none"> <li>12. Use existing trails, roads or cut lines wherever practical as access routes to avoid disturbance to the riparian vegetation.</li> <li>13. Design the drill path to an appropriate depth below the watercourse to reduce the risk of inadvertent release and to a depth to prevent the line from becoming exposed due to natural scouring of the stream bed. The drill entry and exit points are far enough from the banks of the watercourse to have limited impact on these areas.</li> <li>14. Locate crossings at straight sections of the stream, perpendicular to the banks, whenever practical. Avoid crossing on meander bends, braided streams, alluvial fans, active floodplains, or other area that is inherently unstable and may result in the erosion and scouring of the stream bed.</li> <li>15. Restore banks to stabilized condition if disturbance occurs.</li> </ul>
<i>Erosion and Sediment Control</i>	<ul style="list-style-type: none"> <li>16. Construct a dugout/settling basin at the drilling exit site to contain drilling fluid to prevent sediment and other deleterious substances from entering the watercourse. If this cannot be achieved, use silt fences or other effective sediment and erosion control measures to prevent drilling fluid from entering the watercourse. Inspect these measures regularly during construction and make all necessary repairs if damage occurs.</li> <li>17. Stabilize waste materials removed from the work site, above the HWM, to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.</li> </ul>
<i>Riparian Vegetation</i>	<ul style="list-style-type: none"> <li>18. The removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the pipeline ROW.</li> </ul>

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-3 Measures to Protect Fish and Fish Habitat when Carrying Out a Direct Piping and HDD Stream Crossing**

Activity/Concern	Measures
<i>Emergency Inadvertent Release Response and Contingency Planning</i>	<ol style="list-style-type: none"> <li>19. Keep all material and equipment needed to contain and clean up drilling fluid releases on site and readily accessible in the event of an inadvertent release.</li> <li>20. Implement the inadvertent release response plan that includes measures to stop work, contain the drilling fluid and prevent its further migration into the watercourse and notify all applicable authorities, including the closest DFO office in the area.</li> <li>21. Prioritize clean-up activities relative to the risk of potential harm and dispose of the drilling fluid in a manner that prevents re-entry into the watercourse.</li> <li>22. Clean up measures do not result in greater damage to the banks and watercourse than from leaving the drilling fluid in place.</li> <li>23. Implement the contingency crossing plan including measures to either re-drill at a more appropriate location or to isolate the watercourse to complete the crossing at the current location. See Isolated or Dry Open-cut Stream Crossings Best Management Practices for carrying out an isolated trenched crossing.</li> <li>24. Stabilize waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with preferably grass or shrubs.</li> <li>25. Vegetate disturbed areas by planting and, where required and prior brush existed, seeding preferably with shrubs or grasses, and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.</li> <li>26. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.</li> </ol>

### C.5 TEMPORARY FORD STREAM CROSSINGS

(Adapted from DFO Pacific Region Operational Statement – Temporary Ford Stream Crossings, Version 1.0)

A temporary ford stream crossing consists of:

- A one-time ford in flowing waters, or
- A seasonally dry streambed ford

Temporary ford stream crossings are employed for short term access across a watercourse by construction vehicles and equipment when an existing crossing is not available or practical to use. They are not intended for prolonged use (e.g., forest or mining haul roads).

DFO prefers use of temporary bridges or dry fording over fording in flowing waters due to the reduced risk of damaging the bed of the watercourse and generation of downstream sedimentation caused by vehicles.

