

# VANCOUVER AIRPORT FUEL DELIVERY PROJECT

## ASSESSMENT REPORT

With Respect to

the Application by Vancouver Airport Fuel Facilities Corporation

for an Environmental Assessment Certificate

pursuant to the *Environmental Assessment Act*, S.B.C. 2002, c.43

and

## SCREENING REPORT

With Respect to

the requirements of a Screening

pursuant to the *Canadian Environmental Assessment Act*, S.C. 1992, c. 37

as amended

Prepared by:

**Environmental Assessment Office**

And

**Vancouver Fraser Port Authority**

December 14, 2012



PORT METRO  
**vancouver**

# Preface

## Provincial Environmental Assessment

Environmental Assessment Office (EAO) manages the assessment of proposed major projects in British Columbia, as required by the *Environmental Assessment Act*. The assessment process examines proposed major projects for potentially adverse environmental, economic, social, heritage and health effects that may occur during the life cycle of these projects. The process is iterative and includes:

- Opportunities for the involvement of all interested parties;
- Consultation with First Nations and consultation with the public;
- Technical studies to identify and examine potential significant adverse effects;
- Strategies to prevent or reduce, adverse effects; and
- Development of comprehensive reports summarizing input and findings.

At the conclusion of each environmental assessment, EAO provides a comprehensive assessment report (Report), and makes recommendations to the Minister of Environment and to the Minister responsible for the project sector, which in this case is the Minister of Energy, Mines and Natural Gas (Ministers). The Ministers may decide to certify a project, decline to certify a project, or require further assessment.

This Report considers the proposed project's potential to cause significant adverse environmental, economic, social, heritage and health effects. It identifies measures to prevent or reduce adverse effects, and sets out EAO's analysis and conclusions. It documents the work undertaken by EAO to consult and accommodate First Nations, in keeping with the Supreme Court of Canada's direction in *Haida v. Minister of Forests* and related case law. It also documents the work undertaken by EAO to consider potential impacts to treaty rights identified through the Tsawwassen Final Agreement.

## Federal Environmental Assessment

The Vancouver Fraser Port Authority (VFPA), doing business as Port Metro Vancouver (PMV), is a non-shareholder, financially self-sufficient corporation, established by the Government of Canada in January 2008, pursuant to the *Canada Marine Act* (CMA), and accountable to the federal Minister of Transport.

VFPA is a designated Canadian Port Authority under the CMA with responsibility for managing federal property, and administering over 16,000 hectares of water, nearly 1,000 hectares of land, and assets along more than 600 kilometres of shoreline.

As a Canadian Port Authority, the VFPA is subject to the *Canadian Environmental Assessment Act (CEAA)* and must assure itself that projects it authorizes do not result in significant adverse environmental effects. A federal environmental assessment for the proposed project was initiated under the former *Canada Port Authority Environmental Assessment Regulations (CPA EA Regulations)*, pursuant to the *Canadian Environmental Assessment Act (CEAA, S.C. 1992, c.37)*. When CEAA 1992 was replaced with CEAA 2012 in July 2012, the proposed project was designated by the federal Minister of Environment to continue as if CEAA 1992 had not been repealed. The proposed project has undergone a federal screening level environmental assessment that considered factors including:

- Environmental effects of the proposed Project, including the environmental effects of malfunctions or accidents that may occur in connection with the proposed Project and any cumulative environmental effects that are likely to result from the proposed Project in combination with other projects or activities that have been or will be carried out;
- The significance of the environmental effects referred to above;
- Comments from the public that are received as part of an assessment process, if any; and
- Technically and economically feasible measures that would mitigate any significant adverse environmental effects of the proposed Project.

The environmental effect, or change that the proposed Project may cause on the environment, also includes consideration of the effect of any change on health and socio-economic conditions, physical and cultural heritage, First Nations traditional uses, and historical structures, sites or objects. The assessment also evaluates the effects of the environment on the proposed Project, which is included in the CEAA 1992 definition of “environmental effects”.

Based on this joint provincial and federal Report, including the implementation of any mitigation measures, and comments from First Nations and the public, the VFPA, as the federally authority will make a determination as to whether the proposed Project is likely to cause significant adverse environmental effects.

The provincial and federal assessment processes have been coordinated in accordance with the Canada/British Columbia Agreement for Environmental Assessment Cooperation (2004).

Information and records relating to environmental assessments are available on EAO's electronic Project Information Centre at [www.eao.gov.bc.ca](http://www.eao.gov.bc.ca). Questions or comments can be directed to:

Environmental Assessment Office  
PO Box 9426 Stn Prov Govt  
Victoria BC V8W 9V1  
Phone: 250 356-7441  
Fax: 250 356-7440  
Email: [eaoinfo@gov.bc.ca](mailto:eaoinfo@gov.bc.ca)

Port of Metro Vancouver  
100 The Pointe, 999 Canada Place  
Vancouver BC V6C 3T4  
Phone: 604-665-9000  
Fax: 1-866-284-4271  
Email: [info@portmetrovancover.com](mailto:info@portmetrovancover.com)

# Table of Contents

PART A – INTRODUCTION AND BACKGROUND .....	17
1 Purpose of the Report.....	17
2 Project Overview.....	18
2.1 Proponent Description .....	18
2.2 Purpose of the Project .....	18
2.3 Project Description and Scope.....	20
2.4 Project Land Use .....	21
2.5 Proposed Project Benefits.....	22
2.6 Alternative Means of Undertaking the Proposed Project .....	23
2.7 Alternatives to the Proposed Project .....	23
3 Assessment Process .....	26
3.1 Provincial EA Process.....	26
3.2 Federal Review .....	27
3.3 Subsequent Permitting Requirements.....	29
3.4 EA Participants .....	29
3.4.1 Working Group .....	30
3.4.2 First Nations .....	30
3.4.3 Local Government .....	31
3.4.4 Public .....	32
4 Assessment Methodology .....	33
4.1 Valued Components .....	34
4.2 Assessment of Potential Significant Adverse Effects Methodology, including Cumulative Effects .....	34
4.3 Assessing Significance of Potential Effects.....	36
4.4 Spatial Boundaries.....	36
4.5 Temporal Boundaries.....	37
PART B – ASSESSMENT OF POTENTIAL EFFECTS .....	38
5 Assessment of Potential Environmental Effects .....	38
5.1 Fisheries, Aquatics, and Surface Water Quality Assessment.....	38
5.1.1 Valued Components .....	42
5.1.2 Potential Project Effects and Proposed Mitigation .....	45

5.1.3	Environmental Management Plans .....	50
5.1.4	Residual Adverse Effects of the proposed Project .....	52
5.1.5	Significant of Residual Effects Analysis .....	53
5.1.6	Conclusion .....	56
5.2	Vegetation, Wildlife and Wildlife Habitat.....	56
5.2.1	Valued Components .....	59
5.2.2	Potential Project Effects and Proposed Mitigation .....	65
5.2.3	Residual Adverse effects of the Proposed Project .....	72
5.2.4	Significant Effects Analysis.....	74
5.2.5	Conclusion .....	78
5.3	Air and Climate .....	78
5.3.1	Valued Components.....	81
5.3.2	Potential Project Effects and Proposed Mitigation .....	84
5.3.3	Potential Residual Effects and their Significance .....	92
5.3.4	Conclusion .....	95
5.4	Noise .....	95
5.4.1	Potential Effects of the proposed Project.....	97
5.4.2	Measures to mitigate Noise Effects .....	99
5.4.5	Conclusion .....	102
5.5	Contaminated Sites.....	102
5.5.1	Potential Effects of the proposed Project.....	103
5.5.2	Measures to Mitigate Potential Effects:.....	104
5.5.3	Management Plans.....	105
5.5.4	Residual Adverse Effects.....	105
5.5.5	Conclusion .....	106
6	Economic Effects .....	106
6.1	Potential Economic Effects of the proposed Project.....	111
6.1.1	Construction .....	111
6.1.2	Operations.....	112
6.1.3	Residual Adverse Effects.....	113
6.1.4	Conclusion .....	113
7	Assessment of Potential Social Effects .....	114
7.1.1	Valued Components.....	116

7.2	Land Use .....	116
7.2.1	Potential Effects of the proposed Project .....	118
7.2.2	Measures to mitigate potential impacts .....	120
7.2.3	Residual Adverse Effects.....	120
7.2.4	Significance Analysis.....	120
7.2.5	Conclusions.....	122
7.3	Vehicle Traffic and Mobility .....	122
7.3.1	Potential Effects of the proposed Project .....	123
7.3.2	Measures to mitigate potential Effects .....	124
7.3.3	Management Plans.....	125
7.3.4	Residual Adverse Effects.....	126
7.3.5	Significance Analysis.....	127
7.3.6	Conclusions.....	128
7.4	Community Features and Recreation Activities:.....	128
7.4.1	Potential Effects of the proposed Project .....	131
7.4.2	Measures to Mitigate Potential Effects.....	132
7.4.3	Residual Adverse Effects.....	133
7.4.4	Significance Analysis.....	133
7.4.5	Conclusions.....	134
7.5	Aesthetic Values and Visuals.....	135
7.5.1	Potential Effects of the proposed Project .....	135
7.5.2	Measures to Mitigate potential Effects .....	135
7.5.3	Residual Adverse Effects.....	135
7.5.4	Significance Analysis.....	136
7.5.5	Conclusion .....	137
8	Assessment of Potential Heritage Effects .....	137
8.1	Heritage and Archaeology.....	137
8.1.1	Valued Components:.....	138
8.1.2	Potential Impacts to Heritage Resources.....	143
8.1.3	Measures to Mitigate Potential Effects.....	143
8.1.4	Residual Adverse Effects.....	144
8.1.5	Significance Analysis.....	145
8.1.6	Management Plan .....	146

	8.1.7 Conclusion .....	146
9	Health Effects .....	147
	9.1 Valued Components .....	147
	9.2 Potential Effects and Proposed Mitigation Measures .....	148
	9.2.1 Noise .....	148
	9.2.2 Air Quality.....	150
	9.2.3 Road Traffic Effects .....	154
	9.2.4 Contaminated Sites: .....	154
	9.2.5 Recreation:.....	155
	9.3 Residual Adverse Effects of the proposed Project on Human Health .....	155
	9.4 Significance Analysis .....	155
	9.5 Conclusion.....	156
10	Effects of the Environment on the Proposed Project .....	156
	10.1 Extreme Weather and Weather-Related Events.....	156
	10.1.1 Construction .....	157
	10.1.2 Operation .....	157
	10.2 Flooding.....	158
	10.2.1 Construction .....	159
	10.2.2 Operation .....	159
	10.3 Wildfire.....	159
	10.4 Seismic Activity.....	159
	10.5 Climate Change .....	160
	10.6 Conclusion.....	161
11	Navigable Waters and Navigation .....	161
	PART C - FIRST NATION CONSULTATION REPORT.....	164
12	Purpose and Overview.....	164
	12.1 Information Sources.....	165
	12.2 First Nations Setting.....	167
13	Overview of the Consultation Process.....	169
	13.1 EAO Consultation with First Nations .....	169
	13.2 Proponent Consultation with First Nations .....	174
14	First Nations Setting.....	175
	14.1 Introduction and Language Overview.....	175

15	Hul'qumi'num First Nations .....	176
15.1	Hul'qumi'num First Nations Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation.....	176
15.2	Tl'ektines .....	179
16	Cowichan Tribes, Penelakut Tribe, Stz'uminus First Nation, Halalt First Nation, and Hwlitsum First Nation as represented by the Cowichan Nation Alliance .....	183
16.1	Cowichan Tribes Regional Context, Asserted Aboriginal Rights and Depth of Consultation.....	183
16.2	Penelakut Tribe Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation .....	186
16.3	Stz'uminus First Nation Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation.....	188
16.4	Halalt First Nation Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation.....	191
16.5	Hwlitsum First Nation Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation.....	192
16.6	Specific Consultation Activities Undertaken with Cowichan Nation Alliance First Nations .....	196
17	Lake Cowichan First Nation .....	202
17.1	Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation.....	202
17.2	Specific Consultation Activities Undertaken .....	204
18	Lyackson First Nation .....	205
18.1	Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation.....	205
18.2	Specific Consultation Activities Undertaken .....	207
19	Kwantlen First Nation .....	210
19.1	Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation.....	210
19.2	Consultation with Kwantlen First Nation .....	212
20	Musqueam Indian Band .....	214
20.1	Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation.....	214
20.2	Consultation with Musqueam Indian Band .....	220
20.3	Measures to Avoid and Minimize Impacts: .....	223
21	Semiahmoo First Nation.....	226

21.1	Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation.....	226
21.2	Specific Consultation Activities Undertaken .....	229
22	Tsawout First Nation .....	231
22.1	Regional Context, Treaty Rights, and Depth of Consultation.....	231
22.2	Specific Consultation Activities Undertaken .....	233
23	Tsawwassen First Nation .....	234
23.1	Regional Context and the Tsawwassen First Nation Final Agreement .....	234
23.2	Consultation Activities Undertaken with Tsawwassen First Nation .....	238
24	Tsleil-Waututh Nation.....	240
24.1	Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation.....	240
24.2	Specific Consultation Activities Undertaken .....	244
25	Katzie, Kwikwetlem, and Qayqayt First Nations .....	246
25.1	Katzie Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation.....	246
25.2	Qayqayt Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation.....	250
25.3	Kwikwetlem Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation .....	252
25.4	Specific Consultation Activities Undertaken .....	253
26	Issues Raised by First Nations.....	253
27	Conclusion as to whether the Crown's duties have been discharged .....	257
	PART D – ACCIDENTS AND MALFUNCTIONS .....	260
28	Aviation Fuel Spills at the Marine Terminal and from Vessels .....	261
28.1	Spill Probability .....	263
28.1.1	Spill Prevention Measures .....	264
28.1.2	Conclusions for Spill Probability.....	266
28.2	Consequences of a Spill .....	266
28.2.1	Approach.....	266
28.2.2	Potential Biophysical impacts in the Event of a Spill (without Mitigation)....	268
28.2.3	Key Strategies to Mitigate Biophysical Effects .....	277
28.2.4	Risk of a Spill to Biophysical Resources .....	284
28.2.5	Social, Economic, Heritage and Health Consequences of a Spill.....	287

28.2.6	Key Mitigation Strategies .....	288
28.3	Key comments from Working Group members and the Public .....	289
28.4	Conclusion .....	291
29	Pipeline Operations Spill .....	292
29.1	Spill Probability .....	292
29.2	Consequences of a pipeline spill .....	293
29.2.1	Mitigation Measures .....	294
29.3	Risk of a pipeline spill .....	296
29.3.1	Key Comments from Working Group members .....	297
29.4	Conclusion .....	297
30	Accidental fire .....	297
PART E – ENVIRONMENTAL MANAGEMENT PROGRAMS AND COMPLIANCE REPORTING .....		300
31	Environmental Management Program .....	300
31.1	Construction Environmental Management Plan .....	301
31.2	Construction Safety Manual .....	303
31.3	Traffic Management Plan .....	304
31.4	Operations Environmental Management Plan .....	304
32	Compliance Reporting .....	305
PART F – CONCLUSIONS .....		306
34	Conclusions .....	306

## **Appendices**

APPENDIX 1	List of Working Group Members
APPENDIX 2	Working Group Tacking Table (including First Nations)
APPENDIX 3	Public Comment Tracking Table – Application Review
APPENDIX 4	Public Comment Tracking Table – Highway 99 Addendum
APPENDIX 5	Aviation Fuel Spill Compensation Framework Technical Working Group Briefing Note
APPENDIX 6	Proponent’s Summary Comments
APPENDIX 7	Holder’s Insurance Policy Summary

## List of Tables

Table 1. Cumulative Effects Assessment Inclusion List.....	35
Table 2: Fish species assessed during the EA.....	42
Table 3: FREMP colour-coded shoreline habitat classification scheme and implications for development. ....	43
Table 4. Significance analysis for residual adverse effects to at-risk fish species and fish species of importance in commercial and recreational and First Nations fisheries, and surface water quality. ....	53
Table 5. Summary of the status and location of species at risk for each VC.....	60
Table 6: Description of use of the South Arm of the Fraser and Western Foreshore by Aquatic Birds. ....	63
Table 7. Potential residual adverse effects to vegetation, wildlife and wildlife habitat .....	73
Table 8: Significance analysis for terrestrial vegetation, at-risk plant species and plant communities, terrestrial wildlife, aquatic birds, and marine mammals.....	74
Table 9: Relevant Air Quality Guidelines and Criteria.....	82
Table 10: Summary of Annual Emissions in LSA and RSA by Emission Source and Type during Construction Phase.....	85
Table 11: Maximum Predicted Ambient Concentrations due to Emissions from Panamax-class Vessels Hotelling at the Marine Terminal .....	88
Table 12: Maximum Predicted Ambient Concentrations of Select VOCs due to fugitive Emissions from the Proposed Fuel Receiving Facility – Base-Case Scenario (medium-grey coloured tanks with no floating pans) .....	89
Table 13: Maximum Net Annual CAC and GHG Emissions due to Proposed Project Operations.....	90
Table 14: Significance of potential residual effects, during construction, on ambient air quality and greenhouse gases .....	92
Table 15. Significance of potential residual effects, during operations, on ambient air quality and greenhouse gases .....	94
Table 16. Typical noise levels and effects for common outdoor and indoor sounds .....	96
Table 17. Predicted decibel levels during construction of the Marine Terminal at three receptor sites .....	97
Table 18. Predicted decibel levels during construction of the marine terminal and fuel receiving facility at three receptor sites.....	98
Table 19. Significance analysis of the residual adverse effects of the proposed Project on sound quality .....	101
Table 20. Risk rankings for the Proponent's contaminated sites assessment.....	103
Table 21. Economic Impacts of YVR.....	108
Table 22. Estimated proposed Project employment, GDP, and tax impacts (2009 estimate)....	111
Table 23. Significance analysis of residual adverse land use effects.....	120
Table 24. Residual adverse effects to vehicle traffic and mobility. ....	126
Table 25. Significance analysis of potential residual adverse effects to motor vehicle traffic and mobility and on-street parking. ....	127
Table 26 Significance of residual adverse effects to community features and recreation activities .....	133

Table 27. Significance analysis of residual adverse effects on aesthetic values and visuals. ....	136
Table 28 Significance Analysis for potential residual adverse effects to archeological sites. ....	145
Table 29. Summary of net CAC emissions due to proposed Project construction and operations .....	151
Table 30. Comparison of potential increase in VOC concentrations due to the proposed Project and relevant guidelines. ....	152
Table 31: Maximum Predicted Ambient Concentrations due to Emissions from Panamax-class Vessels Hotelling at the Marine Terminal .....	153
Table 32. Spill sizes and examples of possible hazards. ....	262
Table 33 Criteria used for rating spill probability .....	263
Table 34 Chance of spills during proposed Project Operations Prior to Consideration of Proponent Spill Prevention Measures. ....	264
Table 35. Spill threshold probability.....	266
Table 36 Consequence rating criteria for a potential fuel spill.....	269
Table 37. A summary of spill risk and consequence before mitigation for each VC .....	275
Table 38. Consequence rating before and after application of mitigation measures for each VC. .....	281
Table 39: Risk of different sizes of fuel spills to VCs. ....	285
Table 40: Probability rating criteria for a potential pipeline spill .....	292
Table 41: Consequence rating for potential pipeline spills .....	293
Table 42. Probability, consequence, and risk of spills for hazards.....	296
Table 43. Management plans included in the Proponent's CEM Plan.....	302

## **List of Figures**

Figure 1: Existing and estimated 2016 composition of fuel sources should the proposed Project not proceed.....	19
Figure 2. Overview map of the proposed Project components .....	25
Figure 3: Study Area for the fisheries, aquatics and surface water quality assessment .....	41
Figure 4: FREMP colour-coded aquatic habitat in the proposed Project area.....	44
Figure 5. Marine and Pipeline LSA for the Proponent's vegetation, wildlife and wildlife habitat assessment.....	58
Figure 6. Sources considered for the Proponent's air quality and climate assessment.....	80
Figure 7: Map of proposed Project and key socio-economic sites .....	115
Figure 8 Map of archaeological sites in the proposed Project area.....	142
Figure 9. Map insert showing presence of Cowichan Village on the South Arm of the Fraser River (from 1841 US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey Map, Archipelago of Arro, Gulf of Georgia, Ringholds Channel and Straits of Juan de Fuca, Oregon Territory). ....	177
Figure 10: 1827 Map depicting the location of a Cowichan village on the South Arm of the Fraser River .....	181
Figure 11. Musqueam Statement of Intent Traditional Territory Boundary.....	216

Chapter 1 of the TFA states that “Tsawwassen Territory” means the area of land that Tsawwassen First Nation identified in its Statement of Intent to the British Columbia Treaty Commission (Figure 12)..... 235

Figure 13. Tsawwassen Traditional Territory..... 236

Figure 14. Katzie First Nation Statement of Intent Map ..... 248

Figure 15: Spill risk matrix..... 263

## Acronyms Used in this Report

AAQO:	Ambient Air Quality Objectives
Act:	<i>Environmental Assessment Act</i>
AIR:	Application Information Requirements (approved)
AOA	Archaeological Overview Assessment
BC:	British Columbia
BMP:	Best Management Practices
CAC:	Criteria air contaminant
CCME:	Canadian Council of Ministers of the Environment
CMA:	<i>Canada Marine Act</i>
CEA Agency:	Canadian Environmental Assessment Agency
CEAA:	<i>Canadian Environmental Assessment Act</i>
CEM Plan:	Construction Environmental Management Plan
CO <sub>2</sub> :	Carbon Dioxide
COR:	City of Richmond
CPA EA Regulations:	<i>Canada Port Authority Environmental Assessment Regulations</i>
dAIR:	Draft Application Information Requirements
DFO:	Fisheries and Oceans Canada
EA:	Environmental Assessment
EAC:	Environmental Assessment Certificate
EAO:	Environmental Assessment Office
EC:	Environment Canada
ePIC:	electronic Project Information Centre
ESA:	Environmentally Sensitive Area
FREMP:	Fraser River Estuary Management Program
GDP:	Gross Domestic Product
GHG:	Greenhouse Gases
HTG	Hul'qumi'num Treaty Group
LSA:	Local Study Area
MEM:	Ministry of Energy, Mines and Natural Gas
MOE :	BC Ministry of Environment
MOTI:	Ministry of Transportation and Infrastructure
OEM Plan:	Operational Environmental Management Plan
OGC:	BC Oil and Gas Commission
PM:	Particulate Matter
PMV:	Port Metro Vancouver
RSA:	Regional Study Area
SARA:	<i>Species at Risk Act</i>
SRKW:	Southern Resident Killer Whale
TFA	Tsawwassen Final Agreement
TMP:	Traffic Management Plan
VC:	Valued Component
VOC:	Volatile Organic Compound

YVR: Vancouver International Airport  
VFPA: Vancouver Fraser Port Authority

## **PART A – INTRODUCTION AND BACKGROUND**

### **1 Purpose of the Report**

The purpose of the Report is to summarize the assessment of the Proponent's Application for an EA certificate (Application) for the proposed Project. EAO is required to prepare this Report for provincial Ministers who are responsible for making a decision on the proposed Project under section 17 of the BC *Environmental Assessment Act* (Act). For this proposed Project, the responsible Ministers are the Minister of Environment and the Minister of Energy, Mines and Natural Gas (Ministers).

The VFPA is also required to prepare this Report to satisfy the requirements under the *Canadian Environmental Assessment Act* (CEAA). The federal assessment was initiated under the former Canada Port Authority Environmental Assessment Regulations (CPA EA Regulations) as promulgated under the *Canadian Environmental Assessment Act* (CEAA, S.C. 1992, c. 37). In July 2012, the CEAA 1992 was replaced by the Canadian CEAA 2012 (S.C. 2012, c.19, s.52), however, the federal assessment for the proposed Project was designated to continue as if CEAA had not been repealed by CEAA 2012. Both pieces of legislation are consistent in that federal authorities are required to demonstrate that projects that they enable do not result in significant adverse environmental effects.

This Report:

- Describes the proposed Project, provincial and federal EA processes;
- Identifies the potential environmental, economic, social, heritage, and health effects of the proposed Project;
- Identifies the measures to reduce or prevent potential effects;
- Sets out conclusions based on the proposed Project's potential for significant adverse effects; and
- Describes consultation undertaken during the EA with regard to the Crown's duty to consult and accommodate with respect to aboriginal interests.

The provincial Ministers will consider this report in their decision whether to issue an EAC for the proposed Project. The VFPA will consider this Report in its determination as to whether the Project is likely to cause significant adverse environmental effects. If the VFPA determines that the proposed Project is not likely to cause significant adverse environmental effects, then the VFPA would be able to initiate its project review and permit process. That review process would consider this Report.

## 2 Project Overview

### 2.1 Proponent Description

Vancouver Airport Fuel Facilities Corporation (Proponent) is a not-for-profit consortium of commercial airlines that owns and operates shared aviation fuel facilities at Vancouver International Airport (YVR). Consortium members include almost all of the domestic and international airlines operating out of YVR. Similar fuel facility corporations operate at all of the major international airports across Canada. The Proponent submitted a letter summarizing their comments from the EA process, which can be found in Appendix 6.

### 2.2 Purpose of the Project

The Proponent is seeking approval to construct and operate a new aviation fuel delivery system that it has determined necessary to meet the future fuel requirements at YVR. The Proponent reports that YVR has experienced a large amount of growth over the last two decades, driving demand for aviation fuel. During the same time, local fuel refining capacity has declined from four refineries to one, and a U.S. refinery in Washington now supplies the majority of fuel for YVR.

The existing pipeline system<sup>1</sup> is owned by TransMountain (Jet Fuel) Inc. (TMJ) and was constructed in the late 1960s to connect YVR with the four refineries that operated in the Lower Mainland at that time. Currently about half of the pipeline's fuel shipments are supplied directly from Chevron's Burnaby Refinery, which is the only refinery now in operation, and half is supplied from the Westridge Marine (WR) Terminal (also in Burnaby), which receives its fuel from marine shipments primarily from Washington, USA.

The existing pipeline system supplies 80% of the YVR's fuel while the remaining 20% is supplied by tanker trucks from the Cherry Point Refinery in Washington, USA. Of the fuel supplied by the existing pipeline system, 40% is from domestic supply from the Burnaby refinery. Currently YVR requires between 25 to 35 tanker truck deliveries a day from the Cherry Point Refinery to supplement the pipeline supply and meet demand. Without a new fuel delivery system, any incremental growth in fuel demand at YVR will need to be met by additional tanker truck deliveries. Figure 1 shows the existing and future (2016) composition of fuel sources if the proposed Project does not proceed from the three sources: trucking from the Cherry Point Refinery, fuel from the Chevron refinery and fuel from the Westridge (WR) terminal.

---

<sup>1</sup> The existing TransMountain Pipeline is separate from the proposed Project.

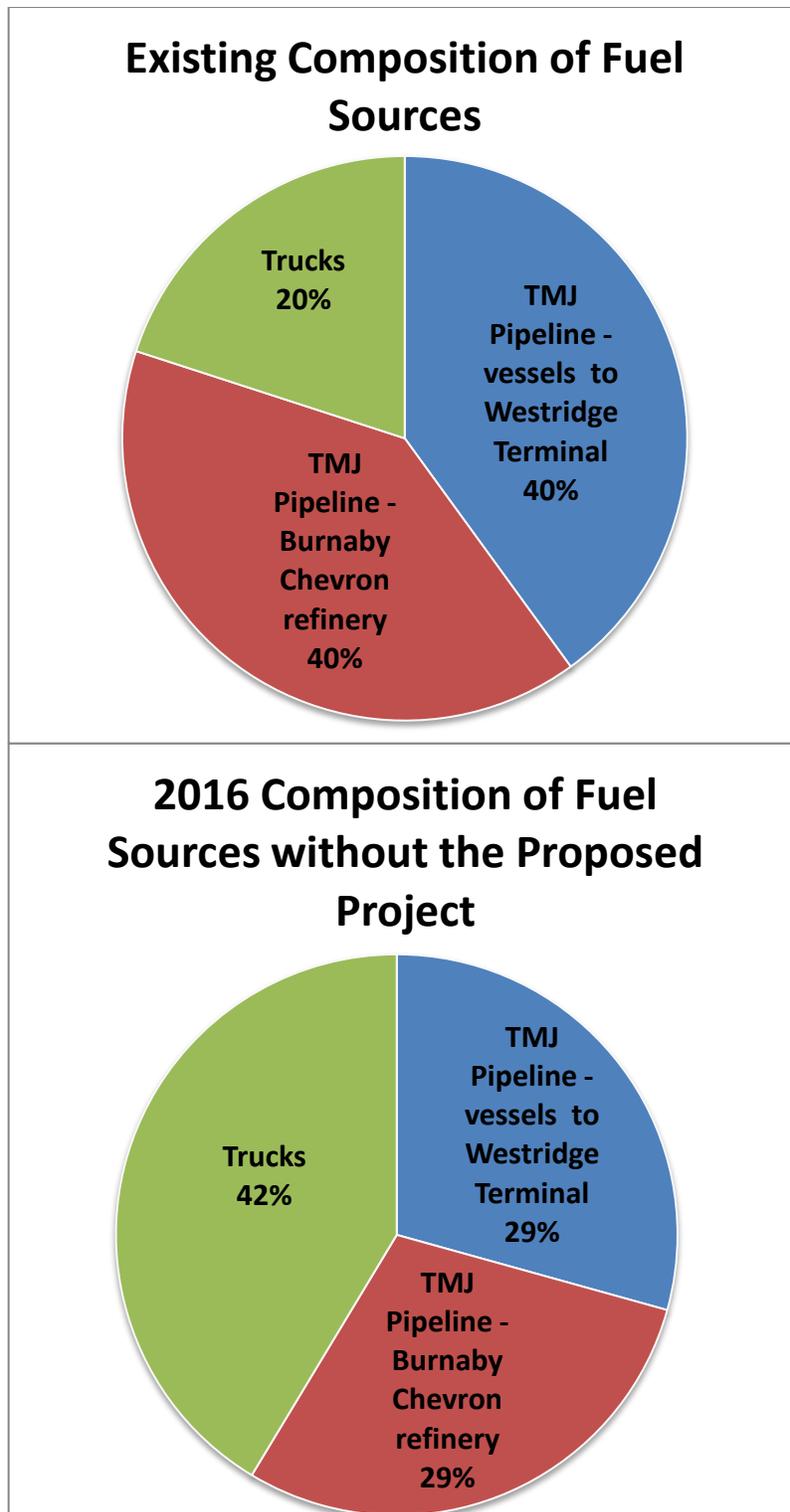


Figure 1: Existing and estimated 2016 composition of fuel sources should the proposed Project not proceed

YVR is a major economic contributor to BC and is Canada's gateway airport to the Asia-Pacific Region. The airport generates \$5.3 billion in Gross Domestic Product (GDP) and \$11.7 billion in total economic output into the Canadian economy. The growth history and the future growth forecasted by YVR and Transport Canada indicate that fuel demand at YVR is expected to continue to increase by an average of 2 to 4% annually over the next 16 years.

The Proponent reports that the limitations of the existing pipeline system, coupled with the diminished refining capacity in the Lower Mainland, has made access to competitive offshore sources of fuel critical to supply the expected growth of airline activity at YVR.

### 2.3 Project Description and Scope

The scope of the EAs of the proposed Project consists of the following on-site and off-site components and activities:

- Upgrade of an existing marine terminal, owned by the Proponent;
- Construction and operation of facilities at the marine terminal for offloading aviation fuel;
- Construction and operation of an aviation fuel receiving facility on VFPA Land;
- Construction and operation of a fuel transfer pipeline from the marine terminal to the aviation fuel receiving facility;
- Construction and operation of a fuel delivery pipeline from the aviation fuel receiving facility to YVR; and
- Movement of vessels transporting aviation fuel within the South Arm of the Fraser River to and from the marine terminal, including fuel off-loading and transfer at the marine terminal.

Figure 1 shows the geographical area of the proposed Project by component.

The proposed Project would be located on Lulu Island and Sea Island in Richmond, BC.

#### *Marine Terminal:*

The marine terminal is located on the north shore of the South Arm of the Fraser River, approximately 21 kilometres upstream from Sand Heads on land owned by the Proponent. The property includes a berthing structure and has an existing water lot lease within VFPA jurisdiction that the Proponent would lease.

#### *Fuel Receiving Facility:*

The proposed fuel receiving facility would be located on the north shore of the South Arm of the Fraser River on approximately 4.8 hectares (12 acres) of industrial-zoned VFPA land. The proposed fuel receiving facility would be located on land owned by VFPA that

the Proponent would lease. This site is currently occupied by ACME Landfill and Peat Ltd, used for the storage of materials dredged from the Fraser River and peat.

*Fuel Transfer Pipeline:*

The proposed fuel transfer pipeline would connect the marine terminal with the proposed fuel receiving facility. The proposed pipeline would be located on the Proponent's marine terminal property and on land owned by VFPA that the Proponent would lease, with a crossing under Williams Road which is owned by the City of Richmond.

*Fuel Delivery Pipeline:*

The proposed fuel delivery pipeline would cross Lulu Island and the Moray Channel to YVR on Sea Island, from the proposed fuel receiving facility north to the Francis Road right-of-way, west along the Francis Road right-of-way to Highway 99, north along Highway 99 to the Westminster Highway, Northwest along Highway 99 to Bridgeport Trail, west and then northwest along Bridgeport Trail to Van Horne Way, southwest along Van Horne Way to Charles Street, west along Charles Street to River Road, northwest along No. 3 Road right-of-way and continue across the Moray Channel to YVR.

The proposed fuel delivery pipeline would be located on lands owned by the City of Richmond for the small portions of the route outside the Highway 99 alignment on Lulu Island. The portions of the proposed fuel delivery pipeline along Highway 99 would be under provincial jurisdiction and would require a permit from Ministry of Transportation and Infrastructure (MOTI). The portion of the pipeline under Moray Channel would be located within VFPA jurisdiction. The portion of the pipeline on Sea Island would be located within Vancouver International Airport jurisdiction.

## 2.4 Project Land Use

All portions of the proposed Project area on Lulu Island are located in urban areas that have been previously altered by development. However, EAO will note that large sections of the Francis Road right-of-way are undeveloped with the forest and brush.

City of Richmond-designated Environmentally Sensitive Areas (ESA), which are of ecological importance for Richmond, are located adjacent to the proposed Project pipeline in some areas. The ESA also includes the shoreline at the marine terminal, which is classified as low productivity under FREMP. Developments within ESAs require a permit. The Richmond Nature Park (adjacent to Highway 99), and shorelines of the South Arm and Middle Arm of the Fraser River are within ESAs.

Within Richmond, Sea Island is predominantly zoned for airport use, with small portions zoned for commercial, neighbourhood residential, conservation, and public and open space.

The Fraser River Delta is an internationally significant habitat for migratory shorebird populations and is conserved through various forms of protection. The Fraser River Delta, in whole or in part:

- Is included in the Western Hemisphere Shorebird Reserve Network;
- Is designated as an Important Bird Area of Canada<sup>2</sup>;
- Is designated the Alaksen National Wildlife Area<sup>3</sup> and a Ramsar Site<sup>4</sup>; and
- Contains the South Arm Marshes Wildlife Management Area<sup>5</sup> and the Sturgeon Bank Wildlife Management Area.

## 2.5 Proposed Project Benefits

The Proponent listed the following as key benefits of the proposed Project:

- Access to more dependable, diverse and competitive offshore fuel supply sources to meet YVR's long-term fuel requirements;
- Enhanced global competitiveness of YVR for airlines and travelers which will assist YVR in continuing its important economic contribution to the region, Province and Canada;
- Economic contribution during construction and operation;
- Modernization of the fuel receiving, storage and delivery infrastructure to YVR, which will enhance the performance of fuel delivery in all respects, including: operational, maintenance, reliability, safety and environmental;
- Elimination of the need for tanker trucks to transport aviation fuel along Highway 99, City and local streets, and the corresponding emissions and safety concerns; and
- Reduced vessel transit distance in Canadian waters, with a corresponding reduction in GHG and criteria air contaminant emissions.

---

<sup>2</sup> Includes a 400 square kilometre area encompassing Boundary Bay, Roberts Bank, and Sturgeon Bank in the Fraser River Delta. The Sturgeon Bank Wildlife Management Area, located on Sturgeon Bank, is also designated under the Western Hemisphere Shorebird Reserve Network.

<sup>3</sup> The BC Waterfowl Society manages the George C. Reifel Migratory Bird Society within the Alaksen National Wildlife Area.

<sup>4</sup> The recently established Fraser River Estuary Ramsar site accounts for 20,682 ha and includes significant portions of the Fraser River estuary. The Ramsar Convention is an international intergovernmental treaty that provides the conservation framework for wetlands and their resources.