The risks to fish and fish habitat associated with temporary ford stream crossings include:

- The potential for destabilization of stream banks
- Compaction of stream beds and spawning habitats
- Changes to channel morphology and hydrology
- Release of sediments and other deleterious substances (e.g., fuel, oil leaks)
- Loss of riparian habitat, or
- Direct harm or disruption to sensitive fish life stages

The purpose of this section is to describe the conditions under which it is applicable to the Project and the measures to incorporate into the Project in order to avoid negative impacts to fish habitat. If the following conditions are met, the temporary fording can proceed without a DFO review:

- The work does not include realigning, dredging, infilling, grading, or excavating the channel or stream bank, or diverting the watercourse.
- Crossing sites avoid known fish spawning sites (e.g., tails of pools).
- Fording of vehicles and equipment involves a one-time event (over and back).
- The crossing will not result in erosion and sedimentation of the stream, alteration (e.g., compaction or rutting) of the bed and bank substrates, or blockage of fish passage.
- The crossing does not involve installation of a temporary culvert.
- The Measures to Protect Fish and Fish Habitat when Carrying Out a Temporary Ford Stream Crossing listed below (Table C-4) are incorporated.

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-4 Measures to Protect Fish and Fish Habitat when Carrying Out a Temporary Ford Stream Crossing**

Activity/Concern	Measures
<i>Timing</i>	<ol style="list-style-type: none"> <li>Generally, there are no restrictions on timing for fording seasonally dry streambeds that do not support fish spawning, as this does not involve in-water work or driving over fish eggs and alevins. However, if there is risk of activities disrupting sensitive fish life stages (e.g., uncertainty that the site does not support fish spawning) adhere to appropriate fisheries timing windows (periods of least risk).</li> <li>Ford only under low flow conditions, and not when flows are elevated due to local rain events or seasonal flooding.</li> <li>Ford only when water depth is sufficiently shallow to allow passage of vehicle/equipment, maintain crossing speed at a very slow and steady pace throughout the crossing and avoid rapid acceleration while on approaches or in the water.</li> </ol>
<i>Equipment</i>	<ol style="list-style-type: none"> <li>Operate equipment in a manner that limits disturbance to the watercourse bed and banks.</li> <li>Protect entrances at equipment access points and establish single site entry and exit (e.g., place a large log tight to each bank to reduce pressure on the bank from the tracks). Excavators should use their boom bucket on the opposite shore and elevate the front tracks and gently pull to take pressure off the tracks. Operators should travel slowly so as not spin tracks and thereby avoid moving the logs, tearing the stream bank or cycling dirt into the watercourse. While large logs flat cut on the bottom are preferred, small swamp mats may also be used.</li> <li>Equipment is to arrive on site in a clean condition (e.g., mud removed) and is to be maintained free of fluid leaks, invasive species, and noxious weeds.</li> <li>Wash, refuel and service equipment and store fuel and other materials for the equipment away from the water to prevent deleterious substances from entering the water.</li> <li>Keep an emergency spill kit on site in case of fluid leaks or spills from equipment.</li> </ol>
<i>Development Area</i>	<ol style="list-style-type: none"> <li>Locate crossings at straight sections of the stream with low gradient banks, perpendicular to the bank. Avoid crossing on meander bends, braided streams, alluvial fans, or other area that is inherently unstable and may result in the erosion and scouring of the stream bed. Avoid locations directly upstream of wetlands and sensitive fish rearing and spawning areas. Plan activities and routes such to reduce the number of crossing sites required to access work sites.</li> <li>Limit disturbance to riparian vegetation (i.e., vegetation that occurs adjacent to the watercourse) by using existing trails, winter roads or cut lines wherever practical and prevent soil compaction.</li> <li>Select a site with early stage forest or shrub and grass riparian vegetation. Avoid thick riparian canopies and mature growth.</li> </ol>
<i>Erosion and Sediment Control</i>	<ol style="list-style-type: none"> <li>Install effective sediment and erosion control measures before starting work to prevent the entry of sediment into the watercourse. Inspect them regularly during construction and make all necessary repairs if damage occurs.</li> </ol>
<i>Riparian Vegetation</i>	<ol style="list-style-type: none"> <li>While these measures don't cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the road or utility ROW. Vegetation should be pruned or topped. Grubbing or uprooting vegetation within 15 m of a stream will only be required for trench line and grading for construction.</li> </ol>