<sup>5</sup> South Arm Marshes Wildlife Management Area is managed by the MOE for critical habitat for waterfowl, shorebirds, raptors, songbirds, small mammal, and wetland-dependant species

## 2.6 Alternative Means of Undertaking the Proposed Project

Alternative means of carrying out the proposed Project are defined as the various technically and economically feasible ways that the proposed Project could be implemented<sup>6</sup>. For the proposed Project, alternative means were provided by the Proponent for methods of fuel transportation on the Fraser River, location and design configurations of the marine terminal, location of the fuel receiving facility, and routing of the pipeline system to YVR.

On April 28, 2011, EAO suspended the timelines of the EA of the proposed Project, at the Proponent's request, to allow time to explore an alternate pipeline route to that originally proposed by the Proponent. The Proponent's Highway 99 Pipeline Addendum (Addendum) outlined the potential impacts of a pipeline route that would follow Highway 99. On September 18, 2012, MOTI provided high-level approval for the Proponent to move forward on the Highway 99 route alignment. MOTI's approval allowed the Highway 99 alignment to be included as an option within the Environmental Assessment Process. However, the decision by MOTI does not constitute final approval of the route alignment.

The Proponent has selected the alternate route as its preferred option. Chapter 2 of the Proponent's Application provides additional information about the other pipeline route alternatives that were considered by the Proponent.

## 2.7 Alternatives to the Proposed Project

EAO and VFPA note that many comments made during the public comment periods in the Application Review stage directly questioned the Proponent's consideration of alternatives.

While a full list of public comments and the Proponent's responses can be found in Appendix 3, key comments that related to possible alternatives included:

- The expansion of existing infrastructure;
- Fuel be transported, by rail or pipeline, directly from the Cherry Point Refinery in Washington;
- A marine terminal and fuel receiving area be constructed closer to YVR to remove the need for a pipeline through Richmond; and,
- The status quo remains.

---

<sup>6</sup> The Proponent provided a review of the alternatives to the proposed Project in Chapter 2 and Appendix 2A of the Application.

The option of upgrading the existing infrastructure was not pursued by the Proponent given the reliance on third party infrastructure (including a marine terminal that will be used predominantly for other uses that will compete for access), the older and potentially less reliable pipeline system, the longer route through developed areas, the inability for an upgrade to meet future market demands and the costs of the upgrades compared to other alternatives.

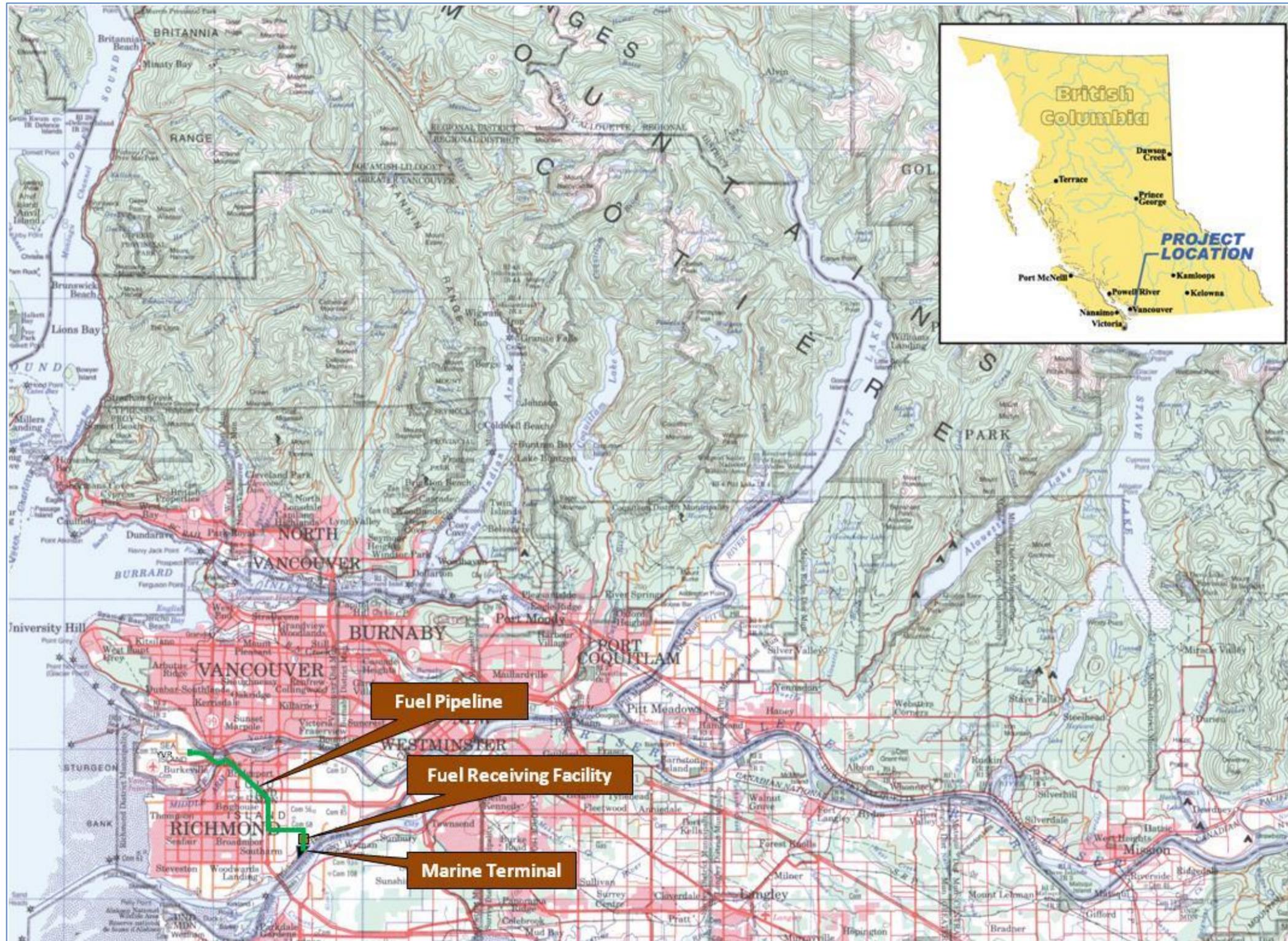


Figure 2. Overview map of the proposed Project components

The option that fuel be transported by rail or pipeline from Cherry Point Refinery was not pursued by the Proponent due to:

- High costs - The Proponent estimated the construction cost of a pipeline to YVR from Cherry Point Refinery to be \$260 million while the construction cost of a rail option to Richmond from the Cherry Point Refinery was estimated to be \$125-\$160 million. Specific annual operational costs of these alternatives were not estimated<sup>7</sup>;
- Lack of rail infrastructure at Cherry Point and at YVR;
- Regulatory framework uncertainty due to multiple jurisdictions;
- Insufficient security of supply given the Cherry Point Refinery is identified as a strategic asset by the US Department of Homeland Security;
- Lack of certainty that Cherry Point Refinery could fully meet the supply needs of YVR; and
- Environmental footprint and social impact of a long pipeline across multiple ecosystems, municipalities, First Nation territories and the Canada-US international border.

The options for a fuel receiving area offshore of YVR, including sites such as the Iona Jetty, were not pursued by the Proponent given the significant amount of dredging that would be required for ship berthing and turn-around areas, subsea seismic instability in the region, potential environmental impacts, high costs, and the regulatory process required.

The status quo was not pursued by the Proponent given it will not meet the needs of YVR.

### **3 Assessment Process**

#### **3.1 Provincial EA Process**

BC's EA process identifies and evaluates a proposed project's potential adverse environmental, economic, social, health, and heritage effects as required by the Act. The provincial EA process includes opportunities for participation by government agencies (local, regional, provincial, federal governments and neighbouring jurisdictions), First Nations, stakeholders and the public to identify and evaluate potential effects and determine means to avoid, mitigate or otherwise manage those effects.

---

<sup>7</sup> The cost of the proposed Project was estimated to be \$90-\$120 million.

The EA process is divided into two stages, the pre-application stage and the application review stage. The pre-Application stage sets out the methods and procedures for the EA and determines the information required in a proponent's application for an EA certificate. The Application Review stage evaluates the proponent's Application and concludes with an assessment report that summarizes the findings of the EA and a referral to provincial Ministers for their decision of whether to issue an EA Certificate.

On November 28, 2008, the Proponent requested that the Executive Director of EAO designate the proposed Project as a reviewable project under section 7(3) (a) of the Act. On January 19, 2009, the Proponent provided EAO with a Project Description to support their request to enter the EA process. The Proponent also provided EAO with letters from City of Richmond, YVR, VFPA and the Fraser Basin Council supporting the Proponent's request to enter the provincial EA process. On February 10, 2009, the proposed Project was designated as reviewable by EAO's Executive Director. Reasons for this decision were:

- The proposed Project would require 2.78 PJ of energy storage capacity, which is close to the 3.0 PJ threshold for energy storage facilities in the *Reviewable Projects Regulation* under the Act;
- The proposed Project has the potential to result in significant adverse environmental, economic, health, heritage and social effects; and
- It was expected that the proposed Project would generate strong public views, and that EA would be in the public interest.

Once designated as a reviewable project under the Act, EAO undertook an EA for the proposed Project. The proposed Project cannot proceed, or receive any provincial permits unless an EA Certificate is issued by Ministers.

### 3.2 Federal Review

A federal environmental assessment of the proposed Project was initiated under the *Canada Port Authority Environmental Assessment Regulations* (CPA EA Regulations) under the *Canadian Environmental Assessment Act* (CEAA, 1992). The VFPA determined that the proposed Project would require a screening level environmental assessment under these Regulations due to the requirement to obtain land and water lot leases from the VFPA to upgrade and operate the proposed marine terminal and construct and operate the proposed fuel storage facility. The VFPA posted a "Notice of Commencement" of a screening assessment on the web-based CEA Agency Registry on March 8, 2010.

On July 6, 2012, the CEAA (and the CPA EA Regulations) were replaced by the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), which requires that

environmental assessment (as defined in CEAA 2012) be conducted only for designated projects. However, under Order, signed by the federal Minister of Environment, the screening level assessment for the proposed Project was designated to continue as if CEAA (and the CPA EA Regulations) had not been repealed by CEAA 2012.

The *Canada-British Columbia Agreement for Environmental Assessment Cooperation* (2004) provides for coordinated EA processes to avoid uncertainty and duplication where a project is subject to review under both the Act and the CEAA. Pursuant to this Agreement, a cooperative EA of the proposed Project was undertaken by BC and Canada. BC and VFPA will each make EA-related decisions within its own legislative authority and timelines.

The CEA Agency, VFPA, Environment Canada (EC), Transport Canada, Health Canada, Canadian Transport Agency, Canadian Coast Guard, Aboriginal Affairs and Northern Development Canada (formerly Indian and Northern Affairs Canada), the Vancouver Airport Authority, and Fisheries and Oceans Canada (DFO) participated in the pre-application stage of the EA of the proposed Project. Once the Application was submitted, the CEA Agency indicated that it would no longer actively participate in the EA, since it was determined that the sole trigger was related to VFPA's potential lease of land to the Proponent in support of the proposed Project.

Starting with the submission of the Application, VFPA led the Federal environmental assessment review. During Application review, DFO, Transport Canada, Health Canada, Canadian Transport Agency, Canadian Coast Guard, Aboriginal Affairs and Northern Development Canada (formerly Indian and Northern Affairs Canada), the Vancouver Airport Authority, and EC participated in the EA of the proposed Project.

Federal comments received during the cooperative review are reflected in this Report and have informed the analysis and conclusions, which will enable the federal authorities to utilize it as the basis of the federal environmental assessment decision documentation, along with any other information the federal authorities may require.

Before the proposed Project can proceed, VFPA must determine whether the proposed Project is likely to cause significant adverse environmental effects. If provincial and federal EA decisions allow the proposed Project to proceed, the Proponent would also be required to obtain the necessary federal, provincial, and municipal approvals, as well as the requisite water and land leases from VFPA to enable the proposed Project to proceed.

The decision with respect to the conclusions of the federal EA would be made by the Director of Environmental Programs for VFPA. Should there be an EA decision allowing the proposed Project to proceed, this would be communicated to VFPA senior

management, who would instruct VFPA Real Estate and VFPA Planning to proceed with completion of the VFPA Project Permit Review process.

Works proposed on federal lands managed by VFPA will be subject to a Project Review and Permit process. The decision with respect to whether those aspects of the proposed Project may proceed on federal lands will be made by VFPA Executive under delegation from the VFPA Board of Directors, after consideration of the environmental factors, the outcome of the VFPA Project Review and Permit process, adequate land tenure arrangements, and other factors.

### 3.3 Subsequent Permitting Requirements

Should an EA Certificate be issued, the Proponent would still require applicable federal and provincial permits to construct and operate the proposed Project.

Of note, federal development permits are required for the marine terminal upgrades, the lease agreements for the fuel receiving facility and the water lot, permits for activities required for work in and around the Fraser River during construction and operation, and permits for work on airport lands. The key federal permitting agencies include the VFPA and the Vancouver Airport Authority.

The Proponent would require provincial permits for the pipeline right of way and associated activities in the right of way, construction and operation of the marine terminal and the fuel receiving facility, and safety of the proposed Project components.

Key provincial permitting agencies include MOTI, and the Oil and Gas Commission which has regulatory authority over pipelines and associated facilities in BC.

Municipal permits may be required from the City of Richmond, such as a development permit and municipal access agreement for the proposed pipeline sections that would be located on City property.

### 3.4 EA Participants

The EA included input from a number of different groups, including federal, provincial, and local governments, First Nations, and the public.

EAO and VFPA considered the comments from participants in the assessment of potential environmental, social, economic, health and heritage effects of the proposed Project in this Report. Comments and activities that related to the Crown's duty to consult and accommodate potentially affected First Nations are described in Part C of this Report.

### 3.4.1 Working Group

The EA established a working group, consisting of representatives from federal, provincial, local government and First Nations (see Appendix 1 for a list of Working Group members).

The role of the working group was to review key documents and provide EAO and VFPA technical advice with respect to:

- Key issue identification;
- The information required for the EA as described in the Application Information Requirements;
- The completeness of the Application;
- The potential impacts of the proposed Project;
- The development of measures to avoid or mitigate potential impacts; and
- The development of conditions, should an EA Certificate be issued by Ministers.

Comments received from working group members, and the Proponent's responses can be found in Appendix 2.

### 3.4.2 First Nations

EAO is required to ensure that the honour of the Crown is discharged by ensuring appropriate consultation and accommodation of First Nation interests in respect of the decision by Ministers as to whether to issue an EA certificate.

The Crown identified a duty to consult the following First Nations given the potential impacts to their asserted or established Aboriginal or Treaty rights:

- Cowichan Tribes;
- Stz'uminus First Nation;
- Penelakut Tribe;
- Lyackson First Nation;
- Halalt First Nation;
- Lake Cowichan First Nation;
- Semiahmoo First Nation;
- Tsawout First Nation;
- Musqueam Indian Band;
- Hwlitsum First Nation;
- Tsawwassen First Nation;
- Kwantlen First Nation; and
- Tsleil-Waututh Nation.

Out of an abundance of caution, EAO kept these First Nations informed about the EA process, given their strength of their asserted rights in the vicinity the proposed Project area:

- Qayqayt First Nation;
- Kwikwetlem First Nation; and
- Katzie First Nation

The Proponent's engagement with First Nations can be found in the Proponent's First Nations Consultation Report (on ePIC at [www.eao.gov.bc.ca](http://www.eao.gov.bc.ca)).

There is often considerable overlap between the interests of First Nations and the assessment of environmental, economic, social, heritage, and health effects. As a result, First Nations comments and interests in terms of consultation are specifically factored into the analysis in Part C of the Report. First Nations comments and interests that directly relate to the environmental, economic, social, heritage and health assessments are discussed in Part B. In addition, further and more specific consideration is given to the Crown's duty to consult and accommodate First Nation interests in Part C of this Report.

### 3.4.3 Local Government

Local Governments, including the City of Richmond, Corporation of Delta and Metro Vancouver, were invited to participate as members of the Working Group for the EA. In addition to comments received on key EA documents, the City of Richmond and Corporation of Delta adopted motions during council meetings with respect to the proposed Project.

City of Richmond stated opposition to the proposed Project and adopted resolutions at Council meetings on:

- June 8, 2009 – stating a preference for jet supply system options that result in no net gain of jet fuel line length on Lulu island, that further consideration and review of alternatives to the proposed Project be conducted, that significant amounts of trucking be removed from regional roadways and that the proposed Project not include a marine terminal on the south arm of the Fraser River;
- April 26, 2010 – stating that the Council is opposed to a marine terminal on the south arm of the Fraser River, a new pipeline through Richmond farmland and urban areas and any increase in trucks carrying aviation fuel on City streets<sup>8</sup>. The Council also stated that recent Proponent open houses were inadequate.

---

<sup>8</sup> EAO notes that this resolution was made before the Proponent changed their preferred pipeline route, as described in the Highway 99 Addendum.

- March 28, 2011 – re-iterating its opposition to the proposed Project and views that public consultation was inadequate;
- April 4, 2011 – stating that, while the Council remains opposed to the proposed Project, the preference would be the continued use of Kinder Morgan Pipeline<sup>9</sup> and/or upgrading it as necessary or alternately a location on the North Arm close to the airport;
- September 12, 2011 – stating that the Council is opposed to transportation of jet fuel on any arm of the Fraser River;
- January 23, 2012 – stating that the Council remains opposed to the route of the proposed Project and instead supports the expansion and upgrading of the existing Kinder Morgan Pipeline. The Council also stated that it insists that a federal environmental assessment be undertaken<sup>10</sup>; and
- October 22, 2012 – stating that the Council remains opposed to the proposed Project.

Delta Council adopted a motion on November 5, 2012 advising EAO of Delta's concerns and opposition to the proposed Project until such time as a full understanding is provided on potential pipeline options and to invite EAO staff to attend a future council meeting.

#### 3.4.4 Public

Three public comment periods were held by EAO to solicit feedback on the following documents:

- *The draft Application Information Requirements (dAIR)* – A 45-day comment period was held in April-May 2009; 86 comments were received. The key issues raised were terrestrial and marine accidents and spills, and alternatives to the proposed Project design. Approximately 90 individuals attended the two EAO open houses held during that time.
- *The Proponent's Application* – A 60-day comment period was held in February-April 2011<sup>11</sup>; 356 comments were received. The key issues raised were safety and health concerns for people living along the pipeline route, and the risk of impacts to the marine environment from an aviation fuel spill into the South Arm of the Fraser River from an accident or malfunction during proposed Project

---

<sup>9</sup> EAO assumes that this reference was intended to be the TransMountain (Jet Fuel) Inc. pipeline rather than Kinder Morgan.

<sup>10</sup> EAO notes that a federal EA has been required since March 8, 2010 when a federal 'Notice of Commencement' was issued.

<sup>11</sup> EAO notes that this public comment period was extended based on feedback from the public and the City of Richmond.

operations. Approximately 75 individuals attended EAO's open house held during that time; and

- *The Proponent's Addendum* – A 21-day comment period was held in January – February 2012; 125 comments were received. The key issues raised were safety and health concerns for people living along the pipeline route, and the risk of impacts to the marine environment from an aviation fuel spill into the South Arm of the Fraser River from an accident or malfunction during proposed Project operations. Approximately 125 individuals attended the Proponent's Open House held during that time. EAO attended the Proponent's open house and provided the public with information on the proposed Project EA.

The Proponent used the following methods to inform the public of the proposed Project:

- Advertising in the local newspapers and on the Project website;
- Sending brochures to, and meeting directly with, specific stakeholder groups;
- Maintaining a dedicated VAFD Project website with project information, including notices of meetings and opportunities to comment;
- Responding to requests for information on its dedicated project phone line and email;
- Meetings with community and business organizations, public officials, and municipal councils, including presentations at public council meetings; and
- Hosting public open houses and information sessions both within and outside of EAO public comment periods.

A copy of the Proponent's consultation report, which contains details of public consultations, can be found on EAO's ePIC at [www.eao.gov.bc.ca](http://www.eao.gov.bc.ca).

#### **4 Assessment Methodology**

For each issue under consideration in Part B, this Report will:

- Set out a summary of relevant of background information (which is set out in considerably more detail in the Application);
- Discuss the potential for residual adverse effects, including cumulative effects, having regard to mitigation measures proposed in the Application or developed subsequently as a result of public consultations, input from the Working Group and consultations with First Nations; and
- Assess whether any residual adverse effects, including cumulative effects, would be significant.

Potential effects of the proposed Project that are the result of an accident or malfunction (such as an aviation fuel spill), are assessed in Part D of this Report.

## 4.1 Valued Components

Valued Components (VC) are any environmental, economic, social, heritage, or health components that are considered important by the Proponent, public, First Nations, scientists or government agencies involved in the EA process. Importance may be determined on the basis of values, including First Nations interests, scientific or regulatory concerns, biodiversity, and sensitivity to proposed Project effects. VCs are used in the assessment of potential adverse effects; the use of VCs in an EA allows the assessments to be focused on key areas that are relevant to the Ministers' decision and VFPA's decisions.

## 4.2 Assessment of Potential Significant Adverse Effects Methodology, including Cumulative Effects

Through the EA, EAO and VFPA considered whether the proposed Project may cause significant adverse effects, including potential cumulative effects, using the following assessment process:

- An examination of background information on relevant VCs including:
  - approved land use plans that designate the most appropriate activities on the land base; and
  - historical data, trends and baseline studies that set out the current conditions and factor in effects of prior developments.
- An identification of potential impacts of the proposed Project on relevant VCs.
- An assessment of the potential for residual adverse effects, taking into account the mitigation measures proposed by the Proponent for the proposed Project.
- An identification of potential overlapping impacts due to other developments, even if not directly related to the proposed Project.
- An identification of predicted impacts from future developments that are reasonably foreseeable and sufficiently certain to proceed.
- An assessment of the significance of any residual effects after mitigation, considering the following factors: magnitude, geographic extent, duration and frequency, reversibility, context, and probability.

The cumulative effects of the proposed Project on VCs were evaluated by EAO and VFPA based on past, present and reasonably foreseeable projects and/or activities as described in Table 1. The projects, facilities, and activities in Table 1 were identified in consultation with various federal, provincial, and municipal agencies, authorities, and departments.

**Table 1. Cumulative Effects Assessment Inclusion List**

Project/Facility/Activity	Description	Potential Spatial Overlap	Potential Temporal Overlap
Fraser Wharves Ltd. Vehicle Storage Facility	Automobile parking	Y	Y
CNR Ewen Branch Rail Line Extension Project	Rail crossing at the southern terminus of No. 7 Road to Fraser Wharves Autoport, Richmond BC	Y	Y
Lehigh Hansen Materials Ltd.**	Development of a construction materials terminal for aggregates, with two barge loading berths located on the VFPA property to the east of the proposed VAFFC Fuel Receiving Facility	Y	Y
No 4. Road Pump Station Upgrade*	Upgrades and related construction works the pump station located at No. 4 Road and River Road, Richmond, BC	N	N
VFPA Richmond Office Seismic Upgrade*	Seismic upgrade	N	N

\*EAO notes that the Proponent included these projects in their cumulative effects assessment, but due to two time-limit suspensions of the EA for the proposed Project, these projects are scheduled to be completed before the proposed Project EA is complete. As a result, they would be existing projects instead of foreseeable future projects.

\*\*The Proponent did not include this proposed project in the cumulative effects assessment as the project was not reasonably foreseeable or sufficiently certain to proceed at that time, and information was not available. However, EAO and VFPA are considering this proposed Project in this Report, given information became available during the course of the EA. The proposed Lehigh project was also considered in VFPA's Tanker Traffic Study.

### 4.3 Assessing Significance of Potential Effects

In addressing what may constitute a “significant” adverse effect, EAO and VFPA consider the following factors<sup>12</sup>:

- *Magnitude*: This refers to the magnitude or severity of the effect. Low magnitude effects may have no impact, while high magnitude effects may have an impact.
- *Probability*: The likelihood that an adverse effect will occur.
- *Geographic Extent*: This refers to the extent of change over the geographic area of the proposed Project. The geographic extent of effects can be local or regional. Local effects may have a lower impact than regional effects.
- *Duration and Frequency*: This refers to the length of time the effect lasts and how often the effect occurs. The duration of an effect can be short term or long term. The frequency of an effect can be frequent or infrequent. Short term and/or infrequent effects may have a lower impact than long term and/or frequent effects.
- *Reversibility*: This refers to the degree to which the effect is reversible. Effects can be reversible or permanent. Reversible effects may have lower impact than irreversible or permanent effects.
- *Context*: This refers to the ability of the environment to accept change. For example, the effects of a project may have an impact if they occur in areas that are ecologically sensitive, with little resilience to imposed stresses.

The development and refinement of mitigation measures is a key component of the EA process and one where EAO spends an extensive amount of time facilitating discussion and negotiation among the Proponent, interested parties and First Nations. In the case of this proposed Project, EAO has recommended Conditions be placed on the EA Certificate, if issued. Key recommended conditions will be discussed in the following sections of this Report.

### 4.4 Spatial Boundaries

Spatial boundaries for the effects assessment are defined by the characteristics of the proposed Project and the VC being assessed. Spatial boundaries used in the report are defined in each section of the Report, where applicable.

---

<sup>12</sup> This is generally consistent with the analysis used in federal environmental assessments under the *Canadian Environmental Assessment Act*, although EAO has added the factor of “probability”.

## 4.5 Temporal Boundaries

Temporal boundaries for the effects assessment are defined by the characteristics of the proposed Project and the VCs being assessed, and include the time prior to proposed Project-related activity (i.e. baseline) and the periods when the VCs will be affected by the proposed Project.

**Construction** – would commence in Spring 2013 and last for approximately 24 to 30 months. Activities associated with proposed Project construction include:

- Upgrading the existing marine terminal;
- Construction of the fuel offloading facilities and transfer pipeline;
- Construction of the fuel receiving facility; and
- Construction of the delivery pipeline;

**Operations** – would last for at least 60 years following construction, with activities including:

- Periodic vessel transit in the Fraser River to the marine terminal;
- Periodic vessel berthing at the marine terminal;
- Periodic transfer of fuel from vessels through the fuel transfer pipeline;
- Storage of fuel at the fuel receiving facility;
- Intermittent fuel delivery from the fuel receiving facility through the fuel delivery pipeline to YVR; and
- Periodic maintenance activities on proposed Project infrastructure.

Due to modern material and corrosion control, the Proponent notes that the life of the pipeline may be longer than 60 years. Periodic inspections, as required by the OGC, may find anomalies requiring repair, however, this is not expected during the first several decades.

## **PART B – ASSESSMENT OF POTENTIAL EFFECTS**

### **5 Assessment of Potential Environmental Effects**

#### **5.1 Fisheries, Aquatics, and Surface Water Quality Assessment**

The Proponent assessed the potential impacts to at-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries, surface water quality, and aquatic habitat (as characterized by Fraser River Estuarine Management Program (FREMP) red- and yellow-coded habitat) from proposed vessel movements, marine terminal upgrades, the fuel receiving facility, and the fuel transfer and delivery pipelines.

Please refer to the Application for a full description of the Proponent's methodology (including definition of spatial and temporal boundaries), baseline conditions in the study areas (including biophysical characteristics and aquatic resources, aquatic habitat and surface water quality), full description of the identified potential impacts of the proposed Project on VCs and proposed mitigation measures. Please refer to Figure 3 for the study area for the fisheries, aquatics and surface water quality assessment.

The Proponent's assessment focused on potential impacts during the construction and operation of the proposed Project in four study areas.

- South Arm of the Fraser River;
- Lulu Island Watercourses;
- North and Middle Arms (Moray Channel) of the Fraser River; and
- Sea Island Watercourses.

Approximately 80% of the Fraser River discharges into the South Arm. The South Arm is considered to be an estuarine ecosystem, given the presence of a tidally-driven salt water wedge underneath a freshwater surface layer. Levels of contaminants in the Lower Fraser River are found to be greater closer to areas of heavy industrial or other urban activity, and become more concentrated moving downstream from the trifurcation<sup>13</sup>.

The South Arm consists of four channel segments: Sand Heads Channel west of Steveston, South Arm Tidal Channel from Steveston to the west end of Deas Island, South Arm Meso-tidal which extends from Deas Island through the main channel via the

---

<sup>13</sup> Trifurcation means having three forks. In this use, it means where the river splits into three channels.

south bank of Annacis Island to its eastern tip, and Annacis Channel which extends along the northern bank of Annacis Island.

### Sands Head Channel

Sand Heads channel is the main access route into the Lower Fraser River for large ships. The navigability of the channel is maintained using a combination of manmade training structures and dredging operations. All five Pacific salmon species use Sand Heads channel for adult holding and upstream migration in the fall, and downstream juvenile migration between spring and mid-summer. Of interest for this assessment, eulachon and white sturgeon also make use of Sands Head channel. The shores of Westham Island are classified as high productivity by the Fraser River Estuarine Management Program (FREMP).

### South Arm Tidal Channel

The South Arm Tidal Channel contains a deep water navigation channel maintained by training structures, which stabilize island banks and sand bars to minimize effects on productive aquatic habitat. Development and industrial activity on the northern shores has resulted in PAHs and metals contained in sediment in this area. The George C. Reifel Migratory Bird Sanctuary and the South Arm Marshes Wildlife Management Area are located in this area, as this area is characterized by productive intertidal marsh and mudflat habitats used by fish.

Migratory fish runs in this channel segment are consistent with those observed in channel segments immediately upstream. Many salmonids use the marshy sloughs and mudflat areas of this segment to rear for an extended period of time prior to entering the sea. In addition to salmonids, White sturgeon use this segment for migration and rearing, and eulachon run upstream, through the lower estuary to spawn each spring.

The northern shoreline of the South Arm Tidal Channel is more developed than the southern shoreline, and contains more low productivity habitat as classified by FREMP. The intertidal zone of the southern shoreline is predominantly classified as moderate to high productivity habitat. The shorelines of the islands in the channel are classified as high productivity by FREMP.

### South Arm Meso-Tidal Channel:

The most upstream channel segment of the South Arm is the South Arm Meso-Tidal Channel segment, which extends upstream from Deas Island to the eastern tip of Annacis Island. Several industries are in this area, such as cement operations and a lumber mill, as well as several deep sea terminals. Routine annual dredging is required at several locations.

The southern shoreline of this area has a narrow productive band of intertidal marshes and mudflats, and is home to several sloughs and a recreational boating area.

The habitat in this area is primarily considered low or moderately productive by FREMP. The marine terminal is and the proposed fuel receiving facility would be located on the north shore of this segment. The shoreline of the existing marine terminal is considered low productivity by FREMP due to the existing development, and adjacent shoreline is considered moderate. Opposite the marine terminal, the southern shoreline is classified as high productivity by FREMP.

#### Watercourses on Sea Island and Lulu Island

Habitat values in the drainage channels located near the alignment of the fuel transfer pipeline between the marine terminal and fuel receiving facility have been compromised by historic land use, and therefore, do not provide suitable or productive habitat for salmonids. The Proponent captured three-spine stickleback at seven of the 10 ditch sites sampled<sup>14</sup>. No other fish species were captured by the Proponent.

No natural watercourses remain on Sea Island; all existing watercourses are classified as drainage ditches that convey runoff from Sea Island to the North Arm of the Fraser River and into the Moray Channel. Fish entry into drainage ditches is limited due to a hydraulic disconnection with the Fraser River for flood protection measures.

---

<sup>14</sup> Specific sampling information available in Table 4.1.2 (pages 4.1-7 to 4.1-9) of the Highway 99 Addendum. Specific ditch channel width, water depth, surrounding vegetation, and other ditch characteristics are detailed in section 4.1 (pages 4.1-10 to 4.1-16) of the Highway 99 Addendum.

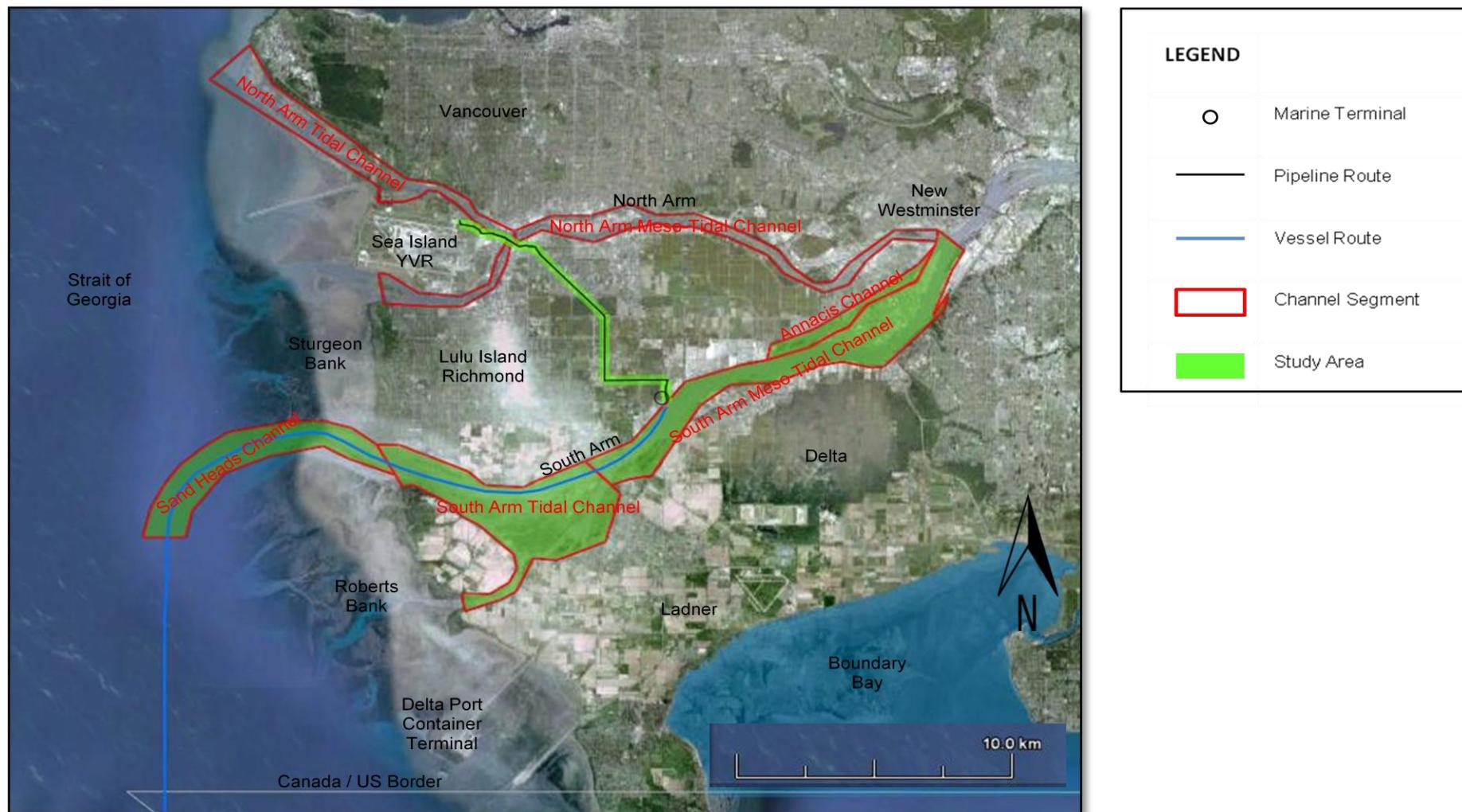


Figure 3: Study Area for the fisheries, aquatics and surface water quality assessment

### 5.1.1 Valued Components

This Report assesses the significance of potential impacts to at-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries, surface water quality, and FREMP red- and yellow-coded habitat.

#### At-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries:

The Proponent assessed the potential impacts of the proposed Project on the fish species provided in Table 2.

Fish species at risk are defined as provincially red- and blue-listed fish species, fish species identified by COSEWIC to be endangered, threatened or of special concern, fish species listed as special concern under Schedule 1 of SARA, species at risk requiring protection under the provincial Identified Wildlife Management Strategy.

The fish species of commercial and recreational importance were identified based on discussions with First Nations and in consideration of species of value for recreational and commercial fisheries.

**Table 2: Fish species assessed during the EA**

Fish Species	Listed (Provincial)	Listed (Federal)	Commercial Importance	Recreational Importance	Importance to First Nations
White sturgeon ( <i>Acipenser transmontanus</i> )	Red-listed	Endangered		Yes	Yes
Eulachon ( <i>Thaleichthys pacificus</i> )	Blue-listed		Yes <sup>15</sup>	Yes	Yes
Salmonoids <sup>16</sup>			Yes	Yes	Yes

#### Aquatic Habitat, as characterized by FREMP:

The Proponent assessed the potential impacts on FREMP habitat in the Application. The FREMP habitat inventory is intended to inform prospective developers and regulators of the relative aquatic habitat values in the Lower Fraser River (Table 3).

---

<sup>15</sup> Commercial and recreational harvesting is currently prohibited by DFO due to conservation concerns.

<sup>16</sup> Sockeye (*Oncorhynchus nerka*), Chinook (*Oncorhynchus tshawytscha*), Coho (*Oncorhynchus kisutch*), Chum (*Oncorhynchus keta*), Pink (*Oncorhynchus gorbuscha*), and Steelhead (*Oncorhynchus mykiss*)

Figure 4 shows the FREMP habitat for the proposed Project area. See Figure 4 for a map showing FREMP colour-coded shoreline habitat in the proposed Project area.

**Table 3: FREMP colour-coded shoreline habitat classification scheme and implications for development.**

Colour Code	Productivity	Description	Development
Red	High	Habitat of high value created to compensate habitat loss, or habitat that support critical fish habitat	Development is restricted, but may occur provided that mitigation is applied to avoid effects on habitat features and functions.
Yellow	Moderate	Habitat of moderate value in habitat structure and diversity that support moderate fish and wildlife functions.	Development may occur provided that mitigation or compensation measures are incorporated into the project design to ensure that there is no net loss, and where possible, net gain, or productive capacity as a result of the project.
Green	Low	Habitat is limited and located in developed land use areas (e.g. port areas)	Development may occur provided that environmental impacts are mitigated through appropriate location, scheduling, design and operation, and no net loss, and where possible, a net gain, in the productive capacity of the site is achieved.

Surface Water Quality:

The Proponent assessed the potential impacts on surface water quality in the Application.

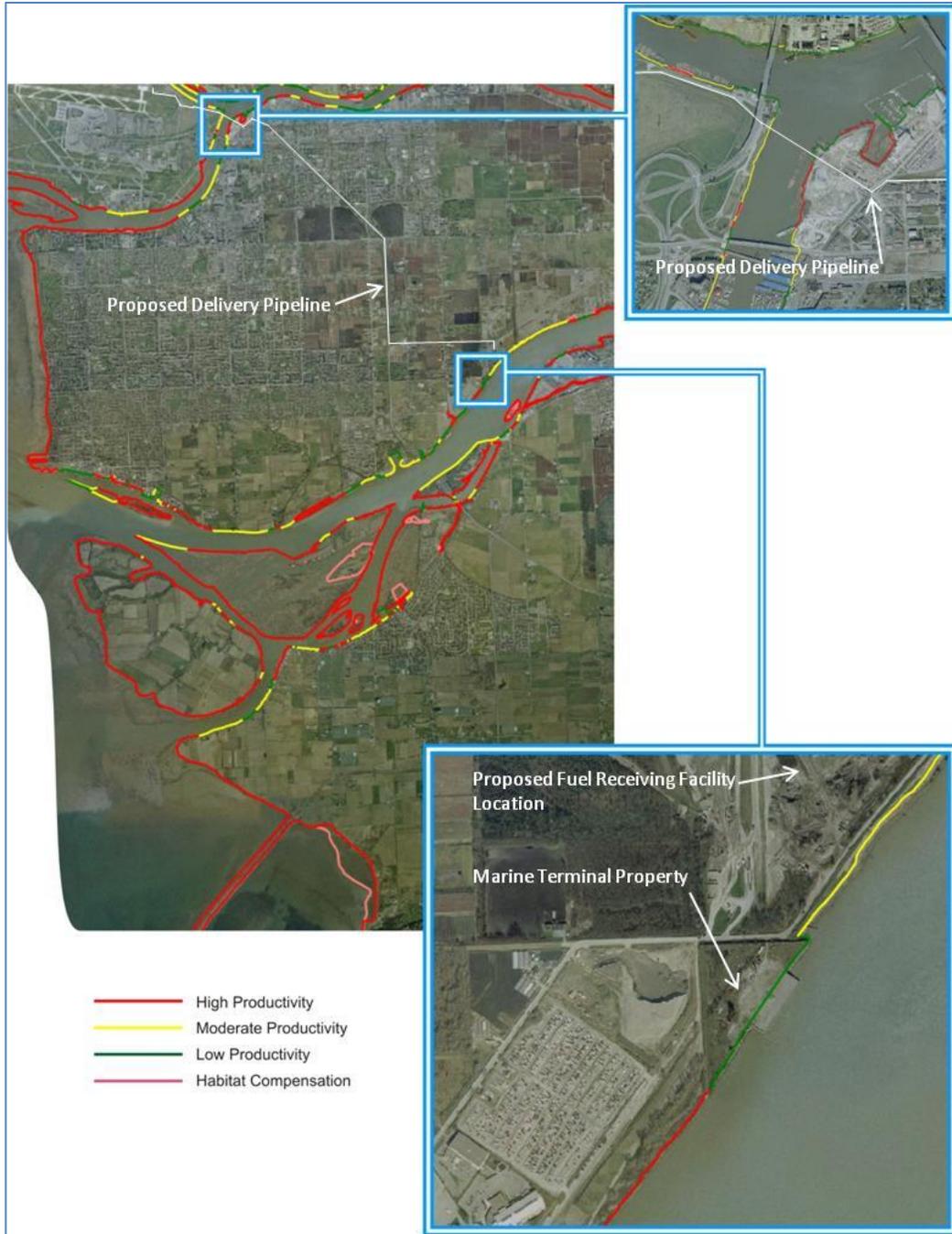
*Fraser River:*

Dissolved oxygen values in the Fraser River (South Arm, North Arm, and Moray Channel) are generally above Canadian Council of Ministers of the Environment (CCME)’s minimum requirements for the survival of aquatic life and MOE’s 30-day mean for May to October, with most values exceeding the 30-day mean for November to April<sup>17</sup>.

Conductivity, hardness and total alkalinity in the Fraser River varied considerably in the Proponent’s sampling periods, due to the presence of saline waters at the time of sampling. No published guidelines exist for these parameters.

---

<sup>17</sup> Specific surface quality data values are included in section 5.2.3.1 (pages 5.2-33 to 5.2-34).



**Figure 4: FREMP colour-coded aquatic habitat in the proposed Project area.**

The pH levels of the Fraser River are better than the CCME guidelines for all areas observed after 2000, and most areas between 1985 and 1994. Suspended sediment levels have been within MOE's guidelines for the South Arm of the Fraser River.

Suspended sediment levels in the North Arm and Moray Channel have, at times, exceeded MOE's guidelines, as the North Arm of the Fraser River naturally carries high loads of suspended sediments<sup>18</sup>.

#### *Lulu Island and Sea Island:*

The Proponent took surface water quality measurements on Lulu Island from September to November 2009. These studies and others on Lulu Island and Sea Island indicated that surface water conditions of Lulu Island and Sea Island generally do not meet minimum criteria for salmonid habitat requirements<sup>19</sup>.

In 2011, the Proponent sampled 10 watercourses along the Highway 99 corridor between Bridgeport Trail and the Westminster Highway overpass along Vanguard Road. At all sites, the dissolved oxygen was lower than the CCME and MOE guidelines, and the pH was within CCME and MOE guidelines<sup>20</sup>.

#### 5.1.2 Potential Project Effects and Proposed Mitigation

This section considers the potential effects to at-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries, surface water and aquatic habitat due to the proposed upgrades to the marine terminal, operation of the marine terminal, construction of fuel receiving facility and the construction of the fuel transfer and delivery pipelines.

During the review of the Application, comments were solicited from the Working group, First Nations and members of the public regarding potential impacts to fisheries, aquatic resources and surface water quality. A number of issues were raised relating to the potential impacts of the proposed Project to First Nations' food, social, and ceremonial fisheries. Those issues are discussed in Part C of this report. A number of issues were raised that related to the impacts of a fuel spill at the marine terminal or from vessels. Those issues are discussed in Part D of this report.

---

<sup>18</sup> Specific values are in Section 5.2.3.2 (page 5.2-67 to 5.2-70) of the Application

<sup>19</sup> Specific values are in Section 5.2.3.2 (page 5.2-59) of the Application.

<sup>20</sup> Specific values are in section 4.1.3 (pages 4.1-3 to 4.1-5) of the Highway 99 Addendum.

### 5.1.2.1 Marine Terminal Upgrade

The Proponent has stated that the majority of construction required to upgrade the existing marine terminal will occur on the shore-side of the site to construct off-loading, receiving, and transfer facilities. In-water works would be required within the Fraser River for pipe pile bulkhead toe re-grades and scour protection and dolphin installations.

Activities that could result in potential impacts are detailed in the Application and include pipe pile bulkhead toe re-grades and scour protection, dolphin installations, seismic upgrades, and storage and staging<sup>21</sup>.

The following potential effects could occur as a result of the marine terminal upgrade:

- Disturbances of sediments, discharge of sediment-laden run-off - Concrete, cement, lime-containing materials and concrete leachate or washwater are alkaline and considered toxic to fish and other aquatic life. Lime in cement and other concrete products is highly soluble in water and can raise the pH;
- Elevated or percussive underwater noise levels associated with in-river pile driving during construction;
- Permanent loss of water column habitat - The Proponent would install approximately four mooring and breasting dolphins<sup>22</sup> and a central off-loading platform, each supported by at least six in-water piles (numbers to be confirmed in design phase, if certified), located within the enlarged rip-rap riverbed armour section directly adjacent to the existing marine terminal wharf. The Proponent expects approximately 153 m<sup>3</sup> water column loss as a result of these features; and
- Permanent alteration of subtidal river bottom habitat as a result of installation of rip rap, breasting and mooring dolphins, and boat launch support piles during marine terminal upgrades.

To address the potential impacts to fisheries, aquatic habitat and surface water quality from the marine terminal upgrade, the Proponent would implement the following key mitigation measures:

- Develop and implement a construction environmental management plan that includes a surface water quality/fisheries protection and sediment control plan and a fuels, chemicals and materials storage and handling plan;

---

<sup>21</sup> Specific activities resulting in the effects detailed in Table 3 in this Report are explained in detail in section 5.2.4.2 (pages 5.2-77 to 5.2-80) of the Application.

<sup>22</sup> Docking structures used by ships

- Adhere to the “Best Management Practices for Pile Driving and Related Operations” (BC Marine and Pile Driving Contractors Association 2003) and other best practices as required by appropriate agencies through permitting processes;
- Monitor underwater sound pressure levels generated by pile driving equipment. If the sounds exceed approved levels or impacts are detected, the Environmental Monitor must immediately suspend all in-river work generating high sound pressure levels, notify DFO, develop and obtain DFO approval for mitigation measures, and work with the contractor to implement those measures when restarting the activity;
- If cast-in-place rather than precast construction methods are used at the marine terminal, the Proponent must use appropriate forms to isolate the concrete from the receiving river environment;
- Undertake all in-water river construction works using equipment and machinery that prevent grounding on the intertidal foreshore or subtidal riverbed of the Fraser River at the marine terminal, unless construction work can be undertaken using equipment and machinery located onshore and above the high water mark; and
- Adhere to the “Fraser River Estuary Management Program (FREMP) Dredge Management Guidelines” (FREMP 2005) and all relevant Federal requirements and guidelines.

In addition to the effects noted above, an increase in riprap may increase habitat for small-bodies and juvenile fish, as riprap has been found to provide habitat in areas of developed or otherwise degraded stream sections.

City of Richmond questioned whether a Habitat Alteration, Disruption or Destruction (HADD) authorization would be required by DFO for the proposed Project. EAO and Proponent both note that DFO has confirmed that a HADD is not expected.

#### *5.1.2.2 Marine Terminal Operations*

During operations, the potential effects of the proposed Project on fisheries, aquatic resources and surface water quality would be primarily related to the accidental discharge of deleterious materials or substances to the Fraser River. Deep water benthic and fish habitat may be impacted by the short term, temporary re-suspension of river bottom sediments from periodic dredging (once every two years) to maintain adequate underkeel clearance for large vessels.

To address the potential impacts on fisheries, aquatic habitat and surface water quality from marine terminal operations, the Proponent would adhere to the “Fraser River

Estuary Management Program (FREMP) Dredge Management Guidelines” (FREMP 2005) and all relevant Federal requirements and guidelines.

### 5.1.2.3 *Fuel Receiving Facility*

Existing landfill operations, soils handling and the more recent placement of preload<sup>23</sup> along the length of the dyke road fronting the proposed fuel receiving facility property have resulted in the loss of riparian areas, disruption of the drainage network and the deterioration of surface water quality such that little or no aquatic habitat suitable for salmonids remains.

Construction of the proposed fuel receiving facility could result in potential adverse effects as a result of the discharge of sediment-laden waters to surface drainage ditches and incidental off-site transport of materials that are hazardous or otherwise deleterious to fish via drainage ditches or vehicles and equipment leaving the site.

Since the proposed fuel receiving facility would be located in an upland area set back from the Fraser River shoreline and away from upland surface water drainage ditches, potential effects on fisheries, aquatic resources and surface water quality from facility operations would be the accidental discharge of deleterious materials to site ditches and migration of those deleterious materials into the Fraser River.

To address the potential impacts on fisheries, aquatic habitat and surface water quality from the proposed fuel receiving facility, the Proponent would implement the following key mitigation measures:

- Include a water sampling program in their construction Surface Water Quality / Fisheries Protection and Sediment Control Plan that:
  - identifies procedures for collecting and analyzing water samples, before and during construction, from surface water drainage ditches that have potential to be adversely affected by construction activities;
  - measure for pH, temperature, and biochemical oxygen demand, as well as relevant contaminants, including, but not limited to, total petroleum hydrocarbons, polycyclic aromatic hydrocarbons, total suspended solids, and metals concentrations; and
  - implement water control measures necessary to verify that all discharge water and surface run-off from the work area meets the applicable water quality guidelines or requirements.

---

<sup>23</sup> Preload is typically added to the top of soil to consolidate the soil and build embankments.

- Conduct all work in and around the Fraser River and surface water drainage ditches on Lulu Island according to the “Standards and Best Practices for Instream Works” (Ministry of Water, Land and Air Protection 2004) and the “Land Development Guidelines for the Protection of Aquatic Habitat” (Fisheries and Oceans Canada and Ministry of Environment, Lands and Parks 1992); and
- Develop and implement a Fuels, Chemicals and Materials Storage and Handling Plan that adheres to relevant guidance in “A Field Guide to Fuel Handling, Transportation and Storage” (Ministry of Water, Land and Air Protection 2002). The Plan must apply to all construction activities and identify best management practices for:
  - equipment refuelling;
  - concrete materials use; and
  - painting, staining and chemical applications.

#### 5.1.2.4 *Transfer and Delivery Pipelines*

A temporary loss of riparian habitat along the pipeline corridor may occur in some areas during construction due to vegetation clearing, soil stripping and salvage, grading for materials, and equipment staging during pipeline installation.

Potential effects of the proposed pipeline site preparation, construction and reclamation on surface water quality could include erosion and sedimentation from exposed soil and soil piles, accidental discharge of deleterious materials, and temporary interruption or loss of habitat for aquatic species during the installation of water crossings.

Directional drilling could result in the accidental release of drilling fluids during drilling activities or during disposal of excavated material. Naturally-occurring non-toxic materials, such as bentonite clay and water, would be used to lubricate the directional drilling equipment. This substance would be disposed of by mix and bury onsite, land spread or hauled to an approved site or disposal facility.

The proposed pipeline construction could result in permanent and minor loss of riparian habitat due to the installation of markers and ancillary facilities if portions of the pipeline are situated within buffer zones that contribute to functional aquatic habitat. However, the loss would be minimal as the pipeline route is located primarily on existing transportation corridors which are currently subject to routine maintenance.

No permanent loss of instream habitat is expected because:

- The pipeline would not be located in the instream portion of any surface water watercourses; and
- Staging areas for pipeline construction would not be located in the instream portion of any watercourse.

The Proponent does not expect effects on fisheries, aquatics or surface water quality from regular pipeline operations activities.

To address the potential impacts on fisheries, aquatic habitat and surface water quality from the construction of the proposed transfer and delivery pipeline, the Proponent would implement the following key mitigation measures:

- Develop and implement a Surface Water Quality / Fisheries Protection and Sediment Control Plan and Fuels, Chemicals, and Materials Storage and Handling Plan (as described above);
- Conduct all work in and around the Fraser River and surface water drainage ditches on Lulu Island according to the “Standards and Best Practices for Instream Works” (Ministry of Water, Land and Air Protection 2004) and the “Land Development Guidelines for the Protection of Aquatic Habitat” (Fisheries and Oceans Canada and Ministry of Environment, Lands and Parks 1992), and for all work in and around surface water drainage ditches on Sea Island, according to the “Environmental Construction Standards” from the Vancouver Airport Authority (1998);
- Develop site-specific management plans for directional drilling of pipelines consistent with the guidelines in the “Planning Horizontal Directional Drilling for Pipeline Construction” (Canadian Association of Petroleum Producers 2004); and
- Adhere to municipal bylaws, legislation, regulations and permitting requirements of the appropriate regulatory authority<sup>24</sup>.

The Proponent states that they may improve the conditions of some drainage ditches along the Highway 99 corridor, given the present degraded state of some riparian areas located adjacent to drainage ditches along Highway 99.

### 5.1.3 Environmental Management Plans

Given the potential effects on at-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries and surface water quality during construction, the following environmental management plans would be required (Condition 1) prior to construction:

- An accident or malfunctions management plan is required so that hazardous substances are handled appropriately during construction, to minimize potential effects;

---

<sup>24</sup> For the transfer and delivery pipelines, there is a combination of municipal, provincial and federal jurisdictions with potentially different requirements. It is not EAO’s intention to document all the cases of overlap, but rather to note that the requirements will be subject to the appropriate authority where they have jurisdiction.

- A surface water quality/fisheries protection and sediment control management plan is also required to ensure that construction meets best practices<sup>25</sup>. The plan would include the following measures to prevent, minimize or mitigate potential impacts to at-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries:
  - developing protocols for the installation of piles and dolphins;
  - developing protocols to mitigate and monitor any underwater acoustic-related effects during pile driving;
  - developing protocols for watercourse crossings consistent with the *Fisheries Act*, COR Riparian Area strategy (where applicable), and the appropriate fisheries timing window as approved by MOE and DFO, including minimizing duration of instream works, utilizing appropriate erosion and control measures, involving temporary isolation of any affected ditch channels on either side of the crossing site, temporarily diverting the watercourse if required, returning the watercourse to its pre-proposed Project streambed, restoring any affected riparian areas as appropriate; and
  - implementing measures to re-establish baseline surface hydrology and site stabilization upon completion of watercourse crossings.
- The surface water quality/fisheries protection and sediment control management plan would also include the following measures to prevent, minimize or mitigate potential impacts due to sedimentation or accidentally release of hazardous material:
  - measures to prevent discharge of deleterious substances or debris;
  - methods to prevent the entry of construction and excavation wastes, overburden, silt, soil, or other substances into any watercourse;
  - methods for collecting, removing and disposing sanitary wastewater via tanks or pump trucks;
  - protocols for managing, monitoring, maintaining, and repairing of surface water drainage, storm water drainage, settling ponds, and other sediment control measures to ensure that these measures function effectively under all site conditions;
  - use of environmentally sensitive, biodegradable and non-toxic hydraulic fluids for hydraulic machinery entering watercourses; and

---

<sup>25</sup> Standards and Best Practices for Instream Works (MLAP 2004), Operational Statement for Directional Drilling (DFO Pacific Regional) and Land Development Guidelines for the Protection of Aquatic Habitat (DFO 1992)

- use of a spud-anchored<sup>26</sup> barge during construction, where appropriate;
- identify procedures for immediately notifying in the event that could or is resulting in the discharge of deleterious materials to the receiving environment.

Operations Environmental Management plans would also be required to ensure that appropriate measures to avoid or minimize potential impacts during pipeline maintenance and other proposed Project operations are developed.

The Environmental Manager is responsible for ensuring that all appropriate agency approvals and authorizations are in place for the proposed Project.

#### 5.1.4 Residual Adverse Effects of the proposed Project

Table 4 summarizes the potential residual adverse effects of the proposed Project on fisheries, aquatic habitat and water quality, after mitigation. As the FREMP-coded habitat at the marine terminal is low productivity, it is not considered red- or yellow-coded. No residual effects to FREMP red- or yellow-coded habitat are expected for the proposed Project, and therefore, EAO and VFPA did not perform a cumulative effects or significance analysis on fisheries, aquatic habitat or water quality.

Site development and management during construction and operations, such as re-vegetation, surface water and sediment control mechanisms and water quality monitoring, would likely result in overall improvement to on-site drainage and surface water quality conditions, resulting in a beneficial residual effect to fisheries, aquatic resources and surface water quality VCs.

The potential residual adverse effects on aquatic habitat are:

##### *Marine terminal construction:*

- Rip-rap re-grading would result in the temporary disruption of existing hard bottom habitat at the base of the bulkhead wall, as well as the permanent conversion of soft river bottom habitat to rip rap;
- Increased habitat complexity to low productivity section of Fraser River due to re-grading of rip rap;
- Permanent loss of water column habitat at and above pipe pile insertions due to installation of mooring and breasting dolphins;

---

<sup>26</sup> A spud anchor is a piling that can be used to keep barges in place, prevent grounding and minimize the risk of riverbed disturbance.

- Midwater portion of berthing dolphins could provide a limited amount of cover for juvenile and small-bodied fish species; and
- Physical habitat temporarily degraded due to increased noise and sediment re-suspension.

*Marine terminal operations:*

- Periodic dredging would remove the biologically active layer of sediments that provide habitat for benthic invertebrates. The area dredged would be relatively small and expected to re-colonize following the re-establishment of a stable sediment layer.

*Transfer and Delivery Pipeline construction:*

- Loss of riparian or aquatic habitat would be localized and temporary.

The residual effects of the proposed Project were not determined to interact cumulatively with other past, present or reasonably foreseeable future projects, facilities or activities.

EAO and VFPA note that increases in habitat complexity and cover for juvenile species are positive effects of the proposed Project.

5.1.5 Significant of Residual Effects Analysis

The significance of residual effects to at-risk fish species and fish species of importance to commercial, recreational and First Nations fisheries and to water quality are assessed in Table 4. A residual effect to aquatic habitat, as characterized by FREMP was not found.

**Table 4. Significance analysis for residual adverse effects to at-risk fish species and fish species of importance in commercial and recreational and First Nations fisheries, and surface water quality.**

VC	At-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries
Residual Adverse Effect	<ul style="list-style-type: none"> <li>• Disturbance due to rip-rap re-grading</li> <li>• Loss of water column habitat due to installation of mooring and breasting dolphins;</li> <li>• Physical habitat degraded due to increased noise and sediment re-suspension.</li> <li>• Periodic dredging would remove habitat for benthic invertebrates.</li> <li>• Loss of riparian or aquatic habitat along the pipeline.</li> </ul>

<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>• Installation of rip rap during marine terminal upgrades could increase habitat for small bodied and juvenile fish.</li> <li>• Installation of mooring and berthing dolphins would result in a loss of 153 m<sup>3</sup> water column habitat, however, the midwater portion of berthing dolphins could provide a limited amount of cover for juvenile and small-bodied fish species.</li> <li>• Incidental off-site transport of materials that are hazardous or otherwise deleterious to fish via drainage ditches or outgoing vehicles and equipment may occur.</li> <li>• Site development and management during fuel receiving facility operations would likely result in overall improvements in on-site drainage and surface water quality conditions resulting in a beneficial effect to at-risk fish.</li> <li>• Construction of the pipeline would result in a temporary loss of riparian or aquatic habitat; however, no at-risk fish species or fish species of importance in commercial recreational and First Nations fisheries were observed in the waterways along the Highway 99 right-of-way.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>• There would be permanent loss of water column habitat, but it is difficult to estimate the probability of these impacts specifically to at-risk fish.</li> <li>• The probability of habitat modification from soft-bottom to rip rap is high, but the impact of that modification could be positive and result in an increase in habitat.</li> <li>• Construction of the pipeline would have a high probability of loss of riparian areas or aquatic habitat, but this would be temporary</li> </ul>
	Geographic Extent	<p>The geographic extent includes:</p> <ul style="list-style-type: none"> <li>• South Arm of the Fraser River from the upstream end of Annacis Island to Sand Heads for the upgrades and operations of the marine terminal and vessel movements, construction and operation of the fuel receiving facility;.</li> <li>• North Arm and Moray Channel of the Fraser River from just upstream of the bifurcation of the North and Middle Arms and the entrance to the Middle Arm with regard to the proposed pipeline crossing of the Moray Channel.</li> <li>• No at-risk fish species or fish species of importance in commercial recreational and First Nations fisheries were identified in Lulu Island or Sea Island watercourses.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>• The duration for water column habitat loss would be long term, and the conversion of soft river bottom habitat to hard rip rap would be permanent.</li> <li>• The frequency for these effects would be one-time.</li> <li>• The duration of potential sedimentation or hazardous materials due to construction would be limited to the 18 to 24 month construction period. The frequency could be continuous during those activities, but is likely to be mitigated by the Proponent's CEM Plan.</li> <li>• The duration of the increase in suspended sediments resulting from dredging operations during operations would be short-term, and the frequency in would be every one or two years, if required.</li> </ul>

	Reversibility	<ul style="list-style-type: none"> <li>Water column loss, conversion of soft bottom to hard rip rap, and any deleterious substance entering a watercourse would be permanent and not reversible.</li> <li>Suspended sediment as a result of the proposed Project would settle out and would be reversible</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context of the marine terminal, fuel receiving facility and Highway 99 right-of-way is disturbed.</li> <li>Little to no aquatic habitat suitable for salmonids remains at the fuel receiving facility due to disrupted drainage network and poor surface water quality.</li> <li>No at-risk fish species or fish species of importance in commercial recreational and First Nations fisheries were observed in the waterways along the Highway 99 right-of-way.</li> </ul>
<b>VC</b>		Surface water quality
<b>Residual Adverse Effect</b>		Sediment re-suspension or exposure to hazardous materials from construction.
<b>Significance Analysis</b>	Magnitude	<p>The impacts of the proposed Project to surface water quality would be low:</p> <ul style="list-style-type: none"> <li>Sediment-laden waters may be discharged to surface drainage ditches during construction of the fuel receiving facility and the pipeline.</li> <li>Periodic dredging would remove the biologically active layer of sediments; the dredged area is expected to re-colonize following the re-establishment of a stable sediment layer.</li> <li>Site development and management during fuel receiving facility operations could result in overall improvements in on-site drainage and surface water quality conditions.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of the proposed Project impacting surface water quality is high, based on the disturbance of sediment during marine terminal construction and dredging during operations.</li> <li>Construction of the pipeline would have a high probability of loss of riparian areas or aquatic habitat</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of the proposed Project's effects to surface water quality would be the same as for at-risk fish.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>The duration of potential sedimentation or hazardous materials due to construction would be limited to the 18 to 24 month construction period.</li> <li>The frequency could be continuous during those activities, but is likely to be mitigated by the Proponent's CEM Plan.</li> <li>The duration of the increase in suspended sediments resulting from dredging operations during operation of the marine terminal would be short-term</li> <li>The frequency in would be every one or two years, if required.</li> <li>There would be no impact from pipeline or fuel receiving facility operations.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>Any deleterious substance entering a watercourse would be permanent and not reversible.</li> <li>Suspended sediment as a result of the proposed Project would settle out and would be reversible.</li> </ul>

	Context	<ul style="list-style-type: none"> <li>• The ecological context of the marine terminal, fuel receiving facility and Highway 99 right-of-way is disturbed.</li> <li>• At the fuel receiving facility area, the drainage network has already been disrupted and surface water quality has deteriorated such that little to no aquatic habitat suitable for salmonids remains.</li> </ul>
--	---------	--

### 5.1.6 Conclusion

EAO and VFPA note that:

- There are not expected to be effects to at-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries due to the pipeline;
- The proposed Project area is green-coded and considered lower productivity. No impacts to FREMP red- and yellow-coded habitat are expected;
- Sedimentation, accidental exposure to hazardous material and potential acoustic impacts during construction at the marine terminal are the most likely of the identified residual effects. As a result,
  - an accident or malfunctions management plan is required so that hazardous substances are handled appropriately during construction, to minimize potential effects; and
  - a surface water quality/fisheries protection and sediment control management plan is also required to ensure that measures are implemented to avoid, minimize or mitigate potential impacts during construction.
- The majority of the potential residual effects are reversible and temporary; and
- For residual effects that are permanent, the geographic extent is limited.

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as part of an EA certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects to at-risk fish species and fish species of importance in commercial, recreational and First Nations fisheries, surface water quality and aquatic habitat.

## 5.2 Vegetation, Wildlife and Wildlife Habitat

The Proponent conducted an assessment of potential impacts to vegetation, wildlife and wildlife habitat due to the proposed Project<sup>27</sup>. The Proponent's assessment focused on

---

<sup>27</sup> See Application section 5.3

potential impacts during the construction and operation of the proposed Project in three local study areas (Figure 5).

1. A riverine/ estuarine component extending from bank to bank along the length of the South Arm between Annacis Island and Sand Heads;
2. An upland component that includes a 50 m wide buffer surrounding the marine terminal and proposed fuel receiving facility site, and a 50 m wide corridor along Highway 99 from Bridgeport Trail south to Williams Road. The width of this component was extended to 150 m for the purpose of surveying and assessing impacts to herons and raptors; and
3. A riverine component encompassing a 50 m wide area on either side of the centreline of the proposed pipeline crossing under Moray Channel in the Middle Arm.

The regional study area for the vegetation, wildlife and wildlife habitat assessment is the area covered by the City of Richmond, including Lulu Island and Sea Island, and the South Arm of the Fraser River from Annacis Island downstream to the Strait of Georgia at Sand Heads (Figure 5).

Please refer to the Application for a full description of the Proponent's methodology (including definition of spatial and temporal boundaries), baseline conditions in the study areas (including biophysical characteristics and aquatic resources, aquatic habitat and surface water quality), and a full description of the identified potential impacts of the proposed Project on valued components and proposed mitigation measures.

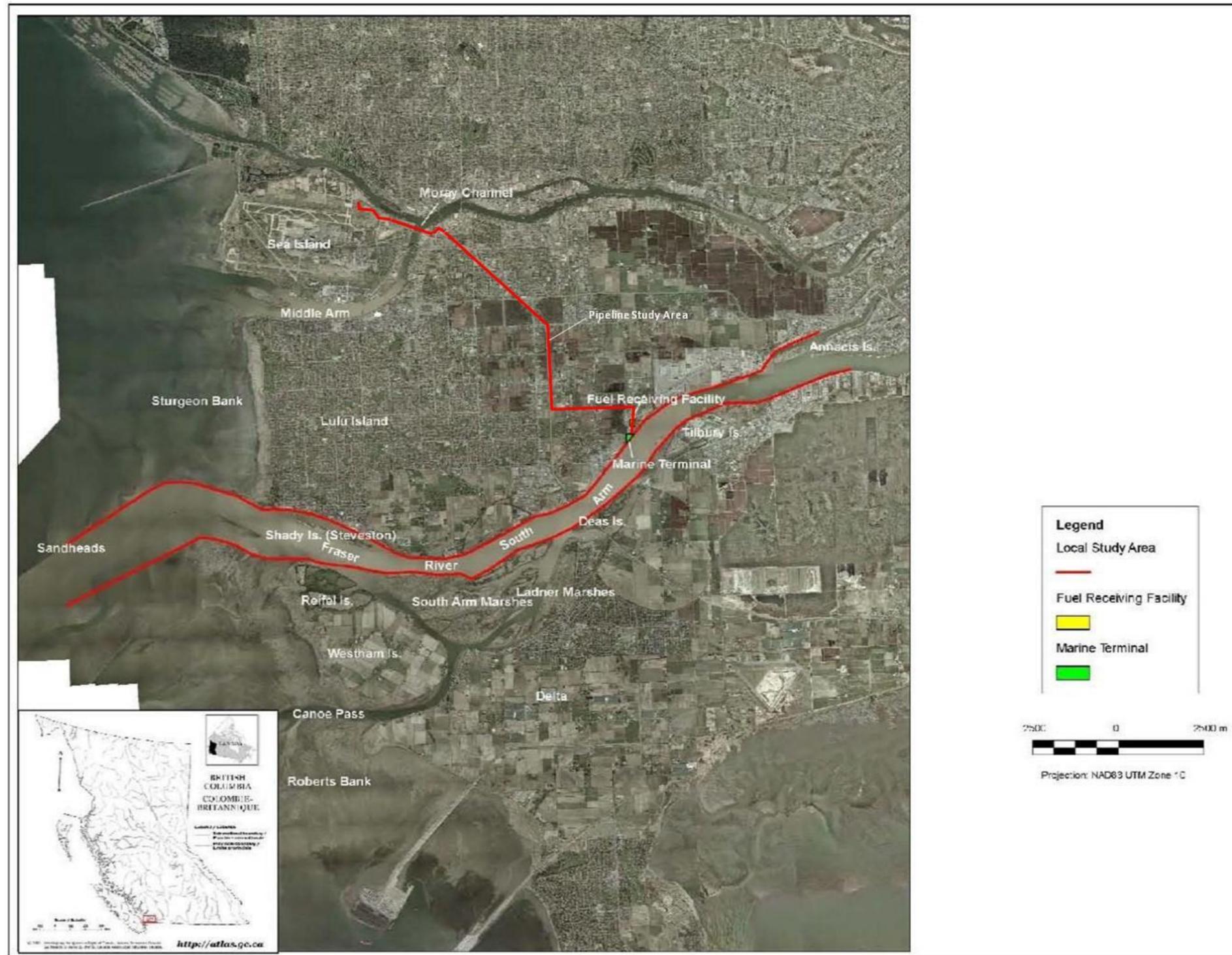


Figure 5. Marine and Pipeline LSA for the Proponent's vegetation, wildlife and wildlife habitat assessment

### 5.2.1 Valued Components

The following VCs were assessed as part of the EA (Table 5):

- Vegetation:
  - Riverine marshes;
  - Terrestrial vegetation;
  - At-risk plant species and plant communities;
- Wildlife and Wildlife Habitat:
  - Terrestrial wildlife;
  - Aquatic birds;
  - Marine mammals;
  - At risk bird species; and
  - Non-avian species at risk.

#### 5.2.1.1 *Vegetation*

The majority of the proposed Project area lies within the moist maritime coastal Douglas fir biogeoclimatic zone, with a small portion in North Richmond within the very dry maritime coastal western hemlock biogeoclimatic zone.

The surface drainage ditches along the pipeline corridor support duckweed, sedges, rushes, as well as other vegetation. Vegetation along the ditches includes grasses, fireweed, blackberry, and other vegetation.

The Lower Fraser River and estuary has several habitat types<sup>28</sup>:

- Estuarine, including brackish and fresh tidal marshes;
- Salt marshes;
- Tidal flats;
- Sea grass meadows; and
- Floodplain woodlands.

The foreshore of the marine terminal does not support shoreline vegetation due to the rip-rap shoreline and has been identified as low-productivity according to FREMP codes. Upstream of the marine terminal, the vegetation is identified by FREMP as moderately productive mudflat, bordered by rip rap. Downstream of the marine terminal, the vegetation is identified by FREMP as high productivity marsh and intertidal mudflat.