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-4 Measures to Protect Fish and Fish Habitat when Carrying Out a Temporary Ford Stream Crossing**

Activity/Concern	Measures
<i>Fording</i>	<p>14. Fording a flowing watercourse to bring vehicles and equipment required for construction to the opposite side is limited to a one-time event (over and back) and is to occur only if an existing crossing at another location or temporary bridge is not available or practical to use.</p> <p>15. To exercise this option, the stream bed at the fording site must be comprised of stable material such as gravel or bedrock and the stream banks must be low and stable.</p> <p>16. If minor rutting is likely to occur, use stream bank and bed protection methods (e.g., geogrids, logs, swamp pads, rubber tire mats), provided they do not constrict flows or block fish passage. Maintain protection as required and maintain fish passage.</p> <p>17. Grading of the stream banks for the approaches is not permitted.</p> <p>18. If the stream bed and banks are steep and highly erodible (e.g., dominated by silts) and erosion and degradation are likely to occur as a result of equipment fording, use a temporary bridge in order to protect these areas.</p>
<i>Clean-up and Reclamation</i>	<p>19. No debris is to remain within the HWM or placed into a stream. On conclusion of the work activity, remove all protective materials introduced to the watercourse and rehabilitate the site to its original condition.</p> <p>20. Stabilize waste materials removed from the work site to above the HWM and prevent them from entering any watercourse. This could include covering spoil piles with biodegradable mats or planting them with preferably grass or shrubs.</p> <p>21. Revegetate disturbed areas by planting and, where required and where prior brush existed, seeding with shrubs and grasses, and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and revegetate the following spring. Maintain effective sediment and erosion control measures until revegetation of disturbed areas is achieved.</p> <p>22. Banks are stabilized, restored to original shape, adequately protected from erosion, and revegetated with native shrub or tree species.</p>

### **C.6 MAINTENANCE OF RIPARIAN VEGETATION IN EXISTING RIGHT-OF-WAY**

(Adapted from DFO Pacific Region Operational Statement – Maintenance of Riparian Vegetation in Existing ROW, Version 3.0)

Vegetation is closely managed in the ROW to prevent disruption to pipeline operations and personal safety. Maintenance activities involving the removal or alteration of riparian vegetation in the ROW corridor may negatively affect fish habitat when improperly executed. This section applies only to existing ROW at the location where they intersect and cross a water body.

Riparian areas are the vegetated areas adjacent to a water body and directly contribute to fish habitat by providing shade, cover and food production areas. Riparian areas are also important because they stabilize stream banks and shorelines. In order to limit disturbance to fish habitat and prevent bank erosion, it is important to retain as much riparian vegetation as practical, especially the vegetation directly adjacent to the watercourse, in the ROW corridor.

Activities carried out to maintain riparian vegetation in existing ROW can negatively impact fish and fish habitat by causing excessive loss of riparian vegetation, erosion and sedimentation, disturbance to the banks and the bottom of the water body from use of heavy equipment, and introduction of deleterious substances as a result of inadequate containment of spoil piles and improper maintenance of equipment.

The purpose of this section is to describe the conditions under which it is applicable to the Project and the measures to be incorporated into the Project in order to avoid negative impacts to fish habitat. The Project may proceed with ROW maintenance without a DFO review when the following conditions are met:

- The work involves the maintenance of vegetation in an existing active ROW for a transportation or utility corridor and not construction of a new ROW or reactivation of an old ROW.
- It is an existing ROW at the location where it intersects and crosses a water body, the ROW is perpendicular or near perpendicular to the water body, it does not include complete removal of vegetation adjacent to the water body.
- It involves the use of vegetative maintenance techniques that allow the root system to stay intact, to help bind the soil and encourage rapid colonization of low-growing plant species.
- The maintenance activities are not currently covered by an existing DFO approved management plan, an approved work practice or according to the conditions of a previous government review.
- The following (Table C-5) Measures to Protect Fish and Fish Habitat when Maintaining ROW in Riparian Areas are incorporated.