---

<sup>28</sup> More detailed information on Lower Fraser River and Estuary habitats is included in section 5.3.3.2 (pages 5.3-21 to 5.3-24) of the Application

**Table 5. Summary of the status and location of species at risk for each VC**

VC	Provincial Identified Wildlife Strategy Species	Provincial status		COSEWIC status*	SARA schedule 1 or 3
		Blue-listed	Red-listed		
Riverine Marshes		Lyngbye's Sedge Herbaceous Vegetation, Tufted Hairgrass-Douglas Aster, Tufted Hairgrass-Meadow Barley, Seashore Saltgrass Herbaceous Vegetation	Large-headed Sedge Community, Arctic Rush-Alaskan Plantain, Beaked Ditch Grass Herbaceous Vegetation, American Glasswort-Sea-milkwort		
Terrestrial Vegetation		Vancouver Island Beggarticks, Threeflowered Waterwort, Small Spike-rush, Nuttall's Waterweed, Purple-leaved Willowherb, Pointed Rush, Flowering Quillwort, False Pimpernel, Ussurian Water-milfoil, Yellow Marsh Marigold	Green-fruited Sedge, Streambank Lupine, Yellowseed false pimpernel, northern watermeal	<b>E:</b> Streambank Lupine	<b>1:</b> Vancouver Island Beggarticks, Streambank Lupine <b>3:</b> n/a
Plant Species at Risk		Henderson's Checkermallow, plus all blue listed species under Terrestrial Vegetation	Green-fruited Sedge, Streambank Lupine, Yellowseed false pimpernel, northern watermeal	<b>E:</b> Streambank Lupine <b>SC:</b> Vancouver Island Beggarticks	<b>1:</b> Vancouver Island Beggarticks, Streambank Lupine <b>3:</b> n/a
Aquatic Birds	Great Blue Heron <i>fannini</i> ssp.	Great Blue Heron <i>fannini</i> ssp., Green Heron, American Bittern, Caspian Tern, California Gull, Surf Scoter, Doublecrested Cormorant	Western Grebe, Marbled Murrelet, Black-crowned Night-Heron, Pelagic Cormorant <i>pelagicus</i> ssp., Brandt's Cormorant, Common Murre	<b>E:</b> n/a <b>T:</b> Marbled Murrelet <b>SC:</b> Great Blue Heron <i>fannini</i> ssp., Horned Grebe	<b>1:</b> Great Blue Heron <i>fannini</i> ssp., Marbled Murrelet <b>3:</b> n/a
Marine Mammals		Grey Whale, Harbour Porpoise, Humpback Whale, Northern (Steller) Sea Lion	Killer Whale (Northeast Pacific southern resident population)	<b>E:</b> Killer Whale (Northeast Pacific southern resident population) <b>T:</b> Humpback Whale <b>SC:</b> Grey Whale, Harbour Porpoise, Northern (Steller) Sea Lion	<b>1:</b> Grey Whale, Harbour Porpoise, Humpback Whale, Killer Whale (Northeast Pacific southern resident population) <b>3:</b> n/a
Terrestrial Wildlife	Northern red-legged frog, pacific water shrew, keen's myotis, Great Blue Heron <i>fannini</i> ssp., short-eared owl, sandhill crane, Northern goshawk <i>laingi</i> ssp.,	Northern red-legged frog, Trowbridge's Shrew, Townsend's Big-eared Bat, Short-eared Owl, Olive-sided Flycatcher, Barn Swallow, Western Screech-owl <i>kennicottii</i> ssp., Band-tailed Pigeon, Purple Martin, Barn Owl, Western toad, northern red-legged frog, great blue heron, sooty grouse	Western Painted Turtle (Pacific Coast Population), Southern Red-backed Vole <i>occidentalis</i> ssp., Snowshoe Hare <i>washingtonii</i> ssp., Olympic Shrew, Pacific Water Shrew, Keen's Myotis, Northern Goshawk <i>laingi</i> ssp., Peregrine Falcon <i>anatum</i> ssp, Long-tailed weasel	<b>E:</b> Western Painted Turtle (Pacific Coast Population), Pacific Water Shrew <b>T:</b> Northern Goshawk <i>laingi</i> ssp., Olivesided Flycatcher, Barn Swallow, Barn Owl, Dun Skipper <b>SC:</b> Northern red-legged frog, Western Toad, Great Blue Heron <i>fannini</i> ssp., Short-eared Owl, Peregrine Falcon <i>anatum</i> ssp., Western Screech-Owl <i>kennicottii</i> ssp., Band-tailed pigeon, Monarch	<b>1:</b> Northern red-legged Frog, Western Toad, Western Painted Turtle (Pacific Coast Population), Pacific Water Shrew, Northern Goshawk <i>laingi</i> ssp., Olive-sided Flycatcher, Peregrine Falcon <i>anatum</i> ssp., Western Screech-Owl <i>kennicottii</i> ssp., Barn Owl, Monarch, Dun Skipper <b>3:</b> Keen's Myotis, Shorteared Owl
Bird Species at Risk	Great Blue Heron <i>fannini</i> ssp., short-eared owl, sandhill crane, Northern goshawk <i>laingi</i> ssp.,	Great Blue Heron <i>fannini</i> ssp., Short-eared Owl, Green Heron, American Bittern, Olive-sided Flycatcher, Barn Swallow, Caspian Tern, California Gull, Western Screech-owl <i>kennicottii</i> ssp., Surf Scoter, Band-tailed Pigeon, Double-crested Cormorant, Purple Martin, Barn Owl, sooty grouse	Northern Goshawk <i>laingi</i> ssp., Western Grebe, Marbled Murrelet, Peregrine Falcon <i>anatum</i> ssp., Black-crowned Night-Heron, Pelagic Cormorant <i>pelagicus</i> ssp., Brandt's Cormorant, Common Murre	<b>E:</b> n/a <b>T:</b> Northern Goshawk <i>laingi</i> ssp., Marbled Murrelet, Olive-sided Flycatcher, Barn Owl, Barn Swallow <b>SC:</b> Great Blue Heron <i>fannini</i> ssp., Short-eared Owl, Peregrine Falcon <i>anatum</i> ssp., Western Screech-Owl <i>kennicottii</i> ssp., Band-tailed Pigeon, Horned Grebe, Monarch	<b>1:</b> Northern Goshawk <i>laingi</i> ssp., Great Blue Heron <i>fannini</i> ssp., Marbled Murrelet, Olive-sided Flycatcher, Peregrine Falcon <i>anatum</i> ssp., Western Screech-Owl <i>kennicottii</i> ssp., Barn Owl, Band-tailed pigeon <b>3:</b> Shorteared Owl
Non-bird Species at Risk	Northern red-legged frog, pacific water shrew, keen's myotis,	Grey Whale, Harbour Porpoise, Humpback Whale, Northern (Steller) Sea Lion, Northern red-legged frog, Beaverpond Baskettail, Autumn Meadowhawk, Trowbridge's Shrew, Townsend's Big-eared Bat, western toad, northern red-legged frog, blue dasher western pine elfin, monarch, silver-spotted skipper, dun skipper	Killer Whale (Northeast Pacific southern resident population), Western Painted Turtle (Pacific Coast Population), Southern Red-backed Vole <i>occidentalis</i> ssp., Snowshoe Hare <i>washingtonii</i> ssp., Olympic Shrew, Pacific Water Shrew, Keen's Myotis, long-tailed weasel, zerene fritillary <i>bremnerii</i> ssp.	<b>E:</b> Western Painted Turtle (Pacific Coast Population), Killer Whale (Northeast Pacific southern resident population), Pacific Water Shrew <b>T:</b> Humpback Whale, Dun Skipper <b>SC:</b> Northern red-legged Frog, Western Toad, Grey Whale, Harbour Porpoise, Northern (Steller) Sea Lion, Monarch	<b>1:</b> Northern red-legged Frog, Western Toad, Western Painted Turtle (Pacific Coast Population), Grey Whale, Harbour Porpoise, Humpback whale, Killer Whale (Northeast Pacific southern resident population), Northern (Steller) Sea Lion, Pacific Water Shrew. Monarch, Dun Skipper <b>3:</b> Keen's Myotis

\* COSEWIC status denoted by E for endangered, T for threatened, and SC for special concern

Just downstream of the marine terminal, Deas Island hosts tidal marshes to floodplain forests.

Much of the shoreline of Lulu Island has been highly modified due to upland development, with small areas of tidal marshes in areas that have not been dyked or filled. Finn Slough and Gilmore (Whitworth) Island are comprised of a range of estuarine habitat types.

Most of the western foreshore is within the Regional Study Area, and is proximate to the Local Study Area (LSA) (Figure 5). Sturgeon Bank supports salt marsh, sandflat and mudflat. Within Roberts Bank, marsh and tidal flat habitat extends west- and southward from the Fraser River, fronting the west shores of Westham Islands, Brunswick Point and further to the Deltaport causeway. This area of Roberts Bank supports brackish marsh, salt marsh, mudflat, sandflat, and eelgrass.

A sea grass meadow extends from Point Roberts to approximately 2.1 km northwest of the Deltaport terminal.

Two rare plant communities have been documented in the LSA:

- Large-headed sedge community: red-listed provincially, located on Shady Island and Sand Island; and,
- American Glasswort – Sea-milkwort community: red-listed provincially, located on Sand Island.

Rare plants potentially occurring along the pipeline route include cyperus, poverty oatgrass, milk spurge, large Canadian St. John's wort, purple-leaved willowherb (yellow-listed provincially), yellowseed false pimpnel (red-listed provincially), Howell's montia, pink watergreen, and Northern water-meal (red-listed provincially). Thirteen plant species and eight plant communities at risk were identified <sup>29</sup>.

The City of Richmond also noted that the proposed pipeline route includes City designated Riparian Management Areas, Environmental Sensitive Areas and is adjacent to the City Nature Park and other Park areas.

#### 5.2.1.2 *Wildlife*

Thirty-eight wildlife species at risk were identified as potentially occurring in the LSA, including two amphibian species, one reptile species, 23 bird species, and 12 mammal species (Table 5).

---

<sup>29</sup> A detailed list of wildlife species, vegetations species and plant communities at risk in the LSA is included in Table 5.3.1 of the Application (pages 5.3-9- 5.3-12).

### *Aquatic Birds*

The south arm of the Fraser River is extensively used by aquatic birds including, for example, geese, swans, dabbling ducks, diving ducks, gulls, loons, grebes, shorebirds, songbirds and raptors. The Fraser River Estuary and western foreshore is critical to many migrating, wintering and breeding bird species.

The type, extent and timing of the use of the South Arm and Estuary of the Fraser River's resources by these birds can vary. As a result, this Report will focus on the areas where use by birds may be impacted by the proposed Project.

### *Marine Mammals*

The following marine mammals were described in the Application:

- Harbour seals - Harbour seals utilize Roberts and Sturgeon Banks for haulouts<sup>30</sup>. The closest haulout site to the marine terminal property is located at Garry Point at the South-eastern edge of Sturgeon Bank, within the LSA. There are seven haul out sites in the northeastern portion of Roberts Bank, and on Sturgeon Bank.
- Sea lions - Stellar sea lions breed at traditional rookeries located on northern Vancouver Island and southern Haida Gwaii. Twenty-one year-round haulout sites have been identified in BC. The closest haulout to the marine terminal property is located on Roberts Bank, outside of the LSA.
- Cetaceans - Grey whale, humpback whale, and minke whale have been recorded within the LSA extending into the southern Strait of Georgia near Sand Heads. Dall's porpoise, false killer whale, harbour porpoise, pacific white-sided dolphin, and killer whale have also been recorded in the southern Strait of Georgia. The Southern Resident Killer Whale (SRKW) population has critical habitat designated within the southern Strait of Georgia off Roberts and Sturgeon Banks. Under SARA, the critical habitat for the SRKW population includes Juan de Fuca and Harrow Straits, Boundary Pass, the waters surrounding the southern Gulf Islands, and the Strait of Georgia off the mouth of the Fraser River. The distribution of these whales is strongly associated with core areas of abundant salmon.

---

<sup>30</sup> Haulouts are when seals, sea lions and walruses temporarily leave the water between periods of foraging, utilized for rest, mating, birthing, predator avoidance, as well as other uses.

**Table 6: Description of use of the South Arm of the Fraser and Western Foreshore by Aquatic Birds.**

Aquatic Birds	South Arm of the Fraser River	Western Foreshore
<b>Geese and Swans</b>	Canada geese Tundra swans have been observed in the main channel of the South Arm, near Tilbury Island. Mute swan (an introduced species) have been observed along the Main Channel of the South Arm.	The Fraser River Estuary supports approximately 47% of the Wrangel Island population of snow geese for their wintering, and at least four percent of the Pacific coast population of trumpeter swan. Snow geese begin arriving to the Fraser Delta in mid-September to early October, with their numbers peaking in November, decline through January and early February, and peak again in March for the Northward migration. Spring departures begin in late March and continue through April. As many as 30,000 snow geese have been recorded at the George C. Reifel Migratory Bird Sanctuary. Their most important feeding areas are Brunswick Point, Lulu Island, Westham Island, and Sea Island. Snow geese were observed in the LSA downstream of Garry Point. Small numbers of trumpeter swan overwinter in the delta (generally in groups less than 75 individuals), especially near Brunswick Point, which is in the RSA. In the spring, thousands of brant geese (mostly sub species <i>nigricans</i> ), representing one to two percent of the population stop in the Fraser Delta during spring migration. In the winter, approximately 200 brant geese from the smaller Western High Arctic or grey-bellied geese population are found in the area. Migrant brant typically utilize the intertidal areas and beaches of Boundary Bay, Tsawwassen Jetty, and Roberts Bank, areas of the RSA where these geese can feed on eelgrass, their most important food.
<b>Dabbling Ducks</b>	American widgeon, mallard, green-winged teal and northern pintail made up approximately 97% of the individual dabbling ducks recorded in surveys in the 1970s, American widgeon, mallard and green-winged teal comprised the majority of ducks observed during 2009 surveys. Other species observed included blue-winged teal, gadwall, northern shoveler, wood duck, and cinnamon teal. The dabbling duck population in the Lower Fraser peaks in September, declines through October and November due to migration and dispersion of birds during hunting season to more secure foreshore salt marshes, and peaks again in February.	Two percent of the global population of American widgeon, one percent of northern pintail, and more than 20,000 individuals of mallard winter in the Fraser River Delta. Green-winged teal are also abundant. These ducks use open water, eelgrass beds including Roberts Bank, foreshore marshes, algal beds and agricultural areas for forage and frequent the delta's sloughs, ditches and distributory channels outside the LSA. Dabbling ducks arrive in the Fraser River estuary in late summer. Less than 1,000 dabbling ducks remain in the region during the breeding season, early April to late August.
<b>Diving Ducks</b>	The Main Channel of the South Arm supports/ is used by / provides habitat for the greater scaup, lesser scaup, bufflehead, common goldeneye, barrow's goldeneye, surf scoter, canvasback, long-tailed duck and ruddy duck, as well as the red-breasted, common and hooded merganser.	The highest numbers of diving ducks in the estuary are typically recorded from September to May, peaking in early May, just before departure to northern breeding grounds.
<b>Loons</b>	The red-throated loon, pacific loon, common loon, yellow-billed loon have been recorded in the South Arm area, as well as grebes and cormorants. The populations of these birds peak in the South Arm area in late winter and decline in late summer, when most birds move to breeding areas.	Loons occur year-round in low numbers on Roberts Bank, and are rarely observed on Sturgeon Bank. The Fraser River Delta is an important moulting site for grebes. Up to 2,500 red-necked grebes, five percent of the North American population, have been recorded in the estuary in early fall. Eared, horned, pied-billed, western, and red-necked grebe has been observed on Roberts and Sturgeon Banks. The populations of fish eating birds peak in Roberts and Sturgeon Banks in October.
<b>Shorebirds</b>	Of the shorebirds observed in the 1970s surveys, dunlin was the most abundant overwintering shorebird in the Lower Fraser River. In the 2009 survey, dunlin, sanderling, and black turnstones were observed along Steveston Jetty. Black-bellied plover were observed extending westward from Westham Island. Although the South Arm lacks shorebird foraging habitat, the jetties and pilings that line the lower river provide resting habitat when high water has flooded the adjacent foreshore or during strong offshore winds.	Shorebird numbers peak in April during spring migration, and in mid to late summer during southward migration. A smaller peak is observed in November. Robert Bank supports internationally-recognized <sup>31</sup> important habitats for the western hemisphere's sandpiper populations. Western sandpiper, least sandpiper, dunlin, and black-bellied plover rely on intertidal sandflats and mudflats during their spring and fall migrations. One-day count estimates in the Fraser River Delta include at least 500,000 western sandpipers, 10% of the global population of the pacific subspecies of dunlin, and three percent of the estimated North American population of black-bellied plover. Fifty species of shorebirds have been recorded in the area. In the winter, 40,000 overwintering dunlin, as well as thousands of killdeer and black-bellied plover rely on the mudflats and adjacent agricultural lands. Steveston North Jetty is an important roosting place for these birds during high tide.
<b>Gulls</b>	Gulls were the most abundant species group observed in the South Arm during the 1970s surveys, comprising 71.5% of all individuals counted. Gull populations peak in October, and maintain high numbers throughout the winter. Glaucous-winged gull represented 75.2% of all gulls counted in 1970s surveys. Mew gull, herring gull, California gull, Bonaparte's gull, ring-billed gull, and western gull were also observed. Gulls primarily use the South Arm to roost. Major roost sites include moored barges near Tilbury Island, shoreline buildings, and Steveston Harbour, which is also used for foraging and scavenging.	Gull numbers on Roberts Bank peak in September and October, and peak in January on Sturgeon. About four percent of the North Pacific population of the glaucous-winged gull (29,000 individuals) winters in Boundary Bay, Roberts Bank, and Sturgeon Bank.

<b>Hérons</b>	The great blue heron and green heron have been observed in the South Arm area. Great blue heron population numbers remain constant throughout the year, with a preference for the South Arm marshes and western Annacis Channel, although they are widespread.	Three large breeding colonies of great blue heron are located in the Lower Mainland region, representing six percent of the global population of the <i>fanninii</i> subspecies; however these colonies are located outside of the LSA. Roberts and Sturgeon Banks marshes are known to support American bittern; however, few observations of these birds have been recorded.
<b>Raptors</b>	Red-tailed hawk, northern harrier, bald eagle, rough-legged hawk, peregrine falcon, sharp-skinned hawk, American kestrel, and the great horned owl have been observed along the South Arm. The Proponent documented two active nests near the shore of the South Arm: Bald eagle nest located 124 m southwest of the marine terminal; and A nest, likely osprey, at an industrial site located on Tilsbury Island.	Waterfowl and shorebirds attract raptors to the Fraser River delta. Roberts and Sturgeon Banks attract bald eagle, northern harrier, and peregrine falcon. The lowlands along the lower Fraser River, particularly the marshes and grass fields of the delta support the largest wintering population of harriers in Canada, as well as red-tailed hawks, rough-legged hawks, a small number of snowy owl.

### *Terrestrial Wildlife:*

The Proponent observed 39 species of birds during their 2011 breeding bird studies. Of that 39, barn swallow (provincially blue-listed) was the only species expected by the Proponent to breed adjacent to the study area in barns, sheds, and other structures.

A red-tailed hawk nest was detected on the west side of Highway 99 near the Westminster Highway overpass.

The only waterfowl species observed along the pipeline route was the mallard.

The Proponent observed green frog and a coyote in their 2011 transect surveys for the pipeline corridor.

A list of insect species that occur in Richmond is included in Table 4.2.5 in the Addendum (page 4.2-13). The western pine elphin, a provincially blue-listed species was recorded in Richmond Nature Park in 2002 and 2003, and may occur along Highway 99.

During the review of the Highway 99 Addendum, Environment Canada noted that the Oregon Forest Snail had not been included in the Application as a SARA species in schedule 1 or 3. The Proponent responded that the Oregon Forest Snails are distributed from southwest BC to northwest Oregon and in BC. Specifically, they occur in a small area along the Chilliwack and Fraser River valleys from Hope to Mission and Langley. More recent records<sup>32</sup> include observations of live snails and shells at Little Campbell River in South Surrey, Tsawwassen, Coquitlam and Fort Langley. No Oregon Forest Snail or other Species at Risk gastropods have been detected in Richmond. The nearest documented site was in Tsawwassen near the international border and is approximately 15 km away from the proposed Project.

#### 5.2.2 Potential Project Effects and Proposed Mitigation

The Proponent identified that the following proposed Project activities may impact the VCs:

- Upgrade of the marine terminal and construction of the fuel receiving facility;
- Clearing and grubbing of the pipeline right of way, excavation of the pipeline trench, and installation of the pipeline; and
- Ongoing operations, including vessel movements within the South Arm shipping channel.

---

<sup>32</sup> Forsyth 2004 and Klinkenberg 2008

The Proponent categorized potential effects on vegetation due to construction into habitat alteration, plant mortality, and the introduction of invasive species. For wildlife, the Proponent assessed potential changes in habitat availability, sensory disturbance and mortality.

The degree to which wildlife would be affected by the proposed Project would depend on species distribution, species size, mobility, and home range or territory. Small species with limited mobility and small home ranges or territories would be more affected than highly mobile species with larger home ranges or territories. Some species may become acclimated to re-occurring sensory disturbances, such as regular vehicle movements. Displaced birds and marine mammals are likely to return to areas once the noise disturbance has ceased. Mortality would depend on timing of proposed Project construction.

#### *5.2.2.1 Marine Terminal Upgrades*

As the marine terminal is located within a highly disturbed industrial area, impacts of the proposed Project and the need for mitigation would be limited.

Little vegetation habitat exists at the marine terminal facility, and therefore, the proposed marine terminal upgrades would likely not affect vegetation. Wildlife may be impacted by elevated noise, olfactory stimuli, and visual stimuli.

Construction activities, such as pile driving and dredging could generate sediment-related effects downstream, affecting the FREMP red-coded marsh located immediately downstream from the marine terminal site. No red- or blue-listed plant communities were located in the riverine habitat near the marine terminal, potentially due to disturbances and armouring of the foreshore.

The Proponent did not observe any at-risk plant species in the immediate vicinity of the marine terminal or downstream.

During the Proponent's 2009 bird surveys, the Proponent did not observe birds congregating near the marine terminal site. Large gulls were observed to roost on barges and other structures across the river and upstream, as well as on Tilbury Island. In addition to the sensory disturbances noted above, birds may fall into and become trapped in piles if they are not covered.

To address the potential impacts to vegetation, wildlife and wildlife habitat from the marine terminal upgrade, the Proponent would implement the following key mitigation measures:

- Develop and implement a Vegetation and Wildlife Management Plan as part of the Construction Environmental Management Plan;

- Place caps on hollow piles to prevent birds falling into and becoming trapped within; and
- Initiate driving of piles using vibratory hammer, followed by diesel or drop hammer to finish to required depth as appropriate.

The potential effects of dredging would be addressed in the terms and conditions of the required dredging permit.

#### 5.2.2.2 *Marine Terminal Operations*

Operation of the marine terminal would result in a minor increase in vessel transits along the South Arm shipping channel (three to five vessel movements per month). The Proponent does not expect a measurable effect to estuarine plant communities due to the existing volume of vessel traffic. The Proponent also does not expect that vessel traffic associated with the proposed Project would affect marine mammals or aquatic birds, since those animals have acclimatized to sensory disturbances from vessel traffic.

To address the potential impacts to vegetation, wildlife and wildlife habitat from the marine terminal operations, the Proponent would ensure that tanker and barge traffic would be travelling at reduced speeds as determined by VFPA, minimizing the amplitude of associated wave wash.

#### 5.2.2.3 *Fuel Receiving Facility Construction*

Given the existing disturbed condition of the proposed fuel receiving facility site, the Proponent determined that no habitat of value to terrestrial wildlife remains in that area. The following potential effects of the construction of the fuel receiving facility have been identified:

- *Species at risk:* Thirteen at-risk plant species could occur in the fuel receiving area site; however, the possibility of at risk plant communities regenerating on the proposed fuel receiving facility site would be unlikely, as no evidence of regeneration was observed in the Proponent's 2009 surveys. Rare plants could occur in the small woodlot or along the perimeter ditches, which would not be affected by construction. Of the 11 wildlife species at risk that could be observed at the fuel receiving facility site, only the barn swallow could be observed regularly. The short-eared owl and barn owl may occasionally forage in the adjacent area. It is likely that amphibians, reptiles, or small mammals occur in the adjacent woodlot or the riparian habitat located along perimeter ditches.
- *Loss of wildlife habitat:* Permanent habitat loss and mortality to terrestrial wildlife could occur as a result of clearing and grubbing activities, and soil excavation. Amphibians are very sensitive to accidental spills of hazardous materials due to their highly aquatic nature. The proposed fuel receiving facility location would not

provide quality habitat for terrestrial bird species. A small amount of suitable habitat may exist in the remnant woodlot located in the southwest corner of the fuel receiving facility property and in the trees and shrubs along perimeter ditches. Barn owl and barn swallow nest in barns and outbuildings, and forage over agricultural land; therefore, they are unlikely to occur on the fuel receiving facility site. There is little or no suitable habitat for amphibians or aquatic insects on the fuel receiving facility site. Western toad and two dragonfly species may occur. Trowbridge's shrew may also occur.

- *Sensory disturbance*: Temporary sensory disturbance to terrestrial wildlife could occur as a result of clearing and grubbing activities, and soil excavation. Birds that would be displaced from areas adjacent to the proposed fuel receiving facility site during construction would likely return after noise associated with equipment operations cease.

To address the potential impacts to vegetation, wildlife and wildlife habitat from the fuel receiving facility, the Proponent would implement the following key mitigation measures:

- Develop and implement a Vegetation and Wildlife Management Plan as part of the Construction Environmental Management Plan;
- Complete site-specific rare / at-risk plant surveys, to be conducted by a suitably qualified professional. If avoidance of rare or at-risk plants is not practical, plants must be salvaged and relocated according to the "Guidelines for Translocation of Plant Species at Risk in British Columbia" (Ministry of Environment 2009);
- Follow the "Best Management Practices Guidelines for Pacific Water Shrew in Urban and Rural Areas (Working Draft)" (Ministry of Environment 2010);
- Complete a bird nest survey, to be conducted by a suitably qualified professional, to verify that the Project complies with the *BC Wildlife Act* and Migratory Birds Regulations pursuant to the *Migratory Birds Convention Act*. EC has web-based advice at (<http://ec.gc.ca/paom-itmb/>), however, it would be the Proponent's responsibility to be in compliance with the *Migratory Birds Conservation Act*. Proponent would still be required to comply with the *BC Wildlife Act* for provincial species of interest (ie raptors). The Proponent must conduct vegetation clearing outside the general bird nesting season from April 1 to July 31 (or to September 15 where fledglings are still on the nest) unless otherwise approved by the Ministry of Forests, Lands and Natural Resource Operations;
- Complete a raptor nest survey, to be conducted by a suitably qualified professional, to update the status of raptor nests and conduct construction activities in accordance with the "Best Management Practices for Raptor Conservation during Urban and Rural Land Development in British Columbia" (Ministry of Environment 2005); and

- Complete an amphibian egg mass and/or adult field survey for northern red-legged frog and western toad, to be conducted by a suitably qualified professional. The amphibian survey must follow the “Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia” (Ministry of Water Land and Air Protection 2004).

#### 5.2.2.4 *Fuel Receiving Facility Operations*

During operations, the Proponent does not expect the fuel receiving facility to have an effect on terrestrial vegetation. Intermittent use of vehicles and heavy equipment, compared to daily use of vehicles and heavy equipment at the site presently would decrease sensory disturbance to wildlife in the area.

Short-eared owls may use the grassland to the east of the fuel receiving facility site. Proposed Project operations would not disrupt this use more than the current use of the fuel receiving facility site. The Proponent does not expect that operations of the fuel receiving facility would affect the distribution or movements of wildlife species at risk during operations.

#### 5.2.2.5 *Transfer and Delivery Pipeline Construction*

The following potential effects of the construction of the transfer and delivery pipelines have been identified:

- *Erosion and sedimentation:* Excavation and stockpiling of soils without mitigation during pipeline construction could result in erosion and sediment input into area ditches. Erosion degrades soil, reducing its productivity for revegetation, and sedimentation could negatively impact vegetation lining the ditches. Disturbed soils are more susceptible to colonization by invasive species and wind erosion of soil stockpiles can spread the seeds of invasive plants.
- *Loss of terrestrial vegetation and wildlife habitat:* Construction would involve temporary and permanent alteration of terrestrial habitats within areas of the pipeline right of way. In some areas, trees and large shrubs would not be permitted to re-establish due to the need to ensure safety and integrity of the proposed pipeline. Clearing, grubbing and excavating along the pipeline corridor may result in the temporary alteration of wildlife habitat. Stripping and soil excavation during clearing and grubbing may result in the mortality of small mammals that inhabit woody debris, litter and soil. Construction activities may have an indirect impact to wildlife, changing wildlife use patterns. Without mitigation, sedimentation due to soil stockpiles could result in suffocation or habitat alteration for amphibians and aquatic insects. Vegetation clearing in bird breeding season could result in mortality if nests were destroyed or abandoned

as a result of disturbance. Direct mortality to terrestrial birds as a result of construction is not expected because terrestrial birds are mobile and would disperse.

- *Sensory disturbance*: The presence of construction personnel and the operation of vehicles and equipment may result in localized, short-term sensory disturbance to wildlife during construction. As well, wildlife may be impacted by elevated noise, olfactory stimuli, and visual stimuli. The presence of construction personnel and the operation of vehicles and equipment may result in localized, short-term sensory disturbance to wildlife during construction. Elevated noise levels during directional drilling at the Moray Channel may cause a sensory disturbance for aquatic and other birds. Birds currently utilizing that area are subject to elevated noise levels due to activities at YVR. Noise associated with directional drilling and construction activities adjacent to the Moray Channel would create a temporary sensory disturbance for marine mammals.

To address the potential impacts to vegetation, wildlife and wildlife habitat from the proposed transfer and delivery pipeline construction and operations, the Proponent would implement the following key mitigation measures:

- Develop and implement a Vegetation and Wildlife Management Plan and Surface Water Quality/Fisheries Protection and Sediment Control Plan as part of the Construction Environmental Management Plan;
- Develop and implement a Vegetation and Wildlife Management Plan as part of the Construction Environmental Management Plan;
- Complete site-specific rare / at-risk plant surveys, to be conducted by a suitably qualified professional. If avoidance of rare or at-risk plants is not practical, plants must be salvaged and relocated according to the “Guidelines for Translocation of Plant Species at Risk in British Columbia” (Ministry of Environment 2009);
- Follow the “Best Management Practices Guidelines for Pacific Water Shrew in Urban and Rural Areas (Working Draft)” (Ministry of Environment 2010);
- Complete a bird nest survey, to be conducted by a suitably qualified professional, to verify that the Project complies with the *BC Wildlife Act* and Migratory Birds Regulations pursuant to the *Migratory Birds Convention Act*. EC has web-based advice at (<http://ec.gc.ca/paom-itmb/>), however, it would be the Proponent’s responsibility to be in compliance with the *Migratory Birds Conservation Act*. Proponent would still be required to comply with the *BC Wildlife Act* for provincial species of interest (ie raptors). The Proponent must conduct vegetation clearing outside the general bird nesting season from April 1 to July 31 (or to September 15 where fledglings are still on the nest) unless otherwise approved by the Ministry of Forests, Lands and Natural Resource Operations;

- Complete a raptor nest survey, to be conducted by a suitably qualified professional, to update the status of raptor nests and conduct construction activities in accordance with the “Best Management Practices for Raptor Conservation during Urban and Rural Land Development in British Columbia” (Ministry of Environment 2005); and
- Complete an amphibian egg mass and/or adult field survey for northern red-legged frog and western toad, to be conducted by a suitably qualified professional. The amphibian survey must follow the “Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia” (Ministry of Water Land and Air Protection 2004).
- Adhere to COR’s bylaws and regulations (such as the *Riparian Area Regulation*) in areas under COR’s jurisdiction;
- Ensure that an experienced and suitable qualified environmental professional conducts all salvage operations for the proposed Project, in compliance with collection permits; and
- Implement the Spill Prevention and Emergency Response Plan and the CEM Plan to avoid erosion of unstable soils and discharge of sediment-laden water into watercourses and minimize adverse effects related to accidental spills of deleterious materials during construction.

#### 5.2.2.6 *Transfer and delivery pipeline Operation:*

During operations, periodic maintenance of the pipeline route may be necessary to prevent the reestablishment of trees that could impact the integrity of the pipeline. The removal of invasive plant species and replacement with native species or grass would limit the potential for future establishment by invasive species. The Proponent expects terrestrial wildlife to return to the areas within and adjacent to the pipeline right-of-way after vegetative cover is re-established. However, depending on species-specific habitat requirements, species preferring arboreal and tall shrub habitat may be reduced, and species favouring site-appropriate native plants and more open habitat may increase.

#### 5.2.2.7 *Environmental Management Plans*

The Proponent would be required to develop a Vegetation and Wildlife Management Plan as part of the Construction Environmental Management Plan (Condition 1) that includes:

- Approach to removal of trees and other vegetation during site preparation;
- Measures to be used during construction to minimize the disturbance of riparian vegetations during works in and about watercourses, protect upland vegetation in naturalized settings that are to be retained, and prevent the introduction,

establishment, and spread of invasive species into valuable habitat and landscaped areas;

- Methods to replace or re-establish previously undisturbed areas disturbed during construction that are identified for revegetation<sup>33</sup>;
- Strategies to minimize effects to vegetation, wildlife, and watercourses during site preparation and planning, including:
  - implementation of measures to limit the extent of vegetation clearing and disturbance;
  - identification of expected areas of temporary and permanent vegetation loss, and detailed restoration plans for these areas;
  - potential salvation of existing vegetation and wildlife prior to construction-related disturbance;
  - schedule of clearing to minimize disturbance to breeding and nesting birds;
  - installation of temporary protective fencing, to be inspected, monitored and approved by a qualified individual, around construction limits, vegetation, and environmentally sensitive areas prior to the commencement of land clearing, demolition, or construction work at specific work sites;
  - minimize movement of vehicles and equipment outside of the proposed Project footprint; conducting onsite monitoring during construction, especially in or adjacent to environmentally-sensitive areas; and
- Management strategies for any nest sites that are protected year round under the *Wildlife Act* (i.e. eagle, peregrine falcon, gyrfalcon, osprey and great blue herons<sup>34</sup>) identified in the proposed Project area, and describe the course of action to be taken, including applying for a nest relocation permit and delaying clearing in any nest proximity until the young have fledged, where appropriate.

### 5.2.3 Residual Adverse effects of the Proposed Project

Table 7 summarizes the potential residual adverse effects of the proposed Project on vegetation and wildlife (including wildlife habitat), after mitigation. The Proponent does not expect any residual effects to riverine marshes, bird species at risk and non-avian species at risk due to proposed Project construction or operations.

To avoid the disturbance of active nest sites as required by the *BC Wildlife Act*, the Proponent would require that the Contractor conduct vegetation clearing outside the

---

<sup>33</sup> The Proponent's suggested methods for revegetation and reestablishment of previously undisturbed areas post-construction are detailed in section 9.4.1.14 (pages 9-24 to 9-25) of the Application.

<sup>34</sup> Great blue heron nests are also protected under the *Migratory Bird Conservation Act*.

general bird nesting season from April 1 to July 31 (or to September 15 where fledglings are still on the nest) unless otherwise approved. This requirement will be addressed in the Construction EMP. The Proponent does not expect the 12 non-avian species at risk potentially occurring in the vicinity of the marine terminal property, proposed fuel receiving facility site or along the pipeline route, to occur in the proposed Project area regularly due to the small area of remaining habitat, habitat fragmentation, degradation of habitat by invasive species, elevated predation rates, and human disturbance. EAO agrees with this assessment and has not identified a residual effect for riverine marshes, bird species at risk or non-avian species at risk.

**Table 7. Potential residual adverse effects to vegetation, wildlife and wildlife habitat**

VCs	Proposed Project Components				
	Marine Terminal Upgrades	Marine terminal operations	Fuel Receiving Facility construction and operations	Pipeline construction	Pipeline operations/ maintenance
Riverine Marshes	No	No	No	No	No
Terrestrial Vegetation	No	No	No	Yes	Yes
Plant Species at Risk	No	No	No	Yes	No
Aquatic Birds	Yes	No	No	No	No
Non-Bird Species at Risk	No	No	No	No	No
Bird Species at Risk	No	No	No	No	No
Marine Mammals	Yes	No	Yes	No	Yes
Terrestrial Wildlife	Yes	No	Yes	Yes	Yes

EAO and VFPA have identified the following potential residual adverse effects:

- *Terrestrial vegetation and at-risk plant species:* Habitat alteration, loss or destruction may occur as a result of pipeline construction and maintenance;
- *Terrestrial wildlife:*
  - sensory disturbance to terrestrial wildlife.
  - mortality of amphibians, reptiles and small mammals may occur, due to the pipeline installation, directional drilling or trenching.
  - pipeline construction and vegetation maintenance could result in habitat alteration, loss, or destruction, impacting terrestrial vegetation and wildlife.
  - pipeline maintenance during operations may also result in accidental mortality to amphibians, reptiles and small mammals.

- *Aquatic Birds*: Proposed Project construction would result in a temporary residual sensory disturbance to aquatic birds ; and
- *Marine Mammals*: Sensory disturbance during pile driving could disturb marine mammals in the vicinity of the marine terminal and at the Moray Channel crossing.

Environment Canada questioned whether there would be potential residual effects to Pacific water shrew, great blue heron nesting or Oregon forest snail as a result of the proposed Project. In considering the information from Environment Canada, the Proponent's Application and Highway 99 Addendum and the required mitigation measures, EAO and VFPA are of the view that the mitigation measures, including surveys and best practices, are sufficient so that no residual effects to these species are expected.

None of the projects, facilities or activities included in Table 1 of this report, the cumulative effects assessment inclusion list, would impact or interact with the proposed Project, and therefore, a cumulative effects assessment was not performed.

#### 5.2.4 Significant Effects Analysis

Table 8 Table 1 provides the significance analysis for residual effects to vegetation, wildlife and wildlife habitat.

**Table 8: Significance analysis for terrestrial vegetation, at-risk plant species and plant communities, terrestrial wildlife, aquatic birds, and marine mammals.**

VC		Terrestrial vegetation
<b>Residual Effect</b>		<ul style="list-style-type: none"> <li>• Habitat alteration, loss or destruction may occur as a result of pipeline construction and maintenance.</li> </ul>
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>• The magnitude of the effects of construction the of the proposed pipeline route to terrestrial vegetation would be low as the area is already disturbed, but trees and large shrubs in the area would be permanently removed.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>• The probability of proposed pipeline route construction and operations impacting terrestrial vegetation is high, as clearing along the Highway 99 would be required during construction and operations.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>• The geographic extent of the proposed Project would be the marine terminal site, fuel receiving facility, and pipeline route from the proposed fuel receiving facility along Highway 99 from Williams Road to Bridgeport Road in Richmond BC, including staging areas.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>• The duration of construction would be 18 to 24 months. The frequency of vegetation removal during construction would be once. During operations, vegetation maintenance would occur periodically along the proposed pipeline route.</li> </ul>

	Reversibility	<ul style="list-style-type: none"> <li>The effects of proposed pipeline construction on terrestrial vegetation would be reversible except for trees and shrubs, in which case, removal would be permanent. The Proponent would replant, which would improve the present vegetation distribution along Highway 99.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context is disturbed, as the marine terminal, fuel receiving facility and proposed pipeline route would all be located on previously disturbed land. The pipeline would likely overlap COR designated Riparian Management setbacks, City Parks and Ecologically Sensitive Areas.</li> </ul>
<b>VC</b>		<b>At-risk Plant Species and Plant Communities</b>
<b>Residual Effect</b>		<ul style="list-style-type: none"> <li>Habitat alteration, loss or destruction may occur as a result of pipeline construction and maintenance.</li> </ul>
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude of the effects of construction and operations of the proposed Project to at-risk plant species and plant communities, if encountered, would be high.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of proposed Project construction impacting at-risk plant species and plant communities is low, given the Proponent's will be required to conduct additional at-risk plant species field surveys prior to construction to verify. The proposed mitigation measures would likely result in avoidance of impacts to at-risk plant species and plant communities.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of the proposed Project would be the marine terminal site, fuel receiving facility, and pipeline route from the proposed fuel receiving facility along Highway 99 from Williams Road to Bridgeport Road in Richmond BC, including staging areas. However, given these species and communities are of regional importance, there may be regional implications as well.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>If at-risk plant species and plant communities are impacted, the duration would be permanent and the frequency would be on-time (during construction).</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The effects of proposed pipeline construction on at-risk plants and plant communities would likely not be reversible.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context is disturbed, as the marine terminal, fuel receiving facility and proposed pipeline route would all be located on previously disturbed land. Impacts are likely to be avoided given requirements for pre-construction surveys.</li> </ul>
<b>VC</b>		<b>Terrestrial Wildlife</b>
<b>Residual Effect</b>		<ul style="list-style-type: none"> <li>Sensory disturbance to terrestrial wildlife.</li> <li>Mortality of amphibians, reptiles and small mammals may occur, due to the pipeline installation, directional drilling or trenching.</li> <li>Pipeline construction and vegetation maintenance could result in habitat alteration, loss, or destruction, impacting terrestrial vegetation and wildlife.</li> <li>Pipeline maintenance during operations may also result in accidental mortality to amphibians, reptiles and small mammals.</li> </ul>

<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude of the effects of construction of the proposed pipeline route to terrestrial wildlife would be moderate, as the area is already disturbed.</li> <li>Proposed Project construction would result in a temporary sensory disturbance and potential mortality to small mammals, amphibians, and reptiles.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of proposed Project construction impacting terrestrial wildlife is high. The probability of proposed Project operations impacting terrestrial wildlife is high for maintenance of the pipeline route, but low for marine terminal and fuel receiving facility operations.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of the proposed Project would be the marine terminal site, fuel receiving facility, and pipeline route from the proposed fuel receiving facility along Highway 99 from Williams Road to Bridgeport Road in Richmond BC, including staging areas.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>The duration of construction would be 18 to 24 months. The frequency of sensory disturbances to terrestrial wildlife during construction would be ongoing for the 18 to 24 months.</li> <li>Accidental mortality as a result of proposed project construction would be one-time in nature.</li> <li>During operations, vegetation maintenance would occur periodically along the proposed pipeline route, potentially resulting in sensory disturbance and accidental mortality. The duration of this would be short, and the frequency would be as required, likely infrequent. Operations of the marine terminal and fuel receiving facility are not expected by EAO to have a measureable effect on terrestrial wildlife.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The effects of proposed Project construction on terrestrial wildlife would be reversible for sensory disturbances.</li> <li>Terrestrial wildlife may permanently disperse as a result of sensory disturbances as well.</li> <li>Permanent accidental mortality would not be reversible.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context is disturbed, as the marine terminal, fuel receiving facility and proposed pipeline route would all be located on previously disturbed land. The pipeline would likely overlap COR designated Riparian Management setbacks, City Parks and Ecologically Sensitive Areas.</li> </ul>
<b>VC</b>		Aquatic Birds
<b>Residual Effect</b>		Proposed Project construction would result in a temporary residual sensory disturbance to aquatic birds.
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude of the effects of construction of the proposed pipeline route to aquatic birds would be low. Proposed Project construction would result in sensory disturbance for aquatic birds, but the marine terminal and fuel receiving facility do not have large amounts of suitable quality aquatic bird habitat.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of proposed Project construction impacting aquatic birds via sensory disturbance is high. The probability of proposed Project operations impacting aquatic birds via sensory disturbance is high for vessel traffic to and from the marine terminal, but low for operations of the fuel receiving facility and pipeline.</li> </ul>

	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of the proposed Project would be the marine terminal site, fuel receiving facility, and potentially ditches along the pipeline route from the proposed fuel receiving facility along Highway 99 from Williams Road to Bridgeport Road in Richmond BC for sensory disturbance.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>The duration of construction would be 18 to 24 months. Sensory disturbance would occur throughout the duration of construction and the frequency would be ongoing. There is not likely suitable quality habitat for aquatic birds at the marine terminal or fuel receiving facility, but if construction were to impact aquatic bird habitat, the duration would be permanent, and the frequency would be once. During operations, the frequency of sensory disturbance would occur with vessel frequency: one to two barges every two weeks with an off-loading duration of 12 hours, and one large tanker every month with an off-loading duration of between 24 and 36 hours, making up a frequency of between three to five vessels per month, or between 36 to 60 vessels per year.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The sensory effects of proposed Project construction on aquatic birds would be reversible once construction ceased.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context is disturbed, as the marine terminal, fuel receiving facility and proposed pipeline route would all be located on previously disturbed land.</li> </ul>
<b>VC</b>		Marine Mammals
<b>Residual Effect</b>		Sensory disturbance during pile driving could disturb marine mammals in the vicinity of the marine terminal and during directional drilling at the Moray Channel crossing.
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude of the effects of sensory disturbance would be moderate during construction (pile driving) at the marine terminal and during the directional drilling for the Moray Channel crossing. The magnitude of sensory disturbance during operations would be low.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of proposed Project construction impacting marine mammals via sensory disturbance is high. The probability of proposed Project operations impacting marine mammals via sensory disturbance is moderate/low for vessel traffic to and from the marine terminal.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of the proposed Project would be the marine terminal site, the south arm of the Fraser River and the Moray Channel crossing.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>The duration of construction would be 18 to 24 months and the frequency would be once. During operations, the frequency of sensory disturbance would occur with vessel frequency: one to two barges every two weeks with an off-loading duration of 12 hours, and one large tanker every month with an off-loading duration of between 24 and 36 hours, making up a frequency of between three to five vessels per month, or between 36 to 60 vessels per year.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The sensory effects of proposed Project construction on marine mammals would be reversible once construction ceased or once the vessel has departed.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context is that there is existing vessel activity in</li> </ul>

		the south arm of the Fraser river and the proposed Project would contribute to a small portion of it.
--	--	---

### 5.2.5 Conclusion

EAO and VFPA have considered that:

- The Proponent would revegetate areas disturbed along the proposed pipeline route;
- The Proponent does not expect at-risk plant species and communities to occur in the proposed Project area;
- The Proponent must complete site-specific rare/at-risk plant surveys prior to construction. If avoidance of rare or at-risk plants is not practical, plants must be salvaged and relocated according to the “Guidelines for Translocation of Plant Species at Risk in British Columbia” (Ministry of Environment 2009);
- Potential sensory disturbance to marine mammals as a result of marine terminal construction would be short-term and reversible; and
- The existing ecological context of the proposed Project’s terrestrial components is disturbed due to previous industrial activities.

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate) EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects on riverine marshes, terrestrial vegetation, at-risk plant species and plant communities, terrestrial wildlife, aquatic birds, marine mammals, at-risk bird species, and non-avian species at risk.

### 5.3 Air and Climate

Section 5.4 of the Proponent’s Application provides an assessment of the effects of the proposed Project on local and regional air quality and GHG emissions. The assessment focuses on the City of Richmond, Corporation of Delta, and the City of Surrey. The scope of the assessment includes criteria air contaminant (CAC) and greenhouse gas (GHG) emissions resulting from construction and operations of the proposed marine terminal, fuel receiving facility and pipelines, and the movement of vessels within the Fraser River during operations.

The Local Study Area (LSA) (

Figure 6) for the air quality and climate assessment is Richmond, BC, as Richmond has the greatest potential to be most affected by the proposed Project construction and operations.

The Regional Study Area (RSA) (

Figure 6) for the air quality and climate assessment includes the City of Surrey, Corporation of Delta, and the City of Richmond encompassing the area where the Proponent anticipates that future emissions would be avoided due to the change from the present truck-based fuel delivery method and shortened travel distance for marine vessels, to the proposed Project fuel delivery method.

The proposed Project's air quality and climate effects were identified and assessed according to the following methodology framework:

1. Identification of air quality and climate issues relevant to the study areas
2. Identification and description of baseline conditions in the study areas
3. Description of the air quality effects resulting from interactions between the Project and the baseline air quality and climate setting
4. Description of alternatives for mitigating the effects of the Project on air quality and climate
5. Characterization of potential residual effects of the Project and assessing their significance
6. Identification of any potential cumulative impacts

The Project's impact on the baseline air quality and climate setting were assessed by estimating the emissions associated with the construction and operation phases.

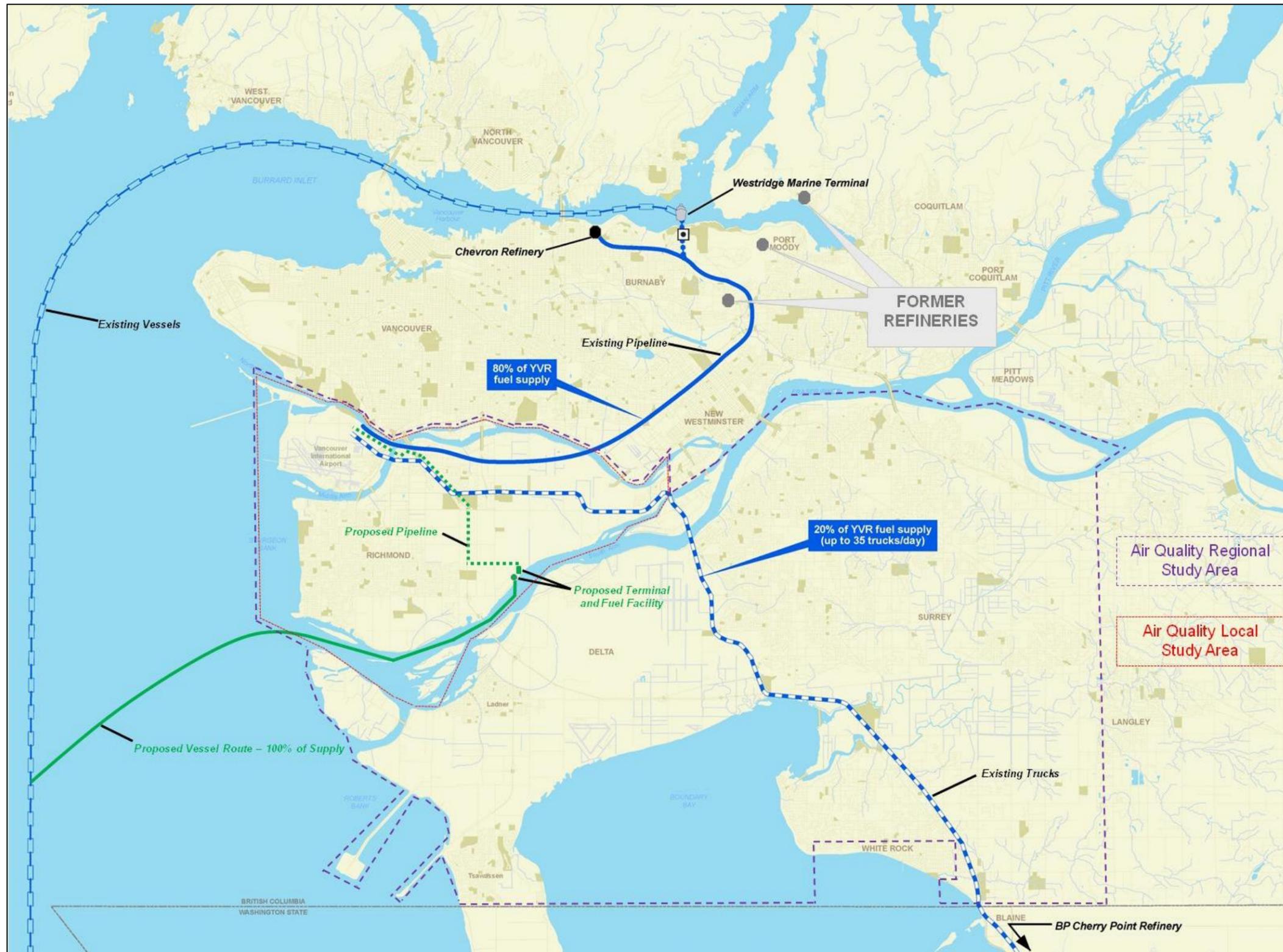


Figure 6. Sources considered for the Proponent's air quality and climate assessment

CAC and GHG emission factors for the Project were estimated using different methods and/or assumptions in accordance with the various types of vehicles, equipment and emission sources and with respect to the types of activities involved at different phases of the Project. For example, in the case of vehicle traffic (including delivery trucks and service vehicles), the exhaust emissions for CAC were estimated using the US EPA model Mobile 6.2C (Canadian version), while GHG emissions from mobile sources were estimated using both the US EPA Mobile 6.2C and the new state-of-the-art emission model MOVES; the most up-to-date tool available for on-road vehicles.

To determine the relative contribution of the Project to future emissions, dispersion modeling of atmospheric emissions was conducted for air contaminants with a predicted net increase in emissions, in order to predict their potential effect on ambient air quality. The predicted concentrations were then compared with the applicable ambient air quality objectives and standards, to assess the magnitude of their effect.

### 5.3.1 Valued Components

This Report provides an assessment of the significance of potential impacts to the following VCs:

- Ambient air quality from CAC emissions; and
- Climate change from GHG emissions.

Poor air quality can have adverse effects on human and ecological health, as well as aesthetic qualities such as visibility. Air quality is assessed in terms of concentrations of CACs relative to ambient air quality criteria. Criteria air contaminants considered in this assessment include fine particulate matter (i.e. PM<sub>10</sub> and PM<sub>2.5</sub>), oxides of nitrogen (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>) and volatile organic compounds (VOCs).

GHG emissions have a global effect that cannot easily be measured on a local scale. These emissions are commonly aggregated into carbon dioxide (CO<sub>2</sub>) equivalent (CO<sub>2</sub>E) emissions, representing the equivalent quantity of CO<sub>2</sub> that would have the effect as the combined greenhouse gases. This assessment has considered GHG emissions of CO<sub>2</sub>, methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O).

Air quality guidelines/criteria have been established for a number of CACs for Canada, British Columbia and Metro Vancouver (refer to Table 9). The Greater Vancouver Regional District (operating as Metro Vancouver) Air Quality Management By-law regulates air emissions from large emitters of contaminants within the region, including emissions from industries, trades, and operations, among others.

**Table 9: Relevant Air Quality Guidelines and Criteria**

Indicators	Contaminant (CACs)		Averaging period	Guidelines / Criteria by Jurisdiction						
				Canada ( $\mu\text{g}/\text{m}^3$ )			BC ( $\mu\text{g}/\text{m}^3$ )			Metro Vancouver ( $\mu\text{g}/\text{m}^3$ )
				Maximum Desirable	Maximum Acceptable	Maximum Tolerable	Level A	Level B	Level C	
Ambient Air Quality	Fine particulate matter	PM <sub>10</sub>	24 hour	-			50			50
			Annual	-			-			20
		PM <sub>2.5</sub>	24 hour	30 <sup>(a)</sup>			25 <sup>(b)</sup>			25
			Annual	-			8			12
	Oxides of nitrogen	NO <sub>2</sub> <sup>(c)</sup>	One-hour	-	400	1000	-			200
			24-hour	-	200	300	-			-
			Annual	60	100	-	-			40
	Sulphur dioxide	SO <sub>2</sub>	One-hour	450	900	-	450	900	1,300	450
			24-hour	150	300	800	160	260	360	125
			Annual	30	60	-	25	50	80	30
		<b>Contaminant</b>	<b>Averaging period</b>	<b>Alberta Ambient Air Quality Objective (AAQO) (<math>\mu\text{g}/\text{m}^3</math>)</b>			<b>Ontario POI limits and AAQC (<math>\mu\text{g}/\text{m}^3</math>)</b>			
	VOCs <sup>(d)</sup>	Benzene	1 hour	30			-			
		Toluene	½ hour	-			2,000			
			1 hour	1,880			-			
24-hour			400			-				

a. Canada-wide standard: annual 98<sup>th</sup> percentile value, averaged over three consecutive years (established in 2000)

b. Ambient Air Quality Objectives: compliance based on the 98<sup>th</sup> percentile value (established in 2009)

c. Expressed as nitrogen dioxide

d. Other specific VOCs are presented in Table 5.4.1 of the Application. They include n-hexane, n-heptane, octane and isomers of hexane, which have higher ambient air quality criteria values, comparatively with benzene and toluene presented in the above table.

### 5.3.1.1 Baseline Conditions

Baseline conditions have been determined by reviewing historical climate and air quality data in the LSA and RSA collected through the Lower Fraser Valley monitoring network and, using regional emission inventories developed by Metro Vancouver.

GHG emissions are difficult to measure on a local scale and therefore national, provincial and regional emission totals are summarized as a basis for comparison to evaluate the Project's effects. At the time of the preparation of the Application, the most recently available emissions inventory data for the RSA was given for 2005. These included emissions for CACs and GHGs from point, area and mobile sources. The geographic extent of the 2005 inventory was for the Lower Fraser Valley. This data was used to forecast 2010 GHG emissions in the RSA and indicated expected contributions from point, area and mobile sources to be 24%, 37% and 39%, respectively.

Baseline conditions for the CACs are assessed in two ways: one that forecasts contributions from point, area and mobile sources for 2010 in the LSA and RSA (similar to the GHGs), and one that uses actual historical data collected from air quality monitoring stations within the Lower Fraser Valley monitoring network. The latter method produces a trend analysis and provides more concrete baseline conditions for each of the CACs being assessed. The closest monitoring stations to the Project are located at the Vancouver Airport (YVR) and in South Richmond. Current levels and historical trends of the CACs can be summarized as follows:

PM <sub>10</sub>	<ul style="list-style-type: none"> <li>• Between 1997 and 2006, the annual average concentrations remained relatively constant (i.e. no significant trend was observed).</li> <li>• The maximum 24h concentrations had greater variation, even exceeding the B.C. ambient air quality objective of 50 µg/m<sup>3</sup> a number of times.</li> </ul>
PM <sub>2.5</sub>	<ul style="list-style-type: none"> <li>• The annual concentrations gradually decreased between 1999 and 2006, thus meeting the B.C. air quality objective in recent years.</li> <li>• The maximum 24h concentrations show frequent exceedances of the Metro Vancouver objective of 25 µg/m<sup>3</sup>, although the 98<sup>th</sup> percentile concentrations have met the B.C. objectives.</li> </ul>
NO <sub>2</sub>	<ul style="list-style-type: none"> <li>• Annual average concentrations have been slightly declining between 1997 and 2006, all values compliant with the Metro Vancouver and Federal annual objectives.</li> <li>• Although the maximum 1h concentrations have shown greater variation between during this period, they have met all Federal and Metro Vancouver objectives, for all averaging periods.</li> </ul>

SO <sub>2</sub>	<ul style="list-style-type: none"> <li>• Annual average and maximum 1h concentrations between 1997 and 2006, have remained well below all of the applicable air quality objectives and criteria.</li> <li>• The 98<sup>th</sup> percentile 1h and 24h concentrations of 5.2 µg/m<sup>3</sup> and 3.2 µg/m<sup>3</sup>, respectively, have been used to represent the baseline conditions for SO<sub>2</sub>.</li> </ul>
VOCs	<ul style="list-style-type: none"> <li>• No historical data is available for total VOCs at these monitoring stations.</li> <li>• Average and peak VOC concentrations in the Lower Fraser Valley have declined approximately 50 % within the last decade. This declining trend has recently stabilized (Metro Vancouver 2009).</li> <li>• Highest average VOC levels tend to be measured near specific industrial sources in the Burrard Inlet.</li> </ul>

### 5.3.2 Potential Project Effects and Proposed Mitigation

The potential effects to air quality have been assessed by applying two separate estimation techniques in order to quantify the impacts from the project. The first technique is to estimate the total annual emissions that would result from the project (reported in kgs) and compare them to the emission totals within the local and regional study areas. While the annual emissions provide an indication of the overall contribution and potential impact to the airshed, a second technique of dispersion modeling is utilized to determine if the proposed Project would exceed local air quality objectives (reported in µg/m<sup>3</sup>).

Based on the annual emission estimates, an increase in emissions is expected for both VOCs and SO<sub>2</sub> over the medium term duration, and there are potentially sensitive receptors nearby. Dispersion modeling was applied using the United States Environmental Protection Agency Industrial Source Complex Short Term “ISCST3” model and the results of the model used to assess potential air quality impacts. VOC emissions from the tanks at the proposed fuel receiving facility and SO<sub>2</sub> emissions from the vessel hotelling at the marine terminal berth were assessed.

#### 5.3.2.1 *Effects from Project Construction*

The construction phase would consist of activities in the LSA that will have potential effects on air quality. CAC and GHG emissions were assessed by applying various methods of calculations (emission factors, models), assumptions and activity levels corresponding to the numerous types of emission sources expected during construction. These estimates were then compared with forecast emissions without the Project in the LSA for CACs and the RSA for GHGs.

The Proponent estimated emissions for the following major construction sources:

- Operation of fossil-fuelled equipment;

- Operation of delivery trucks and service vehicles;
- Operation of tug and barge for pile-driving;
- Fugitive dust from the handling of rock and soil;
- Indirect emissions from the production of cement for use in concrete; and
- Painting fuel receiving tanks.

Table 10 presents predicted CAC and GHG emissions during the construction period.

**Table 10: Summary of Annual Emissions in LSA and RSA by Emission Source and Type during Construction Phase**

Construction Emission Source	Total CAC Emissions (kg)					Total GHG Emissions (tonnes)
	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	CO <sub>2</sub> E
Fossil-Fuelled Equipment	1,611	1,562	28,473	25	1,805	3,366
Vehicle Traffic	16	11	526	2	250	192*
Tug and Barge	6	5	212	6	14	18
Fugitive Dust	4	0.6	-	-	-	-
Painting of Tanks	-	-	-	-	10,100	-
Production of Cement	-	-	-	-	-	1,034
<b>Total Emissions</b>	<b>1,637</b>	<b>1,579</b>	<b>29,211</b>	<b>33</b>	<b>12,169</b>	<b>4,610</b>
Percent Change in Total Annual LSA Emissions (%)	0.2	0.3	0.6	0.0	0.3	-
Percent Change in Total Annual RSA Emissions (%)	-	-	-	-	-	0.1

\* Total GHG emissions presented for vehicle traffic are those obtained from US EPA Moves, which is approximately 10 % greater than the emissions estimated using Mobile 6.2C for all mobile vehicle types.

The results in Table 10 indicate that fossil-fuelled equipment contributes to the majority of CAC emissions during construction, with the exception of VOC emissions that are mainly associated with the painting activities of the tanks.

The overall contribution of total CAC emissions due to Project construction is low, with less than 1% increase in total annual LSA emissions for all of the CACs being assessed.

Fugitive dust emissions from site preparation and construction activities have not been included in the assessment as specific design information is currently unavailable. Thus the particulate matter emissions associated with Project construction would be higher than those shown in Table 10.

The annual total GHG emissions from construction activities increase RSA annual emissions by less than 0.1%. The majority of the GHG releases are from fossil-fuelled equipment, followed by production of cement, as indicated in Table 10.

#### 5.3.2.2 *Effects from Project Operations*

The significance of Project operations on air quality and climate were assessed, relative to the existing fuel delivery system, by estimating net emissions of CACs and GHGs for the following two scenarios:

- Present fuel requirements; and
- Projected fuel requirements in 2016.

Dispersion modelling was undertaken for CACs with a predicted increase in emissions as a result of the Project which presented a possible effect on sensitive receptors. Results from the dispersion modelling were compared against corresponding air quality objectives and the results provided in Table 11 and Table 12.

The proposed Project would alter the way that fuel deliveries would be made to YVR, resulting in expected reductions of CAC and GHG emissions. These modifications were assessed by estimating:

- Avoided emissions for tanker truck deliveries from the Cherry Point Refinery to YVR and marine vessel deliveries from the Cherry Point Refinery to Westridge Marine Terminal; and
- Incremental emissions for marine vessel deliveries from the Cherry Point Refinery to the marine terminal and fugitive emissions from tanks at the proposed receiving facility.

The proposed Project would eliminate the use of Westridge Marine Terminal storage tanks and require approximately 50% less fuel movement through the Trans Mountain Jet Fuel storage tanks immediately following proposed Project commissioning. Within a few years of proposed Project start-up, the Trans Mountain Jet Fuel pipeline and storage system are expected to be decommissioned. The Westridge tanks could also be decommissioned or could continue to operate for storage unrelated to YVR. Due to the uncertainty of future uses of those tanks by their owners, VOC emissions from the proposed Project's fuel receiving facility were assessed incrementally in the local and regional context.

### *Tanker Truck Deliveries*

Approximately 300 million litres of aviation fuel per year is currently delivered to YVR from the Cherry Point Refinery via tanker trucks. Annual fuel demands are estimated to double to 600 million litres by 2016, which will continue to be delivered by tanker trucks should the current fuel delivery system remain in use. The Project proposes to replace these truck deliveries by marine vessel deliveries traveling to the upgraded marine terminal. A single barge shipment to the proposed marine terminal would replace approximately 460 truck deliveries, while a single tanker shipment would replace 1,400 truck deliveries. Based on these figures, it is estimated that an annual avoided tanker truck distance of 1,077,020 km would result under the present scenario, and of 2,153,900 km under the 2016 scenario.

### *Marine Vessel Deliveries*

Approximately 500 million litres of fuel is currently shipped from the Cherry Point Refinery to Westridge Marine Terminal each year, an approximate distance of 238 km per round trip. The Project will redirect these existing aviation fuel shipments to the marine terminal on the Fraser River, thereby eliminating the need for these vessels to call at Westridge Marine Terminal, thus reducing the round-trip vessel transit distance to 170 km per trip.

The amount of fuel shipped to the marine terminal for the proposed Project would be greater than the amount currently shipped to the Westridge Marine Terminal, as the proposed Project would replace the tanker truck and vessel deliveries associated with the existing fuel delivery system. The potential effects of two types of marine vessels were assessed: articulated tug-barges and Panamax-class vessels.

Articulated tug-barges have an average cargo capacity of 18 million litres and travel at an average speed of 20 km/hr (10 to 20 knots). Since tugs would not typically be left running while barges are moored at the proposed marine terminal, hotelling emissions from tugs were not included.

On the other hand, Panamax-class vessels have a total cargo capacity of approximately 50 to 60 million litres and will travel at an average speed of 27 kilometres per hour (13.5 to 15.5 knots). These vessels would hotel for approximately 24 hours at the marine terminal berth, during which time an auxiliary engine (i.e. diesel generator or steam boiler burning bunker fuel) would be used.

The present and future potential effects of these vessels are summarised as follows:

- The overall net emissions of CACs and GHGs associated with Panamax-class tankers are less than those associated with articulated tug-barges except for sulphur dioxide for the transit activity along the river;
- SO<sub>2</sub> emissions from Panamax-class tankers are considerably higher than those associated with articulated tug-barges due to the high sulphur content in the bunker fuel used for these vessels; and
- When hotelling, auxiliary engines and boilers are operated and the propulsion engines are shutdown. If Panamax-class vessels use low sulphur fuel for their auxiliary diesel engines when hotelling at the marine terminal berth, this would help reduce SO<sub>2</sub> emissions.

Table 11 summarizes the predicted ambient concentrations of emissions due to the hotelling of the Panamax-class vessel while berthed at the terminal.

**Table 11: Maximum Predicted Ambient Concentrations due to Emissions from Panamax-class Vessels Hotelling at the Marine Terminal**

Pollutant	Averaging Period	Maximum Predicted Ambient Concentration (µg/m <sup>3</sup> )	Maximum Predicted Cumulative Concentration (µg/m <sup>3</sup> )	Metro Vancouver Ambient Air Quality Objectives (µg/m <sup>3</sup> )
SO <sub>2</sub>	1 – Hour	8	22	450
	24 – Hour	4	14	125
PM <sub>10</sub>	24 – Hour	1.0	30	50
PM <sub>2.5</sub>	24 – Hour	0.9	18	25

### *Fuel Receiving Tanks*

Aviation fuel handling tanks typically incorporate a fixed roof design with either a pressure or vacuum venting system, or free venting system with floating pans. The colour of the receiving tanks impacts the amount of VOC evaporation. Darker colours absorb more heat, resulting in greater evaporative VOC emissions inside the tank; therefore, a lighter colour is preferred.

When compared to the existing fuel system, the VOC emissions associated with the storage and movement of aviation fuel to YVR, would be reduced as a result of the proposed Project. With the current delivery system, fuel is sequentially stored in three

different tank systems: the Westridge tanks at Burnaby, the Trans Mountain Jet Fuel tanks at YVR, and the VAFFC tanks at YVR, resulting in three stages where VOC emissions are released with movement in and out of the tanks. The Westridge Marine Terminal would not be utilized by the proposed Project, resulting in only two stages where VOC emissions would be released.

It should be noted that VOC emissions from the tanks could increase in the future with an increase in ambient temperature due to climate change.

Table 12 summarizes the maximum predicted ambient concentrations of VOCs due to fugitive emissions from the proposed fuel receiving facility. The base case scenario is magnitudes lower than the Alberta Ambient Air Quality Objectives and Ontario Point of Impingement Limits and Ambient Air Quality Criteria<sup>35</sup>. The maximum predicted ambient SO<sub>2</sub> concentrations due to Panamax-class vessels hotelling at the marine terminal would also be below the Metro Vancouver Ambient Air Quality Objectives<sup>36</sup>.

**Table 12: Maximum Predicted Ambient Concentrations of Select VOCs due to fugitive Emissions from the Proposed Fuel Receiving Facility – Base-Case Scenario (medium-grey coloured tanks with no floating pans)**

Pollutant	Averaging Period	Maximum Predicted Ambient Concentration (µg/m <sup>3</sup> )	Alberta Ambient Air Quality Objectives (µg/m <sup>3</sup> )	Ontario Point of Impingement Limits and Ambient Air Quality Criteria (µg/m <sup>3</sup> )
Benzene	1 – Hour	0.1 to 3.1	30	-
Toluene	½ - Hour <sup>(1)</sup>	0.07 to 2.2	-	2000
	1 - Hour	0.06 to 1.8	1880	-
	24 - Hour	0.01 to 0.4	400	-
N-hexane	½ - Hour <sup>(1)</sup>	0.2 to 7.3	-	7500
	1 - Hour	0.2 to 6.0	21000	-
	24 - Hour	0.04 to 1.3	7000	2500
N-heptane	½ - Hour <sup>(1)</sup>	0.1 to 3.1	-	33000

<sup>35</sup> Specific values are presented in Table 5.4.21 (page 5.4-39) of the Application. Note that BC does not have regulations for VOCs, which is why the Proponent used Alberta and Ontario standards.

<sup>36</sup> Specific values are presented in table 5.4.22 (page 5.4-40) of the Application.

	24 - Hour	0.02 to 0.6	-	11000
Octane	10-minute <sup>(2)</sup>	0.03 to 0.8	-	61800
	½ - Hour <sup>(1)</sup>	0.02 to 0.6	-	45400
Isomers of hexane	½ - Hour <sup>(1)</sup>	0.3 to 7.9	-	22500
	24 - Hour	0.05 to 1.4	-	7500

Notes: (1) Calculated based on the maximum 1-hour concentration using a conversion factor of 1.2 (Ontario Ministry of Environment 2005)  
(2) Calculated based on the maximum 1-hour concentration using a conversion factor of 1.65 (Ontario Ministry of Environment 2005)

### Summary of Project Operations

Table 13 summarizes the estimated annual CAC and GHG emissions associated with Project operations.

**Table 13: Maximum Net Annual CAC and GHG Emissions due to Proposed Project Operations**

	CAC Emissions (kg)					GHG Emissions (tonnes)
	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	CO <sub>2</sub> E <sup>(b)</sup>
<b>Present Fuel Requirements</b>						
Total Net Emissions <sup>(a)</sup>	- 90	- 64	- 4,132	+ 333	+11,750	- 1,306
Percent change in Total LSA emissions	- 0.02%	- 0.02%	- 0.12%	+ 0.25%	+ 0.29%	--
Percent change in Total RSA emissions	- 0.004%	- 0.005%	- 0.034%	+ 0.067%	+ 0.09%	- 0.0204%
Total Net Emissions(a)	- 124	- 76	- 6,702	+ 1,226	+11,568	- 2,443
Percent change in Total LSA emissions	- 0.02%	- 0.02%	- 0.19%	+ 0.93%	+ 0.29%	--
Percent change in Total RSA emissions	- 0.005%	- 0.005%	- 0.055%	+ 0.25%	+ 0.089%	- 0.038%

a. Combined net emissions for tanker delivery trucks, marine vessel deliveries and fuel receiving tanks.  
b. The portion of the emissions for delivery trucks was estimated using US EPA MOVES model.

Note: The values in the table give the maximum amount of net increase (+) or net decrease (-).

Total SO<sub>2</sub> emissions are expected to increase as incremental emissions from proposed vessel deliveries are expected to offset the avoided emissions from tanker truck deliveries. Net VOC emissions would also have net positive increases, considering the change from the present fuel delivery infrastructure to the proposed Project infrastructure, as indicated in the yellow shaded areas of Table 13. Emissions of the other CACs would decrease as a result of proposed Project operations. The change in most CAC emissions relative to total LSA and RSA emissions is predicted to be very minor, except for SO<sub>2</sub> emissions.

Net GHG emissions associated with the operations are expected to result in an overall small decrease in regional emissions as the avoided emissions from tanker truck deliveries more than offset the incremental emissions from proposed vessel deliveries. The expected decrease in GHG emissions is low, representing less than 0.04% of total RSA emissions for the present and future scenarios. The use of Panamax-class vessels results in a greater decrease in GHG emissions than the use of barges.

### *5.3.2.3 Measures to Mitigate Effects of the Proposed Project*

#### *Construction Mitigation Measures*

To mitigate the effects of proposed Project construction activities to CAC and GHG emissions, the Proponent will implement following mitigation measures:

- An Air Quality and Dust Control Management Plan must be developed and implemented and must be based on the "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" (Cheminfo Services Inc. 2005);
- As part of the contractual terms, the Proponent requires that contractors use non-road diesel engines for construction equipment that meet Tier 2 emissions standards, as defined by the U.S. Environmental Protection Agency (EPA). Preference will be given to contractors having 50 percent or more of their non-road diesel engines meeting Tier 4 emission standards.
- The Proponent must identify and implement measures to reduce common air contaminants and greenhouse gas emissions at the marine terminal based on the goals and objectives of the "Northwest Ports Clean Air Strategy" (Port of Seattle, Port of Tacoma, and Port Metro Vancouver 2007) and subsequent updates to that strategy.
- The Proponent must design and construct the marine terminal to include infrastructure to facilitate the future use of shore power (i.e. power conduits); and

- The Proponent must incorporate a pressure/vacuum venting system to control emissions from the fuel receiving tanks unless internal floating pans are used in the tanks.

### *Mitigation Measures during Operations*

The following proposed measures could mitigate the effects of proposed Project operations to CAC and GHG emissions<sup>37</sup>:

- Reduction of vessel emissions by encouraging vessel operators to reduce SO<sub>2</sub> emissions by using low-sulphur fuels during transit (while operating within the jurisdictional waters of the Port) and in their auxiliary engines when hotelling at berth;
- Maintenance of vapour-tight conditions in fuel receiving tanks and pipelines;
- implementation of bottom loading into fuel receiving tanks to reduce turbulence and reduce VOC vapour venting; and
- Implementation of a leak detection and repair program; and, maintenance of vapour-tight conditions in fuel receiving tanks and pipeline.