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-5 Measures to Protect Fish and Fish Habitat when Maintaining Riparian Vegetation in Rights-of-Way**

Activity/Concern	Measures
<i>Equipment</i>	<ol style="list-style-type: none"><li>1. If machinery must be used, operate machinery on land (above the HWM) and in a manner that limits disturbance to the banks of the water body.</li><li>2. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks, invasive species, and noxious weeds.</li><li>3. Wash, refuel and service and store fuel and other materials for the machinery, which include hand tools, at locations away from the water to prevent deleterious substance from entering the water body.</li><li>4. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.</li><li>5. Refer to Temporary Ford Stream Crossings for machinery fording (Section C.5).</li></ol>
<i>Disturbance Area</i>	<ol style="list-style-type: none"><li>6. Combined maintenance activities (e.g., mowing, brushing, topping, slashing, etc.) will affect no more than one third of the total woody vegetation, such as trees and shrubs, in the ROW within 30 meters of the HWM in any given year.</li></ol>
<i>Riparian Vegetation</i>	<ol style="list-style-type: none"><li>7. While this section does not cover the complete clearing of riparian vegetation, the alteration (e.g., topping and pruning) of select plants may be necessary to meet operational and safety needs.</li><li>8. When practicable, alter riparian vegetation in the right-of way by hand.</li><li>9. When altering a tree that is located on the bank of a water body, the root structure and stability will be maintained.</li></ol>
<i>Clean-up and Reclamation</i>	<ol style="list-style-type: none"><li>10. Restore banks to original condition if disturbance occurs.</li><li>11. Stabilize waste materials removed from the work site to prevent them from entering the water body. This could include covering spoil piles with biodegradable mats or tarps. All long-term storage of waste materials should be kept outside of the riparian area.</li><li>12. Vegetate disturbed areas by planting and, where required and where prior brush existed, seeding with shrubs or grasses, and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.</li><li>13. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.</li></ol>

### C.7 CLEAR SPAN BRIDGES

(Adapted from DFO Pacific Region Operational Statement – Clear Span Bridges, Version 3.0)

This section applies to the construction of small-scale bridge structures that completely span a watercourse without altering the stream bed or bank, and that are a maximum of two lanes wide. A clear-span bridge is preferred to a culvert as no structures are placed on the stream bed and therefore there is no alteration of natural channel processes.

Clear-span bridge construction has the potential to negatively affect riparian habitat. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover and areas for spawning and food production. Only the vegetation causing operational and safety concerns for the crossing structure and approaches, within the ROW, should be removed. Stormwater run-off and the use of machinery can introduce deleterious substances to the water body and result in erosion and sedimentation.

The purpose of this section is to describe the conditions under which it is applicable to the Project and the measures to incorporate into the Project in order to avoid negative impacts to fish habitat and maintain passage of fish. The Project can proceed with the installation of a clear-span bridge without a DFO review when the following conditions are met:

- There is no alteration of the stream bed or banks or infilling of the channel.
- The bridge is no greater than two vehicle lanes in width, does not include sidewalks and biking lanes and does not encroach on the natural channel width by the placement of abutments, footings or rock armouring below the HWM.
- The work does not involve the clearing of riparian vegetation—removal of select plants within the road ROW can occur to meet operational and/or safety needs.
- The Project does not require multiple bridge crossings over the same watercourse.
- Measures to Protect Fish and Fish Habitat when Constructing Clear-Span Bridges listed below (Table C-6) are incorporated.



## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-6 Measures to Protect Fish and Fish Habitat when Constructing Clear-Span Bridges**

Activity/Concern	Measures
<i>Timing</i>	1. Generally, there are no restrictions on timing for the construction of clear-span structures as they do not involve in-water work. However, if there are activities with the potential to disrupt sensitive fish life stages (e.g., crossing of watercourse by machinery), these should adhere to appropriate fisheries timing windows (periods of least risk) where practical.
<i>Equipment</i>	2. Operate machinery on land (above the HWM) and in a manner that limits disturbance to the banks of the watercourse. 3. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks, invasive species, and noxious weeds. 4. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substance from entering the water. 5. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery. 6. Restore banks to original condition if disturbance occurs.
<i>Disturbance Area</i>	7. Reduce the riparian area temporarily disturbed by access activities along the adjacent upland property. Use existing trails, roads, or cut lines wherever practical to avoid disturbance to the riparian vegetation. 8. Avoid building on meander bends, braided streams, alluvial fans, active flood plains, or other area that is inherently unstable and may result in the alteration of natural stream functions or erosion and scouring of the bridge structure.
<i>Erosion and Sediment Control</i>	9. Install effective sediment and erosion control measures before starting work to prevent the entry of sediment into the watercourse. Inspect them regularly during construction and make all necessary repairs if damage occurs.
<i>Riparian Vegetation</i>	10. While these measures don't apply to the clearing of riparian vegetation, the removal of select plants within the road ROW may be required to meet operational and/or safety concerns for the crossing structure and the approaches. This removal should be kept to a minimum and within the road ROW. When practicable, prune or top the vegetation instead of uprooting.
<i>Bridge Installation</i>	11. The clear span bridge will be properly designed to address river and channel processes at flows above the ordinary HWM. 12. Design and construct approaches so that they are perpendicular to the watercourse to limit loss or disturbance to riparian vegetation. 13. Design the bridge so that stormwater runoff from the bridge deck, side slopes and approaches is directed into a retention pond or vegetated area to remove suspended solids where practical, dissipate velocity and prevent sediment and other deleterious substances from entering the watercourse. 14. Use measures to prevent deleterious substances such as new concrete (i.e., it is pre-cast, cured, and dried before use near the watercourse), grout, paint, ditch sediment and preservatives from entering the watercourse.

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

**Table C-6 Measures to Protect Fish and Fish Habitat when Constructing Clear-Span Bridges**

Activity/Concern	Measures
<i>Clean-up and Reclamation</i>	<ul style="list-style-type: none"><li>15. No debris to remain within the high-water mark or placed into a stream.</li><li>16. Stabilize waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with preferably grass or shrubs.</li><li>17. Vegetate disturbed areas by planting and, where required and where prior brush existed, seeding with shrubs or grasses, and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.</li><li>18. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.</li></ul>

## ENVIRONMENTAL PROTECTION PLAN

Appendix C Best Management Practices for Pipeline Stream Crossings in British Columbia  
October 21, 2016

### C.8 REFERENCES

BC Ministry of Forests, Lands and Natural Resource Operations, BC Ministry of Environment, and Fisheries and Oceans Canada (MFLNRO, MOE, and DFO). 2012. *Fish-stream crossing guidebook*. Rev. ed. For. Prac. Invest. Br. Victoria, BC.

Fisheries and Oceans Canada (DFO). 2013a. An Applicant's Guide to Submitting an Application for Authorization under Paragraph 35(2) (b) of the *Fisheries Act*. Accessed December 2014. <http://www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/application-eng.html>.

Fisheries and Oceans Canada (DFO). 2013b. Fisheries Protection Policy Statement. Accessed December 2014. <http://www.dfo-mpo.gc.ca/pnw-ppe/pol/index-eng.html>.

Fisheries and Oceans Canada (DFO). *Pacific Region Operational Statement – Clear Span Bridges*. Version 3.0.

Fisheries and Oceans Canada (DFO). *Pacific Region Operational Statement – Dry Open-Cut Stream Crossings*. Version 1.0.

Fisheries and Oceans Canada (DFO). *Pacific Region Operational Statement, Maintenance of Riparian Vegetation in Existing Rights-of-Way*. Version 3.0.