A frequent mitigation measure discussed for marine emissions is the use of shore power. However, the VFPA reports that only auxiliary loads (lights, ventilation, etc.) would be covered by shore power, and that out of 1400 tankers, approximately 9 are equipped with electrical equipment and they use a specific terminal type. The possible use of shore power will be incorporated in the proposed marine terminal design.

### 5.3.3 Potential Residual Effects and their Significance

#### 5.3.3.1 *Effects from Project Construction*

Table 14 summarizes the potential residual adverse effects of the proposed Project construction on air quality and climate after mitigation. The significance analysis is also presented for the operation phase below.

Project construction would result in a small residual increase of CAC and GHG emissions. The CAC and GHG emissions that would be emitted during this phase would be below all existent relevant guidelines.

**Table 14: Significance of potential residual effects, during construction, on ambient air quality and greenhouse gases**

---

<sup>37</sup> Further explanation of these measures is included in section 5.4.22 (pages 5.4-40 to 5.4-41) of the Application.

VC		Ambient Air Quality (CACs)
<b>Residual Effects</b>		<ul style="list-style-type: none"> <li>Construction activities for the proposed Project would result in a less than one percent increase in CAC emissions in the Greater Vancouver Area for all contaminants.</li> </ul>
<b>Significance Analysis:</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude of the increase of all CACs during construction (&lt;1% in LSA) of the proposed Project would be low and within applicable standards and guidelines.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of emissions of CACs during construction is high.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent impacts would be close to construction sites</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>The duration of CAC emissions for construction sources would be restricted to the 18 to 24 month construction period. The frequency would be continuous during daytime hours Monday to Friday for the 18 to 24 month construction period.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The CAC emissions during construction would be reversible once construction ceases.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context of the area is disturbed. The proposed Project would be located in the metropolis of Richmond BC.</li> </ul>
<b>VC</b>		Greenhouse Gas Emissions
<b>Residual Effects</b>		<ul style="list-style-type: none"> <li>Construction activities for the proposed Project would result in a less than 0.1% increase in annual GHG emissions in the RSA.</li> </ul>
<b>Significance Analysis:</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude of the increase of GHG emissions during construction of the proposed Project would be low (less than a 1% increase in the LSA for all contaminants, and less than a 0.1% increase in the RSA) and within applicable standards and guidelines.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of GHG emissions during is high, based on the use of fossil fuel emissions by construction vehicles.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of the GHG emissions is global.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>The duration of GHG emissions for construction sources would be restricted to the 18 to 24 month construction period. The frequency would be continuous during daytime hours Monday to Friday for the 18 to 24 month construction period.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The GHG emissions during construction would not be reversible.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context of the area is disturbed. The proposed Project would be located in the metropolis of Richmond BC. The Fraser River does have tanker traffic on it currently.</li> </ul>

### 5.3.3.2 Effects from Project during Operations

Table 15 summarizes the potential residual adverse effects on air quality and GHG emissions from operations.

The proposed Project would result in a small residual increase of SO<sub>2</sub> and VOC emissions during operations. The CAC, VOC and GHG emissions that would be emitted due to the proposed Project would be below all existent relevant guidelines.

**Table 15. Significance of potential residual effects, during operations, on ambient air quality and greenhouse gases**

VC		Ambient Air Quality (CACs)
<b>Residual Effects</b>		<ul style="list-style-type: none"> <li>Overall decrease in regional PM10, PM2.5, NOx emissions expected (positive effect)</li> <li>Overall increase in regional SO2 emissions expected (negative effect)</li> <li>Overall increase or decrease in VOC emissions expected (negative or positive effect)<sup>38</sup></li> </ul>
<b>Significance Analysis:</b>	Magnitude	<ul style="list-style-type: none"> <li>Most CACs would decrease during operations. SO2 and VOCs would increase during operations of the proposed Project, but would be low and within applicable standards and guidelines.</li> <li>Maximum predicted ambient air concentrations less than half of the ambient air quality objectives.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of emissions of CACs during construction and of SO2 and VOCs during operations is high, based on the use of fossil fuel emissions by construction vehicles, tanker vessels, as well as other sources as identified in this section.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of the impacts of fugitive dust would be regional, as would the ambient concentrations of CAC emissions.</li> <li>Reduced or avoided trucking and vessel emissions will occur throughout the region.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>The duration of emissions of SO2 during operations would occur for at least the 60-year proposed Project . Vessel traffic associated with the proposed Project is considered to be frequent. The frequency of emissions related to the fuel storage tanks would be continuous for the approximate 60-year life of the proposed Project.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The CAC emissions during operations would be reversible at the end of the project life.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context of the area is disturbed. The proposed Project would be located in the metropolis of Richmond BC.</li> </ul>
<b>VC</b>		Greenhouse Gas Emissions

<sup>38</sup> Direction of the effect for VOCs depends on fuel requirements at YVR and type of storage tanks to used at proposed receiving facility

<b>Residual Effects</b>		<ul style="list-style-type: none"> <li>Due to the proposed shift from tanker trucks to fuel vessels, the proposed Project would result in an overall decrease of 0.03% of regional GHG emissions, which would be a decrease of 0.002% in provincial GHG emissions and a 0.0002% decrease in national emissions.</li> </ul>
<b>Significance Analysis:</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude of the increase of GHG emissions during construction and operations of the proposed Project would be low (less than a 1% increase in the LSA for all contaminants, and less than a 0.1% increase in the RSA) and within applicable standards and guidelines. Net GHGs emitted during proposed Project operations may be slightly lower than the fuel delivery system in place presently.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of GHG emissions during construction and operations is high, based on the use of fossil fuel emissions by construction vehicles and tanker vessels as well as other sources as identified in this section.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of the GHG emissions is global.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>The duration of emissions of GHGs during operations would occur for at least the 60-year proposed Project life. Vessel traffic associated with the proposed Project is considered to be frequent. The frequency of emissions related to the fuel storage tanks would be continuous for the approximate 60-year life of the proposed Project.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The GHG emissions during operations would not be reversible.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The ecological context of the area is disturbed. The proposed Project would be located in the metropolis of Richmond BC. The Fraser River does have tanker traffic on it currently.</li> </ul>

#### 5.3.4 Conclusion

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects on air quality and climate due to the relatively small net impact that proposed Project construction and operations would have on area air quality and GHGs. The levels of GHGs and CACs would remain within established guidelines.

#### 5.4 Noise

Section 5.5 of the Proponent's Application identified and assessed potential noise effects on noise sensitive land uses, resulting from construction and operations activities for the proposed Project. Baseline conditions were measured in several representative locations. The Proponent used models to determine the potential effects on sound quality as a result of proposed Project construction and operations. Noise effects have the potential to develop from several proposed Project-related activities including:

- Construction upgrades and activities at the marine terminal;
- Operations activities at the marine terminal;
- Construction of the proposed fuel receiving facility; and
- Construction and installation of sections of proposed pipeline in proximity to residential housing.

Please refer to the Application for a full description of the Proponent’s methodology (including definition of spatial and temporal boundaries), baseline conditions in the study areas, a description of the identified potential impacts of the proposed Project on VCs, and proposed mitigation measures<sup>39</sup>.

The City of Richmond’s Public Health Protection Bylaw (Bylaw #6989) imposes time constraints and a maximum noise level on construction activities, and also permits applications for exemptions from these requirements. No construction activities are permitted prior to 07:00 and after 20:00 Monday to Saturday, or prior to 09:00 and after 18:00 on Sundays and statutory holidays. This bylaw also stipulates a maximum noise level of 80 A-weighted decibels (dBA) resulting from construction or construction equipment at a point of reception in the City between the allowable hours of construction.

The Proponent used sounds levels during the day ( $L_d$ ) and the night-time equivalent sound levels ( $L_n$ ) for their assessment.

A-weighting is commonly used for the measurement of environmental and industrial noise, as well as when assessing potential hearing damage and other noise health effects. C-weighting is commonly used for the measurement of low frequency community noises. The decibel scale is logarithmic.

Table 16 shows the typical noise levels and effects for common outdoor and indoor sounds for reference.

**Table 16. Typical noise levels and effects for common outdoor and indoor sounds**

dBA	Outdoor Environment	Indoor Environment	Typical Reaction or Effect
<b>0-10</b>	n/a	n/a	Threshold of hearing
<b>10-20</b>	n/a	Recording studio	Just audible

<sup>39</sup> The methodology used by the Proponent in their assessment is located in section 5.5.2.3 (pages 5.5-2 to 5.5-4) of the Application.

20-30	Wilderness with no wind or birds	Concert hall (with no music)	Very quiet
30-40	Rural area during the day	Library or typical living room	Quiet
40-50	Suburban residential area	Kitchen with fridge operating	Comfortable
50-60	Urban residential area away from main streets	Noisy business office	Satisfactory speech communication possible
60-70	Business area in large city	Inside car, 50 km/h, closed windows	Telephone use becomes difficult
70-80	Busy street at curbside	Inside car, 50 km/h, open windows	Annoying, interferes with speech communication
80-90	Heavy truck at 15 m	Noisy workshop	Hearing damage threshold for extended exposure

#### 5.4.1 Potential Effects of the proposed Project

##### 5.4.1.1 *Marine Terminal Upgrades*

As shown in Table 17, during construction, the most significant contributor to predicted  $L_d$  levels at all receiver locations would be from pile-driving. While the Proponent expects that proposed Project noise levels at all receptor sites would, at most times, be below the City of Richmond's bylaw limit of 80 dBA, Riverport Way receptors could experience up to and including 80 dBA sound levels at times when pile driving is occurring during proposed Project construction. The potential increase in sound levels during construction would likely be noticeable to people at the receptor sites.

**Table 17. Predicted decibel levels during construction of the Marine Terminal at three receptor sites**

Site No.	Location	Predicted $L_d$ levels (dBA)	Predicted $L_{max}$ levels from pile driving (dBA)	Predicted $L_d$ excluding pile driving (dBA)	Measured baseline $L_d$ weekday (dBA)	Measured baseline $L_d$ weekend (dBA)
1	Riverport Way	75	80	54	52	49
2	10040 No. 6 Road	66	72	47	51	48
3	Deas Island Regional Park	62	68	43	47	46

##### 5.4.1.2 *Marine Facility Operations:*

The primary noise sources during proposed Project operations would be shipboard generators on vessels berthed at the proposed marine terminal and transfer pumps at the fuel receiving facility. Operational noise would be generated both day and night. To

determine the effects of noise associated with proposed Project operations, the Proponent studied dBA and dBC levels. Predicted noise levels were compared to existing  $L_d$  and  $L_n$  levels to determine the potential impact

The Proponent predicted that the operations sound levels would be 46 to 52 dBA and 62 to 68 dBC during the day, and 45 to 53 dBA and 60 to 69 dBC at night, depending on the receptor location studied. These are still within the City of Richmond noise bylaws. Based on the Deltaport Container Terminal Study, approximately 85% of vessels would be quieter than the Proponent’s prediction, and 15% would be noisier.

For the majority of vessels, the A-weighted and C-weighted noise levels produced by shipboard generators would be expected to be within 5 dB of existing ambient levels at the three receiver sites. For the noisiest shipboard generators, A-weighted noise levels would be similar to ambient levels, but C-weighted (low-frequency) noise levels could be noticeably higher than existing ambient levels. Low-frequency noise can more easily penetrate through walls and windows of houses. Increases in noise levels of 5 dB are only slightly perceptible. However, the predicted increases of 7 to 9 dB are likely to be noticeable and potentially disturbing. Weather conditions may result in sound attenuation, resulting in lower noise levels at receiver locations, however this depends on prevailing conditions.

#### 5.4.1.3 Fuel Receiving Facility Construction

As shown in Table 18, as with the proposed marine terminal upgrades, the most significant contributor to predicted daytime noise levels at all receiver locations was from pile-driving during construction of the proposed fuel receiving facility. All predicted noise levels would be less than the COR bylaw noise limit of 80 dB. Noise would occur during daytime hours and for a limited time during the construction period.

**Table 18. Predicted decibel levels during construction of the marine terminal and fuel receiving facility at three receptor sites.**

Fuel Receiving Facility Construction						
Site No.	Location	Predicted $L_d$ levels (dBA)	Predicted $L_{max}$ levels from pile driving (dBA)	Predicted $L_d$ excluding pile driving (dBA)	Measured baseline $L_d$ weekday (dBA)	Measured baseline $L_d$ weekend (dBA)
1	Riverport Way	69	74	54	52	49
2	10040 No. 6 Road	65	70	47	51	48
3	Deas Island Regional Park	56	65	43	47	46

#### 5.4.1.4 *Construction of the fuel transfer and delivery pipelines*

The Proponent determined the noise levels for typical equipment and machinery to be used during construction of the proposed pipeline. For the west side of Highway 99, the Proponent's predicted noise levels ranged from 48 dBA for the noise experienced by the second row of houses from the signal boards and lightning plan and generator, and up to 75 dBA for the noise experienced by the first row of houses from the concrete/industrial saw and backup alarm. For the east side of Highway 99, the Proponent's predicted noise levels ranged from 42 dBA for the noise experienced by the second row of houses from the signal boards and lightning plan and generator, and up to 73 dBA for the noise experienced by the first row of houses from the concrete/industrial saw and backup alarms.

The Proponent does not expect noise from pipeline construction activities to exceed COR's noise bylaw limit of 80 dBA, provided that construction activities are located at least 10 m away from the nearest residential property line. The Proponent expects pipeline construction to last for a day or two at each 100 -200 m section, making any annoyance from pipeline construction short in duration.

#### 5.4.2 Measures to mitigate Noise Effects

##### 5.4.2.1 *Construction Mitigation Measures:*

To address the potential noise effects from the construction activities for the proposed marine terminal upgrades, fuel receiving facility and pipeline, the Proponent would implement the following key mitigation measures:

- Implement a Construction Environmental Management Plan that would include a section on noise control requirements, which specifies maximum allowable noise emissions from equipment and machinery, allowable hours of work, requirements for providing advance notice of pile-driving activity, communicating with the public regarding any construction noise issues that may arise, and procedures for responding to noise complaints (see Part E of this Report).
- Identify and implement procedures and timelines for providing advance notice to potentially affected residences and businesses about pile-driving activities and responding to noise complaints;
- Require a contractor to:
  - Coordinate and schedule activities to minimize overall noise levels and implement the CEMP noise requirements;
  - Construct temporary noise barriers when working in close proximity to noise sensitive areas where no inherent shielding elements are available, where practical;

- Use methods and equipment that produce less noise while doing equivalent work;
- Inform potentially affected residents/communities well in advance of the types of particularly noisy activities, and notify them of changes in the estimates start or completion dates for the various phases of construction; and
- Monitor construction noise in accordance with municipal bylaws.

#### 5.4.2.2 *Mitigation Measures during Operations*

To address the potential noise effects from the operations of the proposed Project, the Proponent would implement the following key mitigation measures:

- Develop and implement a Noise and Nuisance Management Plan that:
  - identifies the procedures for receiving and responding to noise complaints related to the operation of the marine terminal and the fuel receiving facility, including records management which will be kept for a minimum of 6 months; and
  - describes the best management practices to mitigate the noise from operating equipment and vehicles, as requested by Health Canada during the EA.

#### 5.4.3 Residual Adverse Effects

The effects of the proposed Project on sound quality is expected to be within COR's noise bylaw. The predicted noise levels associated with pile-driving activities are close to the upper limit of COR's noise bylaw. The effects of pile driving at the marine terminal and fuel receiving facility would be dependent on existing ambient noise levels, time of day, wind and weather conditions, type of pile-driving (hammer pile-driving is noisier than vibration pile-driving), advance notice to the public and residents in the surrounding area, and successful implementation of recommended mitigation measures. Pile-driving related noise would be short-term and temporary.

The Proponent assessed the cumulative effects of the proposed Project and noted a potential cumulative effect with the Fraser Wharves Ltd. Vehicle Storage Facility Expansion. The effects of the Fraser Wharves Ltd. Vehicle Storage Facility Expansion would be dependent on the same factors as the residual effects of the proposed Project.

A cumulative effect could arise if pile driving was occurring at both facilities at the same time, exceeding COR's noise bylaw. The Proponent requested more information regarding Fraser Wharves Ltd. Vehicle Storage Facility Expansion's construction activities.

To avoid cumulative effects to noise as a result of proposed Project pile-driving if occurring at the same time as pile driving for Fraser Wharves Ltd. Vehicle Storage Facility Expansion the Proponent would:

- Closely monitor noise levels during pile driving and, when necessary, coordinate with Fraser Wharves Ltd. to offset timing of pile driving activities;
- Consult with COR prior to pile-driving to determine the best time to conduct pile-driving activities; and
- Use a vibration pile-driver instead of a hammer pile-driver to reduce associated noise where possible.

City of Richmond was of the view that potential cumulative effects could occur as a result of the proposed Canadian National Rail (CNR)'s Ewen Line<sup>40</sup>. The Proponent noted that a residual effect was only found in for pile driving, during proposed Project construction, and that given CNR's timeline<sup>41</sup>, there was not a potential for sound quality to be affected cumulatively. Should CNR's proposed line move forward, the Proponent suggested that residual noise effects from the proposed Project, if approved, be considered in the cumulative effects assessment that would be undertaken for the proposed CNR Ewen Line.

#### 5.4.4 Significant Effects Analysis

Table 19 provides a significance analysis for potential residual effects to sound quality.

**Table 19. Significance analysis of the residual adverse effects of the proposed Project on sound quality**

VC		Sound Quality
<b>Residual Adverse Effects</b>		Construction noise associated with pile driving
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>• With the exception of pile-driving, the magnitude of the proposed Project's impact to sound quality in construction and operations would be low, below COR's noise bylaw of 80.</li> <li>• The magnitude of the effect from pile-driving would be moderate because sound levels would measure 80 dBA at the Riverport Way receptor site which is the upper limit of COR's bylaw. This would be exceeded if pile-driving from the proposed Project and Fraser Wharves Ltd. Vehicle Storage Facility Expansion occurred at the same time.</li> </ul>

<sup>40</sup> Please see Proponent's Application, section 5.4.

<sup>41</sup> CNR would still need to plan, build and operate the line to interact with the proposed Project.

	Probability	<ul style="list-style-type: none"> <li>The probability of the proposed Project creating noise during construction and operations is high.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>The geographic extent of proposed Project noise would be local.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>Construction noise would occur fairly continuously for the 18 to 24 month period.</li> <li>Noise associated with the pipeline construction would move with construction, limiting noise disturbances in any part of the pipeline to two weeks maximum in duration.</li> <li>Noise generated during operations of the marine terminal and fuel receiving facility would continue for the life of the proposed Project (at least 60 years).</li> <li>The frequency would be 5 to 50 percent of the operations time when vessels would be berthed at the marine terminal, and continuous for the fuel receiving facility pump.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>Construction noise would cease after the construction period.</li> <li>Operations noise at the marine terminal and fuel receiving facility would cease at the end of the proposed Project lifespan.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The area is currently used for industrial purposes and there are currently noise effects.</li> </ul>

#### 5.4.5 Conclusion

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects on sound quality as the Proponent would adhere to the COR's noise bylaw and the largest potential effect (due to pile driving) would be short-term during construction. The Proponent would closely monitor noise levels during pile driving and, when necessary, coordinate with Fraser Wharves Ltd. to offset timing of pile driving activities associated with their Vehicle Storage Facility Expansion.

#### 5.5 Contaminated Sites

In section 5.6 of the Application, the Proponent's contaminated sites assessment focused on identifying known contaminated sites that may interact with proposed Project construction or operations activities to pose a risk or cause an effect.

Section 4.5 of the Proponent's Highway 99 Addendum evaluated the proposed fuel delivery pipeline from Williams Road to Bridgeport Trail. The Proponent's evaluation considers all roadways, waterways, and privately held properties within these areas.

In BC, the management of contaminated sites is done through the Contaminated Sites Regulation under the *BC Environmental Management Act*.

### 5.5.1 Potential Effects of the proposed Project

Contamination from sites outside of the proposed Project footprint would likely migrate to the proposed Project area in groundwater.

Underground utilities can serve as preferential pathways for contaminants to travel. Typically, major utilities follow roadways; contaminants, if present, are likely to travel preferentially along these utility corridors, and parallel to the proposed Project footprint, which will also follow roadways.

Groundwater gradients and contaminant flow gradients in Richmond tend to be low, due to the lack of topographic relief, geology, and boundary conditions, and are strongly influenced by an extensive network of drainage ditches, which generally decrease contaminant mobility. Drainage ditches act as a hydraulic barrier, as contaminants would generally not migrate across the ditches.

The Proponent applied the following risk rankings described in Table 20.

**Table 20. Risk rankings for the Proponent's contaminated sites assessment**

Risk Ranking	Definition
<b>High (1)</b>	Known release of contaminants onsite or a long history of occupation by industrial or specific commercial uses: dry cleaners, landfill operators, gas service stations or auto service.
<b>Moderate (2)</b>	Short occupation by industrial or specific commercial uses: dry cleaners, gas service stations or auto service type operations. Dry cleaners and service stations typically have a fairly high risk of causing contamination, but this is moderated by the short occupation.
<b>Low (3)</b>	History of residential use or short occupation by industrial or commercial sites that typically have little risk of causing significant contamination; photographic laboratory.

#### 5.5.1.1 *Proposed Marine Terminal, Pipeline and Fuel Receiving Facility*

The Proponent found that there would be a low to moderate risk of encountering contamination during construction. The Proponent identified two high risk areas associated with gas service stations at the intersection of No 3. Road and Douglas Street and 7891 Grauer Road.

The existing wharf structure at the marine terminal property was observed as being constructed using fill material of unknown source, posing a moderate risk of being contaminated.

Moderate risk locations are associated with historical streams that may be been filled with contaminated fill. And nearby properties that may be sources of contamination.

The Proponent did not identify any high risk areas for the Highway 99 pipeline route.

#### 5.5.1.2 *Project Operations*

The Proponent's assessment suggests that there would be an unlikely risk of encountering contamination during the operations phase of the proposed Project. However, proposed Project construction may result in the creation of a preferred groundwater flow pathway and conduit for contamination over time. If contaminants are absent during construction, but occur during operations, some contaminants have the potential, at high concentrations, to affect the long-term integrity of the proposed pipeline. The likelihood of this is small and the Proponent would monitor to ensure the integrity of the pipeline.

#### 5.5.2 Measures to Mitigate Potential Effects:

To address the potential effects of pre-existing contaminated sites during construction and operations of the proposed Project, the Proponent would implement the following key mitigation measures:

- The Construction Environmental Management Plan must include a Contaminated Sites Management Plan;
- The Contaminated Sites Management Plan must be consistent with the Technical and Administrative Guidance documents for contaminated sites issued by the Ministry of Environment;
- Avoid high risk contaminated sites, where possible;
- Conduct sediment, soil, soil vapour, groundwater or surface water investigations in high or moderate risk areas;
- Maintain detailed records of contaminated media, classification, volumes, disposal method, and disposal location; and
- Perform ongoing integrity and corrosion monitoring during operations to detect failure of anti-corrosion coatings for the pipeline.

In response to inquiries from the Cowichan Nation Alliance regarding the treatment of contaminated sites, the Proponent clarified that contaminated sites encountered during construction would be remediated to the extent the proposed Project disturbs the site. The authority/land-owner would be notified of conditions adjacent to the proposed Project area and asked to provide a decision on how they wish to proceed in those areas (e.g., remediate, monitor). The Proponent would adhere to the Provincial *Contaminated Sites Regulation*.

### 5.5.3 Management Plans

The Proponent will be required to implement a Contaminated Sites Management Plan. This plan would outline additional investigations required prior to disturbance of soils, as well as management strategies for specific contaminants that may be encountered during construction, or contamination that may occur as a result of construction activities.

The steps for determining if a Contaminated Soil Relocation Agreement is required, and the application for the agreement, would be described. The Contaminated Sites Management Plan would specify the procedures for keeping imported fill out of the receiving environment (watercourses, wetlands, storm water systems), as well as provisions for a sampling program to identify the composition of all soil materials to be excavated. Based on this, the Proponent's contractor would identify appropriate on-site or off-site land disposal locations for excavated soils, and ensure that all material would be disposed of according to the BC *Environmental Management Act*.

### 5.5.4 Residual Adverse Effects

EAO and VFPA have not identified potential residual adverse effects, given:

- The Proponent would avoid sites identified as high risk of contamination where possible;
- If the Proponent identified soil and groundwater contamination during proposed Project construction, this would lead to remediation. This would have a net positive effect as any encountered contamination would be identified, managed and addressed;
- The proposed Project may create a preferred groundwater pathway along the pipeline route. The impact of this could be negative if this changes the migration of contaminants in the area. However, given the large number of other similar utility corridors, and low groundwater gradients, the proposed Project would be unlikely to materially increase the migration of existing contamination; and
- The risk of degradation of anti-corrosion coating on the pipeline due to existing contaminants would be dependent on the type and amount of the contaminated substance in the substrate in which the pipeline would be located. This would be a very small risk.<sup>42</sup>

Since the residual effects of the proposed Project would not be adverse, EAO has not performed a cumulative effects assessment or significant adverse effects analysis.

---

<sup>42</sup> The probability and consequence of a potential aviation fuel spill from the proposed pipeline is assessed in Part D of this Report. This section also includes measures that the Proponent would use to reduce to the probability of a spill and respond to a spill.

### 5.5.5 Conclusion

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate) EAO and VFPA are satisfied that the proposed Project is not likely to disturb high risk contaminated sites that could result in a significant adverse effect on the environment surrounding proposed Project components. The Proponent would be required to adhere to applicable regulations in identifying and remediating any contaminated sites encountered. Remediation contamination could have a net positive effect, as any encountered contamination would be identified, managed and addressed.

## **6 Economic Effects**

The Proponent conducted an economic assessment focused on the potential effects on economic development from the proposed Project in COR, the Corporation of Delta, and the South Arm of the Fraser River. Metro Vancouver, BC, and Canada were also considered where broader economic effects are expected.

The Proponent chose an LSA of Richmond, including Lulu Island and Sea Island, the Corporation of Delta, including Ladner and Tsawwassen; and areas within and adjacent to the lower Fraser River, including the South Arm navigation channel. The LSA for the pipeline route was the Highway 99 right-of-way between Williams Road to Bridgeport Trail and its surrounding residences, farmlands, parks, businesses, and communities.

Where the proposed Project could have broader social and economic implications for Metro Vancouver, the Proponent considered a broader RSA, as well as including BC and Canada, where relevant.

The Proponent considered GDP, government revenues, demographics, economic activity at YVR, VFPA operations, and commercial fishing activity (level of catch and value) in their assessment<sup>43</sup>.

### City of Richmond:

Industries important to Richmond's economy include YVR, which contributes \$22 million per year in tax revenues to municipal governments, of which, \$11.8 million are in grants in lieu of taxes<sup>44</sup>; agriculture, with 172 farms, grossing \$40.5 million<sup>45</sup>; technology;

---

<sup>43</sup> The Proponent's socio-economic assessment is included in section 6.2.3 to 6.2.5 (pages 6-3 to 6-6) of the Application.

<sup>44</sup> Vancouver Airport Authority 2006

<sup>45</sup> Statistics Canada 2006

wholesale and distribution; retail sales; Asian market retailing; and tourism and visitor services.

Richmond has 8.2% of Metro Vancouver's population, and 7.9% of Metro Vancouver's employed labour force. In 2006, 108,095 jobs with a fixed place of work were located in Richmond, with 49.5% of those jobs filled by the local labour force.

Approximately 6000 YVR employees live in Richmond. The median family income in Richmond in 2006 was \$61,627, and the average individual income was \$31,720, with 92,475 people in the labour force in 2006.

#### Corporation of Delta:

The Corporation of Delta's economy includes employment in the transportation, manufacturing, agriculture, retail sales, and tourism sectors. Delta has 180 farms with a total 2006 gross of \$190 million. The Corporation of Delta has 4.6% of Metro Vancouver's population, and 4.8% of Metro Vancouver's employed labour force.

#### Vancouver International Airport:

YVR is Canada's second-busiest airport after Toronto International Airport, and is the second largest international passenger gateway on the west coast of North America. An economic impact assessment conducted for YVR, based on 2005 passenger and air traffic data, estimates that ongoing airport operations generate 26,700 direct jobs, representing 23,800 person years of direct employment (see

Table 21). The 360 employers and approximately 90% of the 26,700 direct airport-related jobs are located on Sea Island. The other 10% are located in Richmond, Vancouver and surrounding municipalities.

YVR has capital investment programs that generated 410 person years of construction employment in 2004, and over 1,000 person years of employment annually between 2005 and 2010 (based on 5,200 person years for approximately five years).

In 2010, the provincial government eliminated aviation fuel taxes for international flights. The 2005 Economic Impact Statement for YVR indicated that 30% of passengers connect through YVR to their final destinations. Each new daily international service to YVR generated between 102 to 190 person years of direct employment, between \$5 million and \$8.9 million in wages, and between \$8 million and \$15 million in provincial GDP.

**Table 21. Economic Impacts of YVR**

YVR Operations and Impacts	2005 (employment)		2005 (\$ Billion)		
	Employment	Total jobs	Person years	Wages	GDP
Direct	26,700	23,800	\$1.1	\$1.7	\$3.4
Indirect	13,100	11,700	\$0.4	\$0.6	\$1.9
Induced	12,600	11,200	\$0.5	\$0.8	\$1.5
Total	52,400	46,700	\$2.0	\$3.1	\$6.8
YVR Operations:	2005	2008		2009	
		2008	% change 2005 to 2008	2009	% change 2005 to 2009
Millions of passengers	16.4	17.9	9%	16.2	-1%
Runway aircraft movements	275,164	278,796	1%	258,272	-6%

Up to 60,000 passengers pass through YVR on a busy day. Ongoing airport-related activity contributed \$680 million in tax revenue contributions to all levels of government in 2006, including \$504 million to the federal government, \$154 million to the provincial government, and \$22 million to municipal governments, of which \$11.8 was paid in grants in lieu of property taxes.

Vancouver Fraser Port Authority Activities:

Port Metro Vancouver is the largest port in Canada, and the fourth largest by tonnage in North America. In 2009, VFPA reported foreign vessel traffic to be 2,791 arrivals, representing 101.9 million metric tonnes of gross registered tonnage. Between 2007 and 2009, aviation fuel accounted for approximately 1% of total cargo tonnage, while total petroleum products, including aviation fuel, accounted for an average of 6% of total cargo tonnage. In 2009, VFPA reported 255 tanker calls, of which 100 tankers carried petroleum products. Currently, aviation fuel shipments from offshore sources (40% of YVR's aviation fuel needs) are delivered and off-loaded at Westridge Marine Terminal on Burrard Inlet in Burnaby.

The movement of 7.27 million metric tonnes of petroleum products reported for VFPA in 2008 primarily includes shipments to and from Burrard Inlet. In the South Arm of the

---

<sup>46</sup> Economic output is the gross value of the services provided and corresponds approximately to the gross revenues collected by airport businesses.

Fraser River, petroleum product shipments of approximately 150,000 metric tonnes a year consists primarily of bunkering traffic<sup>47</sup>.

The only major terminal facility that accommodates large deep sea foreign vessels in the lower South Arm is Fraser Wharves, located on Steveston Highway in Richmond, just west of the marine terminal. Other large stevedoring and distribution facilities along the South Arm of the Fraser River include:

- Canadian Forest Products International Distribution Centre, a large covered lumber re-load facility in Richmond;
- Coast 2000 Terminals Ltd, a logistics service provider for the pulp and paper industry and various ocean carriers located in Richmond;
- Tilbury Terminal of Seaspan Coastal Intermodal, a daily freight ferry service between Tilbury Island and Nanaimo and Swartz Bay on Vancouver Island;
- Fraser Surrey Docks Limited Partnership, located on the Fraser River that annually handles between 300 and 400 deep sea vessels up to Panamax-class size.

A 2002 FREMP report concluded that compared to trucking, barging represented approximately one-tenth the costs of transport and one-twentieth the environmental costs.

#### Fraser River-based Commercial Fisheries<sup>48</sup>:

Fish species that are commercially harvested in the Fraser River include five Pacific salmon species (Sockeye, Coho, Chinook, Pink, and Chum). Sockeye is the largest fishery. Species that are harvested in the Strait of Georgia, near the mouth of the Fraser River include rockfish, sablefish, hake, herring, Dungeness crab, geoduck and prawn.

In 2008, the value of BC's commercial salmon catch was \$21.5 million, approximately 10% of the overall value of the wild fisheries commercial catch of \$225.2 million. The Fraser River catch was \$0.445 million, representing 2.1% of the total value of BC's commercial salmon fishery. The 2008 value represents a multi-decade low, contrasting greatly with the \$312 million peak in 1988.

In recent years, the productivity of key Sockeye runs has declined, possibly due to a combination of decreased ocean survival rates, habitat loss and degradation, over-fishing, and below average river discharge levels, and higher water temperatures during

---

<sup>47</sup> Supply of fuel to ships moored in the Fraser River.

<sup>48</sup> Section 5.1 of this report assesses the potential physical impacts of the proposed Project to fish in the Fraser River, and Part C of this report discusses the Aboriginal rights of the First Nations who use the Fraser River for food, social, and ceremonial fisheries.

upstream migrations. In some years, including 2007 to 2009, the commercial sockeye fishery was closed, to allow for spawning escapement requirements of specific runs, and to provide fish for First Nations' food, social and ceremonial fisheries. The commercial sockeye fishery was reopened in 2010 for several days, due to the largest salmon run since 1913.

The Cohen Commission<sup>49</sup> was established on November 5, 2009 to investigate and report on the decline of sockeye salmon in the Fraser River and make recommendations for improving the future sustainability of the sockeye salmon fishery in the Fraser River, including, as required, any changes to the policies, practices and procedures of Fisheries and Oceans Canada in relation to the management of the Fraser River sockeye salmon fishery.

Commissioner Cohen's final report was tabled in Parliament and publically released October 31, 2012. The three volume, 1200 page report, "The Uncertain Future of Fraser River Sockeye", includes 75 recommendations on the sustainability of the fish and changes to the federal Department of Fisheries and Oceans (DFO).

Commissioner Cohen report's primary focus is on policies, practices and procedures of DFO as they affect Fraser River sockeye (and Environment Canada).

General findings include:

- Risks to Fraser River sockeye salmon are real, but not well understood and further research is required;
- There is no single cause for the Fraser River sockeye salmon decline. However, cumulative impacts of climate change and downstream impacts from human activities are significant;
- Although there is no evidence of fish farms (e.g., disease or sea lice) as a singular cause of the decline, DFO should limit net-pen salmon farming in the Discovery Islands until 2020; and
- DFO should fully implement the 2005 Wild Salmon Policy and the 1986 Habitat policies.

Commissioner Cohen's report includes recommendations about provincial responsibilities including: forestry; Riparian Area Regulation (RAR); water use and Water Act Modernization (WAM); habitat; pesticides (Forestry and Agriculture); agriculture, mining, sediment management; water and waste water management;

---

<sup>49</sup> [www.cohencommission.ca](http://www.cohencommission.ca)

salmon aquaculture (fish health and tenure siting); First Nations issues; and socio-economic aspects of fisheries in BC.

Of relevance to the EA for the proposed Project, Commissioner Cohen’s report recommends that:

- DFO should identify an individual in DFO who has regional responsibility to act as a liaison with the Canadian Coast Guard, Environment Canada, and the Province of British Columbia on marine habitat spill response. EAO understands that coordination of spill response is the subject of current discussions between provincial and federal agencies; and
- DFO should clarify Food/Social/Ceremonial definition and clarify allocations for First Nations. EAO notes that these allocations would likely be used to determine the level of compensation in the event of a major spill.

EAO understands that provincial agencies are currently working with federal departments to further review Commissioner Cohen’s recommendations and that this will continue over the coming months.

Potential impacts to recreational fisheries are described in section 7 of this report.

## 6.1 Potential Economic Effects of the proposed Project

Chapter 6 of the Proponent’s Application includes an assessment of the economic effects of the proposed Project. VFPA reviewed the analysis and did not have substantial comments but noted that more detail would be required during the permitting stage.

### 6.1.1 Construction

The potential economic effects during construction from the proposed Project are provided in Table 22. The capital costs of the proposed Project would range between approximately \$93 million and \$108 million. Construction of the proposed Project would be expected to result in an estimated 762 person years of direct, indirect and induced employment in BC, based on a conservative estimate of \$80 million in construction expenditures.

**Table 22. Estimated proposed Project employment, GDP, and tax impacts (2009 estimate).**

Economic effects from the proposed Project	Estimated effects from Construction (\$ million)			
	Employment (person years)	GDP factor cost (\$ million)	Federal taxes (\$ million)	Provincial taxes (\$ million)
Direct	320 or 160 person years per year for two years	\$21.5	\$2.9	\$3.5

Economic effects from the proposed Project	Estimated effects from Construction (\$ million)			
	Employment (person years)	GDP factor cost (\$ million)	Federal taxes (\$ million)	Provincial taxes (\$ million)
Indirect	330	\$23.4	\$2.0	\$1.4
Induced	112	\$8.0	\$1.1	\$1.2
Total (2009)	762	\$52.8	\$6.0	\$1.2
Multipliers based on other major infrastructure projects	Multipliers per \$ million of construction expenditures			
	Person years per \$ million	GDP factor cost (\$ million)	Federal taxes (\$ million)	Provincial taxes (\$ million)
Direct	4.00	\$0.27	\$0.04	\$0.04
Indirect	4.13	\$0.29	\$0.03	\$0.02
Induced	1.40	\$0.10	\$0.01	\$0.01
Total (2009)	9.53	\$0.66	\$0.08	\$0.07
Total Capital Cost (2009)	\$80 million	-		

The estimated 762 person years of direct, indirect, and induced employment represents less than one percent of the Richmond labour force, and less than 0.07% of the Metro Vancouver labour force. The proposed Project would provide YVR with access to more dependable, diverse and competitive offshore fuel supply sources to meet YVR's long-term fuel requirements, and assist with the general economic competitiveness of Metro Vancouver, BC, and Canada.

### 6.1.2 Operations

During operations, the proposed Project would generate approximately 14 full time equivalent jobs, excluding person years for offloading vessels at the proposed marine terminal. The increased employment from the proposed Project operations would not likely have a noticeable effect on the economies of local communities.

In the event of a spill, economic impacts on the commercial fishery could occur. See Part D of this Report for the potential risk and the consequences to aquatic resources in the event of an aviation fuel spill.

If the proposed Project proceeds, the incremental increase in vessel movement on the river would be minor and would be subject to the regulation by Transport Canada and VFPA<sup>50</sup>.

The Proponent will be required to notify affected First Nations of the arrival and departure of a vessel delivering aviation fuel to the marine terminal at least 24 hours before the scheduled arrival and departure of that vessel in the South Arm of the Fraser River. The notice time may be reduced, from time to time, to the extent necessary to

---

<sup>50</sup> Vessels would also be piloted by the qualified Fraser River Pilots, who are familiar with the characteristics and navigation requirements for the Fraser River.

adjust to circumstances beyond the reasonable control of the Proponent related to the vessel's movement, but not reduced below 12 hours. For the purpose of this condition, an affected First Nation is any aboriginal organization which had been consulted during the environmental assessment of the Project and to which DFO has issued a communal fishing license, Tsawwassen Harvest Documents, or other aboriginal community-based authorizations or commercial fishing license allowing members of an aboriginal community to fish on the South Arm of the Fraser River on the day of the arriving vessel. Specifics for notification procedures must be determined before the start of Project operations.

### 6.1.3 Residual Adverse Effects

The direct effects of the proposed Project on local and provincial economies would be largely positive during the 18 to 30 months of construction due to labour requirements as well as due to the approximately 14 full-time equivalent jobs and potential economic development as a result of increased capacity at YVR during operations.

The proposed Project would result in the loss of jobs due to changing the existing delivery system away from using tanker trucks from Cherry Point in the USA. The loss of 10-12 trucking jobs is not expected to be a residual effect as the trucking jobs are not currently held by BC or Canadian citizens.

In the event of a spill, there could be negative economic effects, particularly to the commercial fishing industry. These effects are explored further in Part D of this report.

Since the residual effects of the proposed Project would have a net positive economic effect, EAO and VFPA did not perform a cumulative effects analysis or a significance analysis on this VC.

### 6.1.4 Conclusion

Based on the above analysis EAO and VFPA are satisfied that the proposed Project is not likely to have a residual adverse effect on local and provincial economies. The proposed Project would have positive economic effects including the creation of an estimated 762 person years of direct, indirect, and induced employment in BC during construction and 14 full-time equivalent positions for the operating life of the proposed Project. The proposed Project would contribute positively to the municipal, provincial, and federal economies employment, as well as contributions to GDP and provincial and federal taxes.

## 7 Assessment of Potential Social Effects

The Proponent's social effects assessment is described in section 6 of the Application<sup>51</sup>. Figure 7 provides a map of the key socio-economic features that were considered in the assessment.

The Proponent chose an LSA for the social effects assessment of Richmond, including

- Lulu Island and Sea Island;
- Delta, including Ladner and Tsawwassen; and
- Areas within and adjacent to the lower Fraser River, including the South Arm navigation channel.

---

<sup>51</sup> Please refer to the Application, (section 6.2.3 to 6.2.5 (pages 6-3 to 6-6)) for a full description of the Proponent's methodology.

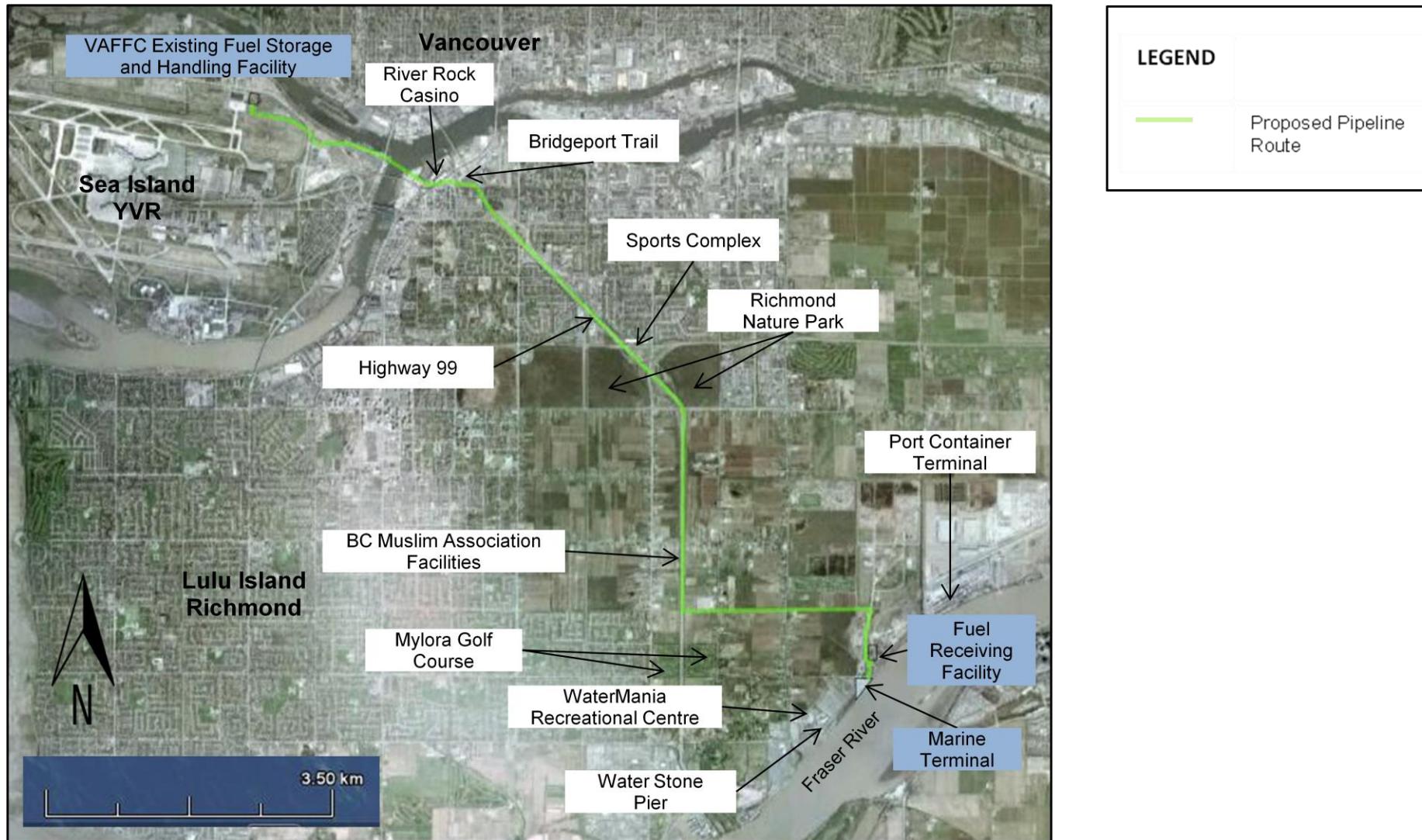


Figure 7: Map of proposed Project and key socio-economic sites

For the Highway 99 pipeline alignment, the LSA was the Highway 99 right-of-way between Williams Road and Bridgeport Trail and its surrounding residences, farmlands, parks, businesses, and communities.

Where the proposed Project could have broader social implications for Metro Vancouver, the Proponent considered a broader RSA, as well as including BC and Canada, where relevant.

The Proponent assessed social impacts within the temporal boundaries of 18 to 30 months for proposed Project construction, including 12 months for the pipeline route, and 60 years for proposed Project operations.

### 7.1.1 Valued Components

The Proponent identified the following VCs through the characterization of socio-economic background conditions:

- Land Use:
  - Conformity with existing land use and Official Community Plans;
  - Property Acquisitions and Property Value;
  - Railway Rights-of-way - effects on railway operations from track crossings; and
  - Utilities – changes resulting from pipeline corridor utility crossings or utility displacement.
- Vehicle Traffic and Mobility:
  - Changes in traffic volumes;
  - On-street parking; and
  - Bicycle and pedestrian traffic and mobility.
- Community Features, and recreation activities:
  - Changes to access and enjoyment;
  - Street and trail trees;
  - Marine traffic; and
- Aesthetic Values and Visuals.

Noise and other health-related issues are discussed in sections 5.3 and 5.4 of this report.

## 7.2 Land Use

This section of EAO and VFPA's social effects assessment details the background information, potential effects, including public input, and mitigation measures for the VCs of land use and community plans, property acquisitions and property value, railway right-of-ways and utilities for the marine terminal, proposed fuel receiving facility, and

proposed pipeline route. In the Proponent's Application, the term "property value" referred to market value, which is driven by the "highest and best use" of a property. This may be different than the use and enjoyment value of a property to its owner.

#### Marine Terminal:

The marine terminal property is zoned I1 industrial<sup>52</sup> under COR's zoning bylaw, and designated for business and industry use under COR's Official Community Plan. The surface water drainage ditch along Williams Road on the north outside property boundary is designated by COR as a Riparian Management Area, with a five metre development buffer.

Residential and hotel uses nearest to the marine terminal include:

- Six houses along Triangle Road/Williams Road, 500 to 700 m west of the marine terminal;
- Sixteen houses along No. 6 Road, approximately 1 km west of the marine terminal;
- One four-storey hotel near No. 6 Road, approximately 1 km southwest of the marine terminal; and
- 139 units in three buildings in the Waterstone Pier condominium complex, 500 to 700 m downstream from the marine terminal along the waterfront.

#### Fuel Receiving Facility:

The proposed fuel receiving facility is part of approximately 280 ha of the Fraser Richmond Port lands. Under the former Fraser River Port Authority Land Use Plan, the site is designated for industrial uses associated with port operations. VFPA indicated to the Proponent that the proposed fuel receiving facility would comply with the existing Land Use Plan. Land immediately surrounding the proposed fuel receiving facility location is largely undeveloped and zoned for industrial uses, and beyond that, land is designated for agricultural use.

The nearest residential zoning is approximately 1 km southwest along the foreshore, where a condominium development was constructed in a City comprehensive development zone (CD/134).

---

<sup>52</sup> The zone provides for a broad range of general and heavy industrial uses, with a range of compatible uses. See City of Richmond for more details:  
[http://www.richmond.ca/\\_shared/assets/I23997.pdf](http://www.richmond.ca/_shared/assets/I23997.pdf)

### Pipeline:

From Francis Road to the Westminster Highway, the pipeline route would run along Highway 99, adjacent to the Mylora golf courses and large properties zoned for agriculture and Assembly uses. Those property parcels generally have no buildings located near the Highway 99 frontage. One farmhouse fronting Blundell Road is located close to the Highway 99 right of way eastern boundary, but approximately 65 m from the current Highway 99 travel surface.

From Westminster Highway to Bridgeport Trail, the pipeline route continues along Highway 99 between the west and east portions of Richmond Nature Park. Existing developments near Highway 99 include 62 homes that are adjacent to Highway 99 or to city streets immediately parallel to Highway 99. Existing developments also include industrial, commercial or retail buildings, including buildings on the southwest side of Highway 99 with a single vehicle access point, Sportstown<sup>53</sup>, light industrial and automotive retail developments as well as a hotel and other large commercial buildings.

Much of the area has been recently heavily disturbed by construction of the Canada Line guideway and related infrastructure.

The pipeline route then crosses under the Middle Arm of the Fraser River to reach Sea Island and then follows existing airport service roads to reach the fuel facilities at YVR. Existing developments along this segment of the pipeline route include roadways, bridge approaches, overpasses, a small moorage facility, and a vacant office building.

#### 7.2.1 Potential Effects of the proposed Project

##### Land Use Plans:

As the marine terminal and fuel receiving facility would be on industrially-zoned land, no adverse effects to land use are expected from the proposed Project. No zoning changes would be required to construct the proposed Project. Recreational uses of the proposed Project area are included in section 7.4: Community features and recreation activities.

##### Property Acquisitions and Property Value:

The Proponent owns the marine terminal property and would lease the site of the proposed fuel receiving facility from VFPA.

The Proponent does not expect to require the acquisition of properties along the proposed pipeline route. Renting temporary workspaces at the sites of horizontal

---

<sup>53</sup> a local sports complex.

directional drilling may be required. Rental agreements are likely to require that business access is maintained throughout construction and would limit effects, such as site contamination, after construction.

During the public comment periods, concern was raised by the public regarding the effects of the proposed pipeline on property values. The Proponent does not expect the proposed Project construction to impact long-term property values. However, short-term liquidity of property could be impacted by proposed Project construction. Between 66 and 74 residences have the potential to be adjacent to the overall proposed pipeline route

During operations, the Proponent expects that there may be some short-term negative effects on property values along the proposed pipeline corridor if an accident or malfunction with the pipeline were to occur.

The Proponent expects that in the medium to long-term (beyond three years of such an incident), any potential negative perception associated with the fuel delivery pipeline would be expected to have dissipated. As a result, no mitigation measures are proposed.

#### Railway Right of Way:

The proposed Pipeline would traverse under the current CNR rail right-of-way parallel to the Shell Road corridor north of Highway 91 at the Shell Road/Highway 99 overpass. The proposed pipeline route would cross Vanguard Street, the railway tracks, potentially the Shell Road bike path and Shell Road. The Proponent would likely use trenchless pipeline construction for crossing under active railway tracks. Construction on those crossings would likely take approximately one week to complete, perhaps more for the Shell Road crossing as it is more complex. The Proponent estimates that crossing the CNR rail right-of way at the Shell Road/Highway 99 overpass would not have any effect on existing railway traffic, as there are existing plans to decommission the CNR railway along Shell Road, and existing rail traffic is limited.

#### Potential Disruption of Utilities:

The Proponent expects the following utilities crossings for the proposed pipeline:

- High capacity power line: parallels Highway 99 on the east side from the Williams Road easement north to Shell Road; a 10 m separation between the power line and the proposed pipeline would be required;
- Kinder Morgan fuel delivery pipeline: trenchless pipeline construction would likely be required;

- Gas line and fibre optic cable: north of Williams Road easement along the east shoulder of Highway 99;
- Water lines and gas lines: along Blundell Road and Westminster Highway; and
- Various utilities including water and gas lines: beneath Vanguard Road and Shell Road.

The final number of utility crossings would be determined during the detailed design stage of the proposed Project.

### 7.2.2 Measures to mitigate potential impacts

To mitigate potential impacts to land use, the Proponent would be required to develop a communication strategy as part of the Traffic Management Plan for the construction phase of the proposed Project to keep First Nations, government agencies and the public informed of the status and activities. Plans for crossing of utilities and rights-of-way must be developed with stakeholders and appropriate regulators.

### 7.2.3 Residual Adverse Effects

Based on the analysis above, EAO and VFPA have identified a potential residual effect of to land use. Specifically, the pipeline construction would potentially affect property acquisitions and property values, railway rights-of-way and utilities.

### 7.2.4 Significance Analysis

Table 23 provides the analysis of significance residual land use effects of the proposed Project.

**Table 23. Significance analysis of residual adverse land use effects.**

VC		Property values and acquisition
<b>Potential residual effect</b>		<ul style="list-style-type: none"> <li>• Pipeline construction may affect short-term liquidity of homes.</li> <li>• Short-term use of private property as temporary workspace may be required to use during proposed pipeline construction</li> </ul>
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>• The magnitude of impacts to property acquisitions and property value would be during the 12 month construction period.</li> </ul>
	Geographic extent	<ul style="list-style-type: none"> <li>• 66 to 74 residences located in proximity to the pipeline right of way and 22 houses, one 4-storey hotel and 139 residential units in a condominium complex are located 1 km away from the marine terminal and fuel receiving facility.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>• The probability of construction of the proposed pipeline having residual effects to property acquisitions and property value is moderately likely.</li> </ul>
	Duration and	<ul style="list-style-type: none"> <li>• Ongoing during the 12-month construction period.</li> </ul>

	frequency	
	Reversibility	<ul style="list-style-type: none"> <li>The effects of construction of the pipeline to liquidity and the use of private property would be reversible after construction. The Proponent would remediate land affected by construction to its base case or better.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The context of Highway 99 is disturbed; utilities run down that corridor and it is a major transportation thoroughfare.</li> </ul>
<b>VC</b>		Railway rights of way
<b>Potential residual effect</b>		Railway right-of-way and crossing of tracks near Shell Road and the Moray Channel leading to potential disruptions
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude is expected to be low, provided trenchless techniques are used.</li> </ul>
	Geographic extent	<ul style="list-style-type: none"> <li>The proposed pipeline would traverse under the current CNR rail right-of-way parallel to the Shell Road corridor north of Highway 91 at the Shell Road/Highway 99 overpass. The proposed pipeline route would cross Vanguard Street, the railway tracks, potentially the Shell Road bike path and Shell Road.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>There is a high probability, given crossing is required for pipeline construction.</li> </ul>
	Duration and frequency	<ul style="list-style-type: none"> <li>The duration of the pipeline construction affecting railway rights of way would be approximately 1 week for each crossing. The frequency would be one time for each crossing.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The effects of construction of the proposed pipeline to railway rights of way would not be reversible for the actual pipeline infrastructure, as it would remain under railway rights of way. Construction activity would be reversible once construction ceases.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The context of the railway rights of way with regard to crossings by pipelines is unknown and will be dependent on the final detailed design.</li> </ul>
<b>VC</b>		Utilities
<b>Potential residual effect</b>		Pipeline corridor utility crossings or utility displacement, leading to disruptions
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude of the proposed pipeline's impacts to utilities would be low.</li> </ul>
	Geographic extent	<ul style="list-style-type: none"> <li>The geographic extent would be local: <ul style="list-style-type: none"> <li>Highway 99 on the east side from the Williams Road easement north to Shell Road;</li> <li>Kinder Morgan fuel delivery pipeline;</li> <li>North of Williams Road easement along the east shoulder of Highway 99;</li> <li>Blundell Road and Westminster Highway; and</li> <li>Beneath Vanguard Road and Shell Road.</li> </ul> </li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of the proposed pipeline crossing utilities is high.</li> </ul>
	Duration and frequency	<ul style="list-style-type: none"> <li>The duration of the pipeline construction affecting utilities would be as long as the pipeline would be in the ground. The frequency would be ongoing.</li> </ul>

	Reversibility	<ul style="list-style-type: none"> <li>The pipeline crossing and utility displacement would not be reversible.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The context of the Highway 99 corridor is disturbed, as a number of utilities are in that area.</li> </ul>

### 7.2.5 Conclusions

EAO and VFPA considered the following:

- The proposed Project would not require rezoning;
- Property values would be unlikely to be affected, and then only for a short-term duration during construction of the proposed pipeline. Property values could be temporarily affected in the unlikely event of an accident or malfunction. These are discussed in Part D of this Report.
- There would be limited, if any, impacts to railway right-of-ways;
- Any utility service disruptions during pipeline construction would be temporary; and
- The Proponent would implement a communications strategy as part of the CEM Plan to ensure advance notice is provided for any scheduled disruption.

Based on the analysis of potential adverse effects and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects on land use.

### 7.3 Vehicle Traffic and Mobility

This section of EAO's social effects assessment details the background information, potential effects, including public input, and mitigation measures for the following VCs: changes in traffic volume, on-street parking, and bike and pedestrian traffic and mobility from the construction and operation of the marine terminal, proposed fuel receiving facility, and proposed pipeline route.

Northbound and southbound total traffic counts for the portion of Highway 99 that crosses Lulu Island in Richmond ranges between 60,000 and 80,000 vehicles per day. The average annual week day traffic averages for three of the ramps is between 6,000 and 12,000 vehicles per day. Highway 99 generally has three lanes of traffic each way, including one high-occupancy vehicle/bus lane. Traffic along Highway 99 is busier on weekdays than weekends, and busier between 6 am and 6 pm. Between the Williams Road easement and Blundell Road, Highway 99 is relatively narrow, and proposed pipeline construction could temporarily disrupt the operation of one bus lane / high occupancy vehicle lane in that area during construction.

### 7.3.1 Potential Effects of the proposed Project

#### 7.3.1.1 *Change in Traffic Volumes*

##### *Proposed Marine Terminal and Fuel Receiving Facility*

Construction of the fuel receiving facility and the marine terminal upgrades would increase motor vehicle and truck traffic on Steveston Highway, No. 6 Road, and Triangle Road. The Proponent determined that construction of the fuel receiving facility and the marine terminal upgrades would not affect vehicle traffic to and from the Riverport Recreation and Entertainment Complex or the condominium complex located on Riverport Way. Construction would increase motor vehicle traffic on Dyke Road, Portside Road, and other roads east of the marine terminal. The Proponent predicts that this increase would not be noticeable when compared to other industrial traffic in the area.

##### *Proposed Pipeline*

During the EA, the public raised concern regarding the potential impact of the proposed Project on vehicle traffic (increased traffic congestion) on Highway 99. Construction of the proposed pipeline would likely result in vehicle and mobility restrictions, restricted access, increased noise, and effects to landscaping and sidewalks, depending on the final alignment along the Highway 99 corridor. Each 100 m of pipeline construction would typically require one day of construction. In areas where trenchless construction techniques are required (e.g. directional drilling), construction would be slower. The Proponent estimates that the proposed pipeline construction would take approximately 12 months. Construction of the pipeline would likely result in temporary disruptions to Highway 99 traffic including bus traffic, changes in traffic patterns away from Highway 99 to Richmond city streets, and potential disruption to city streets such as Vanguard Road, Patterson Road, and St. Edwards Drive.

The Proponent would consider the known expansion and upgrade plans for Highway 99 in their final alignment plans, including a potential interchange at Blundell Road, replacement or expansion of the Oak Street Bridge, and replacement or expansion of the George Massey Tunnel and Steveston Highway interchange in their detailed design.

Pipeline maintenance may periodically disrupt traffic for short periods of time.

The need for aviation fuel trucks to YVR will be eliminated as a result of the proposed Project.

### 7.3.1.2 *On-Street Parking:*

The Proponent states that construction of the marine terminal upgrades, fuel receiving facility and fuel transfer pipeline would occur primarily on property owned by the Proponent or leased from VFPA, and should not have impacts on on-street parking or roadside parking.

Construction of the proposed Highway 99 pipeline alignment could potentially affect parking on Vanguard Road, St Edwards Drive or Patterson Road. The Proponent expects the effects of the proposed pipeline route construction on on-street parking to be low as it would be isolated to a few road segments at a time and be short-term in duration.

During operations, the Proponent does not expect effects to on-street parking due to the proposed Project.

### 7.3.1.3 *Bicycle and Pedestrian Traffic and Mobility*

Bicycle and pedestrian traffic under Highway 99 near Shell Road and going onto the Highway 99 Oak Street Bridge sidewalk from the Patterson Road bicycle path may be disrupted by construction.

## 7.3.2 Measures to mitigate potential Effects

To address the potential effects of the proposed Project during construction and operations, the Proponent would implement the following key mitigation measures:

- Develop and implement a Traffic Management Plan (TMP) in accordance with Chapter 9 of the Application. The TMP must:
  - follow the “Traffic Control Manual for Work on Roadways” (Ministry of Transportation and Infrastructure (MOTI) 1999) where the Project activities occur within MOTI jurisdiction, and the City of Richmond Planning and Development Department guidelines where the Project activities occur within the City of Richmond’s jurisdiction; and
  - include a communications strategy to inform stakeholders, including the public and government agencies, about construction progress and identify methods for providing feedback on issues and concerns.

Given the proposed Project’s traffic and mobility effects during construction would interact with other existing and future projects and activities (including and in addition to the cumulative effects inclusion list in Table 1) EAO and VFPA note the following:

- Consideration of current and future project/activities that may impact traffic VCs within the project area and pipeline corridor is required to manage cumulative

impacts. As a result, the Proponent will be required to coordinate and communicate their construction plans and schedule with MOTI and COR;

- Tools, approaches and measures to manage traffic-related impacts need to be developed in advance of construction. As a result, the Proponent will be required to articulate these in a Traffic Management Plan; and
- Given the existing traffic in the proposed Project area, communication to the public, government agencies and stakeholders is required.

It is EAO and VFPA's view that these additional measures are required in light of the existing and future project/activities that may interact cumulatively to traffic impacts with the proposed Project activities.

### 7.3.3 Management Plans

The Proponent's Traffic Management Plan would be separate from their CEM Plan. The Traffic Management Plan would be created by the Proponent's contractor, and reviewed and approved by the Proponent.

The Traffic Management Plan would:

- Include consideration of:
  - motor vehicle, bicycle, and pedestrian traffic, time of day, day of week and seasonal sensitivities, as well as a communication strategy to publicize any likely delays and signage indicating alternate routes, if required;
  - the construction schedule and hours of work, to minimize effects of construction traffic;
- Address parking concerns for construction staff;
- Outline equipment staging, and identify and describe noise control measures and routes for construction-related traffic to reduce the amount of construction-related traffic in neighbourhoods, especially where schools, hospitals, parks, recreation facilities, and other public gathering places are located;
- Describe safety issues associated with specific construction activities and stages;
- Identify types of vehicles and volumes of construction traffic expected with regard to each construction stage;
- Develop a communications strategy to provide information on how members of the public, including First Nations and regulatory agencies and other stakeholders would be kept informed of construction progress in order to maintain the flow of pedestrian, cycle, and vehicle traffic, minimize effects to local residents and businesses, and avoid traffic delays;
- Include the following four additional sub-plans:
  - *Traffic Control Plan* to define: what traffic control measures would be provided by the Proponent during construction within the Highway 99

right-of-way, how those measures would be implemented and the schedule for these measures, including work zone size and location, schedule of lane closures, speed advisories throughout the work zone, and temporary traffic control signals;

- *Public Information Plan* to identify: actions and procedures to inform the travelling public, relevant stakeholders and MOTI of planned changes to traffic operations along Highway 99, including notices to the travelling public in media outlets, signs and public and stakeholder meetings;
- *Incident Management Plan* to identify: the Proponent’s actions and procedures for detection and response to unplanned events or incidents to safeguard the public and restoring traffic flow as quickly as possible; and
- *Implementation Plan* to identify: responsibilities and procedures for development and implementation of the traffic management component plans in a coordinated manner as well as identify qualifications, duties and responsibilities for supervisory and management personnel responsible for implementing the Traffic Management Plan.

The Proponent is also required to implement a Directional Drilling Planning and Execution Plan as part of the CEM Plan to manage potential impacts of trenchless pipeline crossings.

#### 7.3.4 Residual Adverse Effects

EAO and VFPA have identified the following residual adverse effects in Table 24.

**Table 24. Residual adverse effects to vehicle traffic and mobility.**

VCs	Residual Adverse Effects				
	Marine Terminal upgrade	Marine Terminal Operations	Fuel Receiving Facility Construction	Fuel Receiving Facility Operations	Pipeline Construction
<b>Changes in traffic volumes</b>	Yes - Increased traffic on Steveston Highway, No. 6 rd, and Triangle rd	No	Yes - Increased traffic on Steveston Highway, No. 6 rd, and Triangle rd	No	Yes - traffic flows and access
<b>On-street parking</b>	No	No	No	No	Yes - Vanguard rd, Patterson rd, and St. Edwards Drive
<b>Bicycle and pedestrian traffic and mobility</b>	No	No	No	No	No

### 7.3.5 Significance Analysis

Table 25 provides the significance analysis for potential residual effect to motor vehicle traffic and mobility and on-street parking due to the proposed Project.

**Table 25. Significance analysis of potential residual adverse effects to motor vehicle traffic and mobility and on-street parking.**

VC		Motor vehicle traffic and mobility
<b>Potential residual effects</b>		<ul style="list-style-type: none"> <li>Increased traffic on Steveston Highway, No. 6 Road, and Triangle Road due to marine terminal upgrades and construction of fuel receiving facility</li> <li>Change in motor vehicle traffic flows and access, depending on final alignment of pipeline along Highway 99 corridor</li> </ul>
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>Low - effects of construction of the marine terminal and fuel receiving facility on motor vehicle traffic and mobility.</li> <li>Moderate - effects of proposed pipeline construction on motor vehicle traffic and mobility along Highway 99.</li> </ul>
	Geographic extent	<ul style="list-style-type: none"> <li>The geographic extent of the effects of marine terminal upgrades and construction of fuel receiving facility on motor vehicle traffic and mobility would be limited to Steveston Highway, No. 6 Road, and Triangle Road.</li> <li>The geographic extent of the effects of pipeline construction would be along the Highway 99 corridor, and potential disruption to city streets such as Vanguard Road, Patterson Road, and St. Edwards Drive.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of construction of the proposed Project affecting motor vehicle traffic and mobility would be high.</li> </ul>
	Duration and frequency	<ul style="list-style-type: none"> <li>The duration of construction at the marine terminal and fuel receiving facility would be 18 to 24 months. The frequency of effects of construction at the marine terminal and fuel receiving facility to motor vehicle traffic and mobility would be ongoing during that time.</li> <li>The duration of construction of the pipeline would be 12 months. The frequency of effects of construction of the pipeline would be ongoing during that time.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The effects of construction of the proposed Project to motor vehicle traffic and mobility would be reversible after construction.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>Currently approximately 60 tanker trucks per day travel to the Marine Terminal and Fuel receiving facility. During operations the proposed Project would result in less traffic on local roads.</li> </ul>
<b>VC</b>		On-street parking
<b>Potential residual effects</b>		Change to on street parking as a result of the proposed pipeline route on Vanguard Road, Patterson Road, and St. Edwards Drive.
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>The magnitude would be low for the effects of pipeline construction to on-street parking, as the spatial and temporal impacts would be low.</li> </ul>

Geographic extent	<ul style="list-style-type: none"> <li>The geographic extent of the effects of pipeline construction to on-street parking would be Vanguard Road, Patterson Road, and St. Edwards Drive adjacent to Highway 99.</li> </ul>
Probability	<ul style="list-style-type: none"> <li>The probability of the effects of pipeline construction to on-street parking would be high.</li> </ul>
Duration and frequency	<ul style="list-style-type: none"> <li>The duration of construction of the pipeline would be 12 months. The frequency of effects of construction of the pipeline to on-street parking would be ongoing during that time.</li> </ul>
Reversibility	<ul style="list-style-type: none"> <li>The effects of construction of the proposed pipeline to on street parking would be reversible after construction.</li> </ul>
Context	<ul style="list-style-type: none"> <li>There would already be use of on street parking resulting in increased pressure due to proposed Project construction.</li> </ul>

### 7.3.6 Conclusions

EAO and VFPA considered the following:

- Disruptions to traffic would be temporary during construction and are unlikely to occur at all during operations;
- The Proponent would provide alternate access for cyclists and pedestrians to the Oak Street Bridge;
- The Proponent would consult with MOTI and COR regarding timing of works and traffic management including disruptions and detours to ensure that any effects are minimized;
- The Proponent would develop a Traffic Management Plan that considers input from key government agencies, provides approaches to manage traffic issues, provides incident reporting and includes communication.

Based on the analysis of potential adverse effects and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects on vehicle traffic and mobility.

### 7.4 Community Features and Recreation Activities:

This section of EAO's social effects assessment details the background information, potential effect, and mitigation measures for the VCs of change in access and enjoyment, street and trail trees, and marine traffic for the effects of the construction and operation of the marine terminal, proposed fuel receiving facility, and proposed pipeline route.

*Land-based community features located adjacent to or in close proximity of the proposed Project include:*

- The Riverport Recreation and Entertainment Complex, located at No. 6 Road and Steveston Highway in Richmond approximately 1 km east of the marine terminal location, includes a cinema complex, large aquatic centre, arena facility, a hotel, a bowling centre, and children's indoor play area and various other amenities and restaurants;
- The Richmond Nature Park, located near No. 5 Road between Westminster Highway and Alderbridge Way, is a network of walking trails and nature areas with an interpretive centre and a playground; reports 95,000 annual visits;
- The Bridgeport Trail, located between Shell Road and Great Canadian Way, is a heavily used bicycle and walking trail;
- The Mylora Golf courses - Mylora on Five is located on No. 5 Road north of the Williams Road right-of-way, and Mylora on Sidaway is located on Sidaway Road north of Williams Road, are both are 18-hole executive golf courses;
- The River Rock Casino Resort, located at 8811 River Road along the North Arm of the Fraser River in Richmond, includes a hotel, entertainment centre, a marina, conference centre and parkade;
- The BC Muslim Association Facilities, located on Blundell Road near the west side of Highway 99, includes a large mosque, funeral services building, primary school, school-related buildings, and playing fields and sports courts;
- Sportstown, a soccer, tennis, tavern complex located near the intersection of Highway 91 and Highway 99; and
- Hotels, light industrial, and retail businesses located between Highway 91 and Bridgeport Road along Highway 99.

*Fraser River Estuary and Marine-Based Community Features:*

- The Fraser River Estuary, produced by the confluence of the Fraser River and the Strait of Georgia, is one of the largest estuaries along the west coast of North America. In 2006, the total length of recreation corridors in the Fraser River Estuary along the South and North arm shorelines of the Fraser River, and including the Pitt River, Pitt Lake, and the Fraser River up to Kanaka Creek was over 145 km, including a trail in the Imperial Landing area in Richmond, and a trail adjacent to Deas Slough in Delta.

Marine-based community features in the Fraser River estuary that would be in close proximity to the proposed Project's vessel transit route between Sands Heads and the marine terminal include:

- Garry Point Park and Richmond's waterfront in Steveston Harbour, including the Gulf of Georgia Cannery National Historic Site, Steveston Historic Fishing Village, Imperial Landing Park, Britannia Heritage Shipyard, No.2 Road Fishing

Pier, Gilbert Beach/Blair Point Park, and the No. 3 Road Fishing Pier and Waterfront Park;

- Finn (Gilmour) Slough, a historic settlement approximately 1 km in length, hosts an annual art show;
- Woodward's Landing and the Horseshoe Slough Trail, a 2.5 ha park located on block east of No. 5 Road on the north side of Dyke Road;
- Shady (Steveston) Island, a popular natural area;
- Don and Lion Islands Regional Legacy Site, two islands near the north shore of the Fraser River between No. 9 Road and Graybar Road in Richmond, west of Annacis Island;
- Westham Island/Alaksen National Wildlife Area and George C. Reifel Refuge/National Migratory Bird Sanctuary,<sup>54</sup> located in Delta, is at the westernmost point of the south shore of the South Arm and includes approximately 586 ha. The National Migratory Bird Sanctuary reported 70,379 visitors in 2009;
- The South Arm Marshes Wildlife Management Area,<sup>55</sup> located along the south shore of the South Arm, is a 937 ha site that is popular for recreational activities such as kayaking, canoeing, water skiing, recreational fishing and wildlife viewing;
- Deas Island Regional Park, located on Deas Island, is a 121 ha park that includes a group camping facility, public boat launch, rowing club, trails and a wildlife viewing tower. Deas Island Regional Park records approximately 290,290 visits per year;
- Ladner Harbour Park, which includes a large picnic area, walking and bicycling trails, a playground, kayaking and canoeing;
- Dow Delta Bar Fishing Park, located at the eastern tip of Tilbury Island; and
- Purfleet Point Park Reserve, located at the western tip of Annacis Island.