Fisheries and Oceans Canada (DFO). *Pacific Region Operational Statement – Temporary Ford Stream Crossings*. Version 1.0.



**APPENDIX D**  
**EMERGENCY AND GENERAL PROJECT**  
**CONTACTS**





## ENVIRONMENTAL PROTECTION PLAN

Appendix D Emergency and General Project Contacts  
October 21, 2016

### Appendix D EMERGENCY AND GENERAL PROJECT CONTACTS

**Table D-1 Emergency Call-Down List**

Contact	Location	Phone Number
RCMP	Chetwynd	911, 250-788-9221
	Hudson's Hope	911, 250-783-5241
Ambulance	Chetwynd	911
Hospital	Chetwynd	911, 250-788-2236
Fire	Chetwynd	911, 250-401-4100
NEB	Calgary	1-800-899-1265
	Construction Incidents	403-807-9473
BC Provincial Emergency Program (PEP)		1-800-663-3456
Area "C" Oil Spill Co-operative	Clean Harbors Environmental Services Dwayne Stone, Fort St. John	250- 785-8500
Environment Canada	Kathy McPherson, Senior Environmental Assessment Officer	250-363-6463
DFO Fisheries Biologist Northeast BC	Guy Scharf, Senior Habitat Biologist	250-561-5368
Transportation Safety Board		819- 997-7887
BC MFLNRO Peace Forest District	Lynn Avis, Fisheries Biologist	250-261-2096
BC Forest Fire Reporting Centre		1-800-663-5555 OR *5555
BC MFLNRO, Ecosystems Section	Graham Suther, Ecosystem Biologist Fort St. John	250-787-3283
BC OneCall		1-800-474-6886
BC MFLNRO, Archaeological Branch	Margaret Rogers, Heritage Resource Specialist	250-953-3311

## ENVIRONMENTAL PROTECTION PLAN

Appendix D Emergency and General Project Contacts  
October 21, 2016

**Table D-2 General Project Contacts**

Contact	Title	Phone Number	E-Mail
Dan Brocklebank	Project Manager, Westcoast	1-403-699-1824	DBrocklebank@spectra.com
Aaron Grey	Pipeline Engineer, Westcoast	1-403-699-1545	agrey@spectraenergy.com
Shane Megoran	Construction Manager, Westcoast	1-403-592-2386	smegoran@spectraenergy.com
Ricardo Moreno	Construction Environmental Specialist (Environment Lead), Westcoast	1-403-699-1003	RMoreno@spectraenergy.com
TBC	Chief Inspector (EI), Westcoast	TBC	TBC
Rod Brausse	Land Resource Agent, Westcoast	403-699-1673	RBrausse@spectraenergy.com
Kelly McTaggart	Community Coordinator, Westcoast	250-262-3601 778-256-4139	KMcTaggart@spectraenergy.com
Martin Helfer	Survey Operations, WSP Group (Focus)	250-7873150	martin.helfer@wspgroup.com
Joanna Zoffman	Operations Manager (Heritage Consultant), Landsong	250-788-3813	joanna@landsong.com
Fort St. John	Regional Office, MFLNRO	250-787-3415	

### Notify if contingency watercourse crossing measures are to be implemented:

Guy Scharf Fisheries Biologist (DFO Representative) Fisheries and Oceans Canada Habitat and Enhancement Branch 3690 Massey Drive, Prince George, BC V2N 2S8	250-561-5368	Guy.scharf@dfo-mpo.gc.ca
---	--------------	--------------------------

### Notify or make application to for planned instream activities or short term water use:

Mike D'Aloia MFLNRO Water Stewardship Officer RR#1 Mile 301, Alaska Highway Fort Nelson, BC V0C1R0	250-774-5530 Fax: 250-787-3219	Mike.DAloia@gov.bc.ca
--	-----------------------------------	-----------------------

### In the event of a spill, notify the parties listed in 7.7 Spill Prevention and Response Plan.