#### *Fraser River-based Recreational Fishery<sup>56</sup>:*

BC's recreational fishery is regulated by DFO. Sport fishing in Metro Vancouver is a very important recreational activity, generating 1,110 person years of employment, which is approximately one third of the 3,590 person years related to all tidal recreational fishing in BC. The area of the Proposed Project includes piers and

---

<sup>54</sup> More information on this area in section 5.2 of the Report.

<sup>55</sup> Ibid.

<sup>56</sup> Section 5.1 of this report assesses the impact of the proposed Project on fish in the Fraser River, and Part C of this report discusses the Aboriginal rights of the First Nations who use the Fraser River for food, social, and ceremonial fisheries.

shoreline that host numerous sport fishermen along the South Arm, particularly in summer and fall.

#### 7.4.1 Potential Effects of the proposed Project

##### *Community Features and Recreation Activities*

During the public comment period on the Application, the public raised concerns about vessel traffic potentially disrupting recreation in the South Arm of the Fraser River (e.g. boating) and along the shoreline (e.g. birdwatching).

Proposed Project construction could temporarily result in the following impacts to community features, including the BC Muslim Association facilities, Kilby Park, Richmond Nature Park and the Mylora Golf Courses:

- Disruption to motor vehicle and parking access;
- Disruption to pedestrian and non-motorized traffic mobility;
- Generation of noise; and
- Removal of street and trail trees and vegetation.

Major community features that may need to be considered in construction plans are identified above. These features would be affected by proposed pipeline construction

Operations of the proposed Project would not have any adverse effects on community features. During operations, the pipeline would not affect use of private or public properties adjacent to the pipeline route.

##### *Street and Trail Trees<sup>57</sup>:*

During the public comment period for the Highway 99 Pipeline Route Assessment Addendum, concern was raised by Mylora Golf Courses regarding the potential removal of trees along the Williams Rd. The Proponent responded that to the extent feasible, the construction of the proposed pipeline would occur within the Highway 99 right of way, not on private land.

Construction of the proposed marine terminal, fuel receiving facility and fuel transfer pipeline would occur in highly disturbed areas without a significant inventory of trees.

Existing trees along the Highway 99 pipeline route may be affected during construction, including along the two Mylora Golf Courses, between Blundell Road and Westminster

---

<sup>57</sup> Section 5.2.2 of this report details the biophysical effects of the proposed Project on vegetation.

Highway, Richmond Nature Park, residential areas located north of Highway 91, between Shell Road and Cambie Road and north of Cambie Road.

*Recreational Fisheries:*

During the course of the EA, there were concerns raised about the impact of vessels associated with the proposed Project on recreational fisheries and First Nation fisheries (asserted or proven aboriginal rights for food, social and ceremonial purposes and the exercise of established rights by the Tsawwassen First Nation)<sup>58</sup>.

Marine terminal upgrades would take approximately eight months, including four months for the in-water works. During operations, the Proponent expects one to two barges every two weeks with an off-loading time of approximately 12 hours, and one large tanker every month with an off-loading time of approximately 24 to 36 hours, resulting in approximately three to five vessels per month, or between 36 and 60 vessels per year. This incremental increase is small when compared to the existing three year average of 538 vessel arrivals between 2007 and 2009 in the Fraser River.

The safety setback zone when a vessel is berthed at the marine terminal may impinge the movements of some marine traffic within the vicinity of the vessels for a short period of time.

The Proponent noted that vessel traffic would be infrequent, with an increase in three to five vessels a month for the South Arm of the Fraser River.

#### 7.4.2 Measures to Mitigate Potential Effects

To address the potential effects of the proposed Project on community features and recreation activities during construction and operations, the Proponent would implement the following key mitigation measures:

*Community Features:*

- Consider major community features in the CEM Plan<sup>59</sup>, including selection of the pipeline alignment to minimize effects on community features, or using trenchless construction methods; and

---

<sup>58</sup> Please see part C for a discussion on potential impacts of the proposed Project on aboriginal interests, including vessel traffic.

<sup>59</sup> Part E of this report details the Proponent's CEM Plan

- Consider seasonal sensitivities for businesses and community features during construction planning.

*Street and Trail Trees:*

- The Vegetation and Wildlife Management Plan, a sub-plan of the CEM, must identify measures to protect street and trail trees; and
- Replace trees along construction footprint as required by the relevant jurisdictional authority.

*Recreational Fisheries:*

- Coordinate with VFPA regarding any potential interactions between the safety setback zone and navigation channel so the impacts to other marine traffic is mitigated; and
- Ensure that marine traffic would always be able to move safely around the floating equipment.

7.4.3 Residual Adverse Effects

EAO and VFPA have identified residual effects to community features and recreation activities due to the marine terminal upgrade, fuel receiving facility construction and pipeline construction. These include potential residual impacts to:

- Motor vehicle access;
- Pedestrian and non-motorized traffic mobility;
- Noise and dust;
- Parking access including on-street parking; and
- Street and trail trees and vegetation.

7.4.4 Significance Analysis

Table 26 provides the significance analysis for residual adverse effects to community features and recreation activities.

**Table 26 Significance of residual adverse effects to community features and recreation activities**

VC		Schools, recreation access and other community features
<b>Potential residual effect</b>		Motor vehicle access, pedestrian and non-motorized traffic mobility, noise, dust, parking access including on-street parking, and effects to trees and vegetation.
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>• The magnitude would be low for the effects of pipeline construction to schools, recreation access and other community features.</li> </ul>

	Geographic extent	<ul style="list-style-type: none"> <li>The geographic extent would be the areas of the highway 99 corridor that coincide with schools, recreation access and other community features</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of the effects of pipeline construction to schools, recreation access and other community features would be high.</li> </ul>
	Duration and frequency	<ul style="list-style-type: none"> <li>Each 100 m of pipeline construction would typically require one day of construction, with trenchless construction taking longer. The frequency would be one-time.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The effects of construction of the proposed pipeline to schools, recreation areas and other community features would be reversible after construction.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The context of the roads around Highway 99 is disturbed, as there are other traffic sources that would impact schools, recreation areas and other community features.</li> </ul>
<b>VC</b>		Street and trail trees
<b>Potential residual effect</b>		Construction of the pipeline along Highway 99 could potentially affect street or trail trees.
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>Depending on the final alignment along Highway 99, and therefore, the amount of trees, the magnitude could be low or moderate.</li> </ul>
	Geographic extent	<ul style="list-style-type: none"> <li>The geographic extent would be along the Highway 99 corridor.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>The probability of pipeline construction affecting street and trail trees is high.</li> </ul>
	Duration and frequency	<ul style="list-style-type: none"> <li>The duration of the removal of street and trail trees would be during the 12 month pipeline construction period. The frequency would be one time, as the proponent would either not allow trees to grow above the pipeline, or replant trees in areas that the trees would not negatively impact the integrity of the pipeline</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>The permanent removal of trees would not be reversible. Replanting would make the removal of some trees reversible, although it would take time for the replanted trees to mature.</li> </ul>
	Context	<ul style="list-style-type: none"> <li>The context of Highway 99 is disturbed.</li> </ul>

#### 7.4.5 Conclusions

EAO and VFPA considered the following:

- Any disruptions to community features caused by traffic and parking disruptions would be minimal and temporary;
- No impacts to recreational boaters are expected as the increase in marine tanker traffic as a result of the proposed Project would be incrementally small; and

- The Proponent would consult with VFPA regarding any impingement on the safety setback zone and navigation channel to ensure that marine traffic would always be able to move safely around the floating equipment;

Based on the analysis of potential adverse effects and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects on community features and recreation.

## 7.5 Aesthetic Values and Visuals

This section of EAO's social effects assessment details the background information, potential effects, and mitigation measures for the VC of aesthetic values and visuals due to effects caused by the marine terminal, proposed fuel receiving facility, and proposed pipeline route.

### 7.5.1 Potential Effects of the proposed Project

During construction, there would be a temporary impact to visual quality along the highway and at the Marine terminal and fuel receiving facility for short periods due to construction equipment. Staging areas for trenchless pipeline construction would not be identified by the Proponent until the final pipeline route along Highway 99 is finalized.

During operations, vessels would be visible; lighting requirements would be similar to the vessels currently seen at other nearby locations on the river. The fuel storage tanks would be approximately 15 m high, and would be located on land zoned for industrial use. These tanks would be visible from some condominiums on Riverport Way.

After construction the pipeline would not be visible, and therefore, there would not be a visual effect.

### 7.5.2 Measures to Mitigate potential Effects

To address the potential effects of the proposed Project on visuals during construction and operations, the Proponent would implement screening measures, before the start of operations, to reduce street level visual impacts from the fuel receiving facility on the east and south side.

### 7.5.3 Residual Adverse Effects

EAO and VFPA have identified residual effects to aesthetic values and visuals as a result of:

- Construction machinery at the marine terminal during upgrades and during the construction of the fuel receiving facility;
- Vessels during marine terminal operations; and
- Fuel tanks during fuel receiving facility operations.

#### 7.5.4 Significance Analysis

Table 27 provides the significance assessment for residual effects to aesthetic values and visuals.

**Table 27. Significance analysis of residual adverse effects on aesthetic values and visuals.**

VC		Aesthetic values and visuals
<b>Potential residual effect</b>		<ul style="list-style-type: none"> <li>• Visual impact associated with construction machinery.</li> <li>• Visual effects associated with berthing at the marine terminal</li> <li>• The tanks at the fuel receiving facility.</li> </ul>
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>• Low-moderate – construction activities would be visible to residents during construction vessels would be visible to shoreline users during operations. Upgraded marine terminal and constructed fuel receiving facility would be visible to nearby industrial users.</li> </ul>
	Geographic extent	<ul style="list-style-type: none"> <li>• Moderate - The geographic extent would be along the Highway 99 corridor for construction, the marine terminal fuel receiving facility and the South Arm of the Fraser River for operations.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>• The probability of pipeline construction affecting aesthetic values and visuals is high. The probability of the marine terminal, vessels and fuel receiving facility affecting aesthetic values and visuals is also high.</li> </ul>
	Duration and frequency	<ul style="list-style-type: none"> <li>• The duration of the pipeline construction affecting aesthetic values and visuals would be the 12 month pipeline construction period. The frequency would be ongoing during that time for the entire corridor, and one time for each segment (average 100 m per day).</li> <li>• The duration of berthing would be one to two barges every two weeks with an off-loading time of 12 hours, and one large tanker every month with an off-loading time of between 24 and 36 hours, making up between three to five vessels per month, or between 36 to 60 vessels per year.</li> <li>• The duration for the fuel receiving facility would be the at least 60 year operations phase. The frequency of the visual effect would be ongoing when the vessels are berthed, and ongoing for the fuel receiving facility.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>• The effects of construction of the proposed pipeline to aesthetic values and visuals would be reversible after construction.</li> <li>• The effect of the marine terminal and fuel receiving facility to aesthetic values and visuals would only be reversible if the infrastructure was removed when the proposed Project is decommissioned.</li> </ul>

	Context	<ul style="list-style-type: none"> <li>• The context of the proposed Project site area is disturbed, as the area has a number of industrial buildings.</li> <li>• Large vessel movement in the South Arm of the Fraser is already occurring with the proposed Project.</li> </ul>
--	---------	---

### 7.5.5 Conclusion

EAO and VFPA considered the following:

- Visual quality impacts of construction machinery would be temporary;
- There would be no visual impacts from the proposed pipeline after construction;
- There would be some visual impacts during operations from the proposed marine terminal; however, the area is already used for industrial purposes including the presence of shipping vessels on the river, and therefore, the incremental change in visual impacts would be small; and
- The Proponent would mitigate some visual impacts of the fuel tanks by using vegetation.

Based on the analysis of potential adverse effects and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects on aesthetic values and visuals.

## **8 Assessment of Potential Heritage Effects**

### 8.1 Heritage and Archaeology

The Proponent assessed the potential effects of the proposed Project on heritage values, including archaeological and heritage resources.

The LSA for the Proponent's heritage assessment is defined as the footprint of the marine terminal plus a 200 m buffer, the footprint of the proposed fuel receiving facility plus a 200 m buffer and a 200 m wide corridor centered on the proposed pipeline alignments. The LSA for the Proponent's pipeline route is the Highway 99 corridor from Williams Road north approximately 7.7 km to Bridgeport Trail, including a 100 m buffer on either side of the Highway 99 right-of-way.

The RSA for the Proponent's heritage assessment encompassed Lulu Island, Sea Island and the Fraser River.

The Proponent's assessment considered all recorded heritage resources present within the RSA at the time they undertook their assessment.

The Proponent's methodology is contained in the Application and Addendum<sup>60</sup>.

#### 8.1.1 Valued Components:

The Proponent assessed the following VCs:

- Paleontological sites: locations where ancient organisms have been preserved as fossils.
- Archaeological sites: locations that contain physical evidence of past human activities for which scientific methods of survey, excavation, data analysis provide the main sources of information.
- Traditional land use: past and contemporary land use by aboriginal groups<sup>61</sup>.
- Historic heritage sites: attributable to post-contact Euro-Canadian or Asian-Canadian settlement and land use in BC, including structures, engineering works and architectural features as listed in the CEAA guidelines.
- Heritage resource potential: Refers to the capability of a landscape or portion of a landscape to have supported the types of past activities that would have resulted in the formation and preservation of archaeological and historic remains.

Where traditional use data was available, activities and places that would not leave physical remains (e.g. medicinal plant collecting, spiritual places) were assessed as landscapes for archaeological resource potential.

The Proponent assessed and categorized portions of the preliminary pipeline alignment that could be affected by construction activities for heritage resources potential as follows:

- *High Potential*: lands exhibiting topographic and biophysical attributes highly supportive of traditional cultural activities in the past that have a high likelihood to have left archaeological or historic evidence.
- *Moderate Potential*: lands exhibiting fewer attributes that would have supported traditional cultural activities than the preceding category.
- *Low Potential*: Lands that exhibit few characteristics supportive of traditional cultural activities. Further field investigations are not normally recommended for lands categorized as having low heritage resource potential.

---

<sup>60</sup> Please see section 7.2.3 (pages 7-5 to 7-8) of the Application as well as section 6.1 of the Proponent's Addendum.

<sup>61</sup> EAO has assessed the proposed Project's impacts to First Nations in Part C of this report.

Environmental conditions govern the availability of natural resources for human use, and are the principal factors determining land use, settlement, and subsistence patterns of peoples. The topography of Lulu and Sea Islands is level to gently undulating and is between 1.5 m to 4.5 m above sea level, so is susceptible to flooding. Unconsolidated Quaternary sediments that could contain fossils do not occur on Lulu and Sea Islands. Historic sloughs, now generally filled in with water drainage diverted to ditches, were important routes and resource gathering areas.

#### *8.1.1.1 Paleontological sites:*

Geoscientists have determined that the western portion of Lulu Island and Sea Island did not begin to form until around 5,000 years ago, leaving no possibility of finding Quaternary-aged fossil organisms in unconsolidated Fraser River sediments<sup>62</sup>. There is no potential for paleontological resources to be encountered during proposed Project construction or operations due to the age of Lulu Island.

#### *8.1.1.2 Archaeological Sites*

Archaeological research has recovered evidence of over 9,000 years of human occupation in the southern Strait of Georgia region. The earliest European explorers made contact with First Nations inhabitants of the southern Strait of Georgia in the late 1800s to early 1900s. The ethnographic setting is provided in Part C of this report, the First Nations Consultation Report. First Nations traditional place or settlement names on Lulu and Sea Islands are included in table 7.3.2 (pages 7-24 to 7-26) of the Application.

The Proponent reviewed previous archaeological studies in the Fraser Delta. Sixty-eight documented archaeological sites have been recorded on Sea Island and the western part of Lulu Island. Prehistoric cultural materials have been identified at 30 sites, historic remains or structures are present at 44 sites, with five sites having both prehistoric and historic remains and structures. Thirty-six of the historic sites are heritage buildings or properties in COR's Heritage Register.

No undocumented archaeological sites were observed along the pipeline alignment during the Proponent's reconnaissance.

EAO and VFPA noted two sites:

- Site DgRs-17 - located in the vicinity or overlapping the proposed fuel receiving facility; and

---

<sup>62</sup> Section 7.3.1.2 of the Application.

- DhRs-26 – located on Sea Island and in the vicinity or overlapping the proposed pipeline.

No evidence of archaeological sites DgRs-17<sup>63</sup> or DhRs-26 was observed by the Proponent, as both locations have been severely disturbed by previous developments. Off-property observations of an excavated pit indicate that at least 1 to 1.5 m of imported fill or reworked sediment are present. Remnants of DgRs-17 would be buried under 3 to 5 m or more of imported fill. Site DhRs-26 and the historic settlement of Eburne on the west shore of the Moray Channel have also been affected by modern developments, most recently the construction of the Arthur Laing Bridge and the Canada Line Bridge. The boundary for DhRs-26 remains undefined, and there is no information on what effects previous developments may have had on the site.

#### *8.1.1.3 Heritage sites*

A total of 36 historic heritage sites are listed in the City of Richmond Heritage Inventory. They include:

- Pioneer residences, often with associated rural outbuildings and other structures, scattered throughout Richmond but primarily west of Shell Road;
- Industrial landscapes associated with historic fisheries on the Steveston and Moray Channel waterfronts, and wartime aircraft manufacture on Sea Island; and
- Institutional and/or commercial structures, mainly concentrated in Steveston and more dispersed elsewhere in Richmond.

None of the documented historic sites in the Richmond Heritage Inventory are in the LSA. Historic structures in the inventory are compiled by City of Richmond staff and no obvious inventory candidates were observed during the field reconnaissance, therefore, historic heritage resources were determined not to be affected by the Project.

#### *8.1.1.4 Heritage resource potential:*

Forested settings along the Middle and South Arms of the Fraser River would have been favourable for settlement with wooden structures, and former prairie settings on Lulu and Sea Islands have the density of documented archaeological sites, signifying that they were the most attractive environments in the past.

Three documented sites, DgRs-17, DhRs-26, and DhRs-80 appear to be situated within 400 m of the proposed Project.

---

<sup>63</sup> Part C of this report, the First Nations Consultation Report, contains more information about site DgRs-17.

The First Nations village of *Tl'uqtinus*<sup>64</sup> is associated with lands near the proposed Project footprint. Other traditional places and settlements tend to be configured to shoreline settings near the western shores of Sea Island and Lulu Island.

---

<sup>64</sup> Information on *Tl'uqtinus* is contained in Part C of this report: the First Nations Consultation Report.

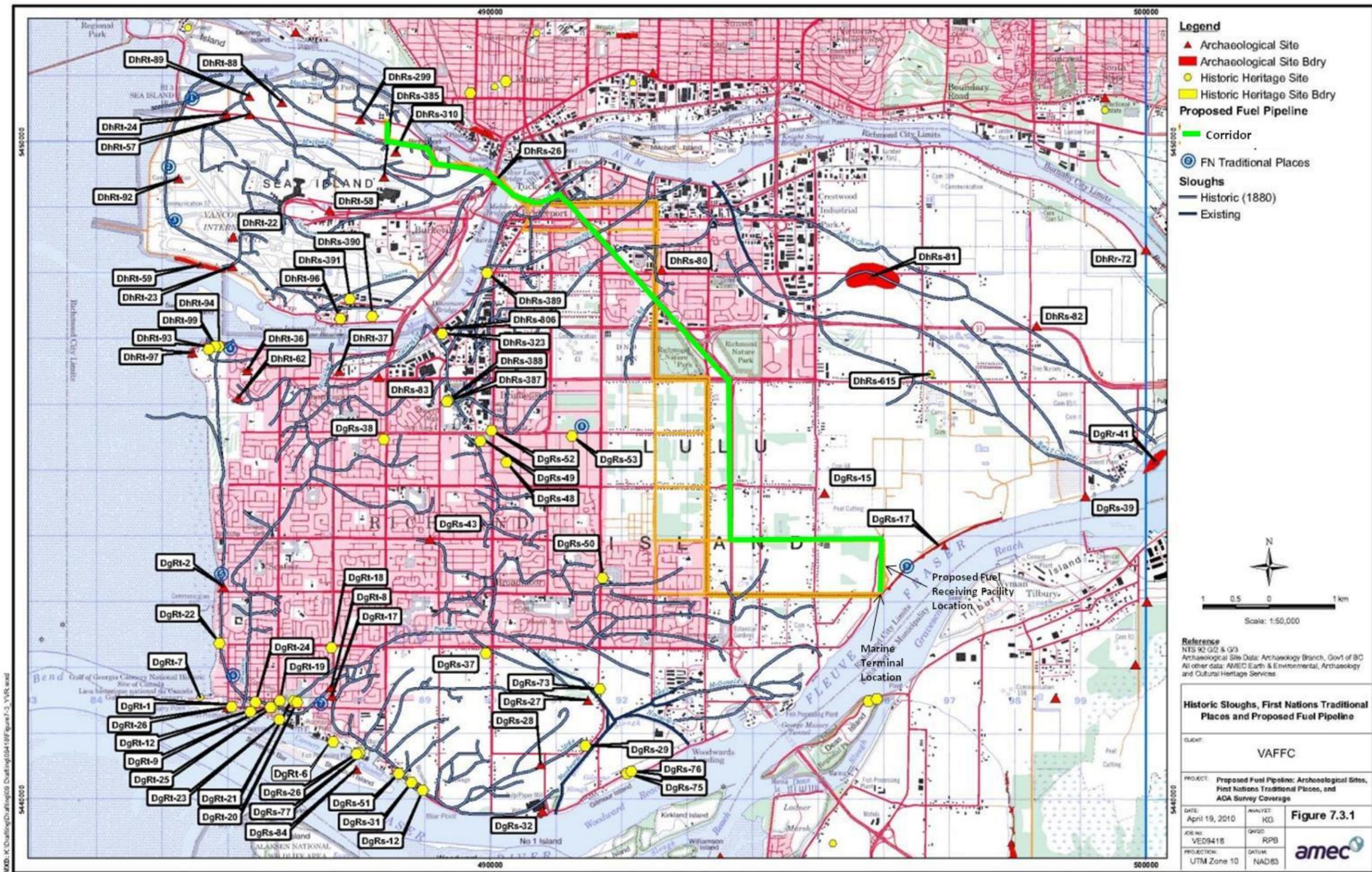


Figure 8 Map of archaeological sites in the proposed Project area.

A number of archaeological sites are located in Fraser River shoreline settings on the South Arm and Moray Channel, as well as a number of past or present slough channels on Lulu and Sea Islands.

#### 8.1.2 Potential Impacts to Heritage Resources

The proposed pipeline alignment is located within existing transportation and utility corridors. Therefore, the potential for encountering undocumented archaeological, historic, and heritage resources is low. EAO and VFPA specifically noted potential impacts to:

- DgRs-17 - located in the vicinity or overlapping the proposed fuel receiving facility;
- DhRs-26 – located on Sea Island and in the vicinity or overlapping the proposed pipeline; and
- DhRs-80 – located within 400m of the proposed pipeline corridor; and
- Heritage resources yet to be identified.

#### *Construction:*

The primary potential effect of construction on archaeological resources is disturbance due to ground altering and excavation activities. Activities that could disturb archaeological resources include:

- Vegetation clearing;
- Ground levelling;
- Removal of native soils;
- Placement of piles and ground densification;
- Excavation of pipeline trenches;
- Excavation of entry/exit points for directional drilling; and,
- Installation of temporary structures (roads, drainage, footings).

#### *Operations:*

Since potential conflicts with archaeological sites would be addressed during construction, the Proponent does not expect proposed Project operations having an effect on archaeological sites.

#### 8.1.3 Measures to Mitigate Potential Effects

To mitigate potential heritage effects, the Proponent would be required to undertake the following measures:

- An Archaeological Management Plan must be prepared and implemented by a BC Registered Professional Archaeologist; Conduct an Archaeological Impact Assessment (AIA) for the fuel receiving facility, marine terminal area, the pipeline exit point on Sea Island and pipeline crossings of old slough channels and all areas where rated as having a high or moderate archaeological potential in the overview assessment;
- Monitor site preparation and construction activities that will enter into native soils (i.e. non-fill) in locations rated as having high or moderate archaeological potential in the Proponent's previously completed Archaeological Overview Assessment;
- The Proponent must invite relevant First Nations to participate in the Archaeological Impact Assessment at least four weeks before commencing the Archaeological Impact Assessment;
- The monitoring procedures must adhere to those identified in the "British Columbia Archaeological Resource Management Handbook", the "Archaeological Impact Assessment Guidelines" issued by the Ministry of Forests, Lands and Natural Resources Operations, and any other practices as required by relevant Federal authorities and agencies; and
- The Proponent must monitor updates to the Richmond Heritage Register during construction.

Cowichan Nation Alliance suggested that an AIA should be conducted on the proposed Project site as soon as possible. The Proponent responded that it has not yet determined the final location of the pipeline alignment along the Highway 99 right-of-way and fuel receiving facility. The Proponent would undertake a field-based investigative AIA during construction. The Proponent has undertaken an AOA to identify areas of focus for the subsequent AIA, if the Project proceeds. This is a standard approach and one that has been discussed and accepted by EAO and BC Archaeology Branch. The Proponent would select and retain a Qualified Archaeologist certified by the Association of Professional Archaeologists and would support the inclusion of one member from each potentially affected First Nation to take part in the AIA field assessment.

#### 8.1.4 Residual Adverse Effects

Construction of the fuel receiving facility and fuel delivery pipeline could potentially disturb remnants of archaeological sites DgRs-17, DhRs-26 and DhRs-80. The proposed Project would not have residual adverse effects to historic heritage sites, paleontological fossil occurrences. Construction of the pipeline along Highway 99 may disturb undocumented sites.

The area that the proposed Project would be built on is industrialized. The past impacts from other activities on heritage VCs were taken into account in the Proponent’s assessment. The reasonably foreseeable projects and activities identified in Table 1 would not have a direct cumulative effect on the areas of disturbance related to proposed Project construction, and therefore, a cumulative effects assessment was not performed.

8.1.5 Significance Analysis

Table 28 provides the significance analysis for potential residual adverse effects to archeological sites.

**Table 28 Significance Analysis for potential residual adverse effects to archeological sites.**

VC		Archaeological Sites
<b>Residual Effect</b>		<ul style="list-style-type: none"> <li>Disturbance to archaeological site DgRs-17 at the fuel receiving facility;</li> <li>Disturbance to remnants of archaeological site DhRs-26 at horizontal direction drilling exit point on Sea Island; and,</li> <li>Disturbance of DhRs-80 or undocumented archaeological sites along the Highway 99 right-of-way during pipeline construction</li> </ul>
<b>Significance Analysis</b>	Magnitude	<ul style="list-style-type: none"> <li>Proponent’s preliminary assessment is that sites DgRs-17 and DhRs-26 are in the vicinity of the proposed Project footprint;</li> <li>Extent of overlap with proposed Project infrastructure currently unknown.</li> <li>This is also true for site DhRs-80 and undocumented archaeological sites within the pipeline route.</li> </ul>
	Probability	<ul style="list-style-type: none"> <li>As the extent of overlap with proposed Project infrastructure is uncertain. Therefore, the probability of interaction with sites DgRs-17 and DhRs-26 is uncertain. Both areas have already been disturbed by development but have a high/moderate potential of occurring. Artefacts may be three to five metres under the surface.</li> <li>The probability of encountering DhRs-80 and undocumented sites during pipeline construction is unknown.</li> </ul>
	Geographic Extent	<ul style="list-style-type: none"> <li>Sites DgRs-17 would be located at the fuel receiving facility site.</li> <li>Site DhRs-26 would be located on Sea Island near the Moray Channel.</li> <li>DhRs-80 and undocumented archaeological sites along the pipeline route would be located along the Highway 99 right-of-way.</li> </ul>
	Duration and Frequency	<ul style="list-style-type: none"> <li>Duration of disturbance would be the 18-24 month construction period.</li> <li>Frequency would be one-time.</li> </ul>
	Reversibility	<ul style="list-style-type: none"> <li>Any negative impacts of proposed Project construction on sites DgRs-17, DhRs-26, DhRs-80 or undocumented archaeological sites would be irreversible.</li> </ul>

	Context	<ul style="list-style-type: none"> <li>• DgRs-17, DhRs-26, DhRs-80 and undocumented archaeological sites would exist in developed areas;</li> <li>• Artefacts would be buried under the surface.</li> </ul>
--	---------	---

As discussed above, an AIA is required to minimize effects to DgRs-17, DhRs-26, DhRs-80 and potentially undocumented archaeological sites on the pipeline route. The Proponent would identify direct and indirect effects of the proposed Project on these sites, and recommend follow-up mitigation measures where unavoidable conflicts are identified.

#### 8.1.6 Management Plan

Prior to construction, the Proponent would be required to develop strategies to identify and implement:

- Additional assessment requirements for the proposed Project and applicable mitigation measures, and
- Archaeological monitoring requirements, to be implemented during the AIA.

Permit requirements and monitoring procedures based on the BC Archaeological Resource Management Handbook and BC Archaeological Impact Assessment Guidelines would be described. The roles and responsibilities of the person(s) designated by the Proponent's contractor to perform archeologically inspection would be described. A Registered Professional Archaeologist would be retained and would have overall responsibility for archaeological monitoring during site preparation and construction. Direction with regard to monitoring of all construction activities involving ground disturbance in areas of archaeological potential would be provided.

Protocols and actions to be implemented in the event of an archaeological finding is encountered would be described, including involvement of First Nations.

#### 8.1.7 Conclusion

EAO and VFPA considered:

- An Archaeological Management Plan would be implemented prior to construction and
- An AIA would be conducted during construction.

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse heritage effects.

## 9 Health Effects

In Chapter 8 of the Application, the Proponent's assessment of human health focused on groups of individuals that may be affected by the proposed Project's impacts to air quality, noise, contaminated sites, or social and economic effects of the proposed Project.

The Proponent selected spatial boundaries based on three groups of potentially exposed populations associated with the proposed Project:

1. Local residents in close proximity to the marine terminal and proposed location of the fuel receiving facility;
2. Local residents and road users in close proximity to the proposed pipeline route; and
3. The general public of Metro Vancouver.

The Proponent considered the construction activities for each project component:

- Proposed marine terminal upgrade – approximately eight months;
- Proposed fuel receiving facility construction – approximately 18 to 20 months; and
- Proposed pipeline construction and installation – approximately 12 months.

The methodology used by the Proponent in their assessment is included in section 8.2.3 (pages 8-3 to 8-9). The Proponent considered the spatial boundaries of the air quality, noise, contaminated sites and road traffic assessments in sections 5.3, 5.5, 5.4 of this report.

### 9.1 Valued Components

The Health VCs assessed in this Report are:

- *Noise* - Noise in this section is defined as “unwanted sound”<sup>65</sup>. Noise impacts humans' ability to receive and interpret useful sound, can damage hearing, affect essential human activities including the ability to communicate, relax, and sleep, as well as create annoyance and stress;
- *Air quality* - Air contaminants can potentially exacerbate the health condition of sensitive populations, such as those with asthma or cardiovascular disease<sup>66</sup>.

---

<sup>65</sup> Section 5.3 of this report has EAO's assessment of the proposed Project's impacts to air quality outside the context of human health.

<sup>66</sup> Section 5.4 of this report has EAO's assessment of the proposed Project's impacts to noise outside the context of human health.

Exposure to PM<sub>2.5</sub> can inflame airways resulting in increased use of medications, emergency room visits and premature mortality. NO<sub>2</sub> irritates the mucous membranes of the eyes, nose, throat, and respiratory tract, lowering the resistance to infection. SO<sub>2</sub> is also a lung irritant, and specific VOCs are associated with health or odour concerns;

- *Road traffic*- Traffic patterns, and probability of traffic-related accidents, would change as a result of the proposed Project due to construction activity and removal of existing tanker traffic from roads during operations<sup>67</sup>;
- *Existing contaminated sites*- Potential health effects of the disturbance of existing contaminated sites depends on the type, volume and concentration of the agent, and the presence or absence of exposure<sup>68</sup> pathways (e.g. contact with groundwater). Exposure routes can occur through skin contact, inhalation, or ingestion; and
- *Recreation*- Recreation can positively affect general health and wellbeing<sup>69</sup>. Richmond's river dyke trail is a public access trail that extends along the perimeter dyke system in Richmond. This trail is used by the general public for walking, cycling, and similar activities. Currently, the trail is not continuous in the vicinity of the marine terminal and proposed location for the fuel receiving facility. The proposed Project would involve consultation with Richmond on the extension of Richmond's river dyke access trail on or around the perimeter of the marine terminal property.

Potential impacts to these VCs have been discussed elsewhere in this Report. However, this section provides the lens of potential impacts specifically to human health. As a result, additional detail regarding the impacts to these valued health components is provided below.

## 9.2 Potential Effects and Proposed Mitigation Measures

### 9.2.1 Noise

Noise from construction equipment and activities could potentially affect:

- Six houses located along Triangle Road/Williams Road;

---

<sup>67</sup> Section 7.3 of this report has EAO's assessment of the proposed Project's impacts to road traffic outside the context of human health.

<sup>68</sup> Section 5.5 of this report has EAO's assessment of the proposed Project's impacts to contaminated sites outside the context of human health.

- 139 units in three buildings located in the Waterstone Pier condominium complex;
- 16 houses located along No. 6 Road;
- A four-storey hotel located near No. 6 Road;
- A condominium development in the nearest residential zone (CD/134);
- Users of the Riverport Recreation and Entertainment Complex;
- Three multi-family residential buildings located on Riverport Way;
- A cluster of farmhouses located on No. 6 Road; and
- Deas Island Regional Park, including residents of Burr House, campers and park visitors.

Health Canada states that noise begins to annoy people in residences when the sound level outside their homes is approximately 55 dBA. The  $L_d$  is expected to change from between 46 dBA and 52 dBA to 62 dBA and 75 dBA for residential areas in proximity of the marine terminal. Deas Island Regional Park currently experiences noise levels similar to a suburban residential area. During construction, noise levels would be that of a business area in a city. For pile driving, the  $L_{max}$  during proposed marine terminal upgrades would be 80 dBA, the limit of COR's Noise bylaw. However, the duration of the pile driving noise would be short. Proposed pipeline construction would typically occur between 08:00 and 16:00 Monday to Friday. Night-time construction may be required along sections of Highway 99 to reduce safety concerns.

Single family dwellings located between the marine terminal and No. 6 Road and the condominium complex located on Riverport Way would be exposed to noise from the shipboard generators while vessels are berthed. The Proponent estimates that for approximately 85% of the vessels, shipboard generators would emit noise within 5 dBA of existing ambient levels at the three baseline monitoring sites. This increase from 53 to 58 dBA would be similar to the difference between a suburban residential area and an urban residential area.

For the vessels with the noisiest shipboard generators, noise at night could be 7 to 9 dBC higher than existing ambient levels, and during the quietest hours of the night in favourable weather conditions, generator noise for these vessels could be 11 to 15 dBC higher than existing levels. Weather conditions could result in lower noise levels from the generators at some receiver locations.

For construction of the pipeline, the Proponent predicts that the highest noise levels would be between 56 dBA and 75 dBA, assuming a 10 m minimum distance to the nearest property line. The Proponent expects that exposures to noise levels greater than 55 dBA to occur for one to two days at any residence. There would be no noise effects associated with pipeline operations.

The Proponent's contractors would be required to meet COR noise bylaw requirements or apply for an exemption. Section 5.4.2 of the Application outlines the Proponent's mitigation measures for noise, and section 10.1.11 of the Application outlines the Proponent's Noise Management Plan.

The Proponent proposes the following mitigation measures to reduce potential human health effects from shipboard generator noise when vessels would be berthed at the marine terminal.

- Identify and implement procedures and timelines for providing advance notice to potentially affected residences and businesses about pile-driving activities and responding to noise complaints;
- Require a contractor to:
  - Coordinate and schedule activities to minimize overall noise levels and implement the CEMP noise requirements;
  - Construct temporary noise barriers when working in close proximity to noise sensitive areas where no inherent shielding elements are available, where practical;
  - Use methods and equipment that produce less noise while doing equivalent work;
  - Inform potentially affected residents/communities well in advance of the types of particularly noisy activities, and notify them of changes in the estimates start or completion dates for the various phases of construction; and
  - Monitor construction noise in accordance with municipal bylaws.

#### 9.2.2 Air Quality

Air contaminants would be released during construction by the operation of fossil-fuelled equipment, delivery trucks and service vehicles, as well as tugs and barges for pile driving. Air contaminants would also be released in the form of fugitive dust from the handling of rock and soil, indirectly through the production of cement used in concrete and painting of the storage tanks. The operation of fossil-fuelled equipment represents the largest source of emissions for all pollutants except VOCs emitted during the tank painting process.

These contaminants would potentially affect residents in close proximity of the marine terminal, proposed fuel receiving facility and along the proposed pipeline route.

During operations, emissions that could cause human health concerns would be from vessels transiting the Fraser River and berthed at the marine terminal, and fugitive emissions of VOCs from the storage tanks. The proposed pipeline would replace truck

deliveries of fuel from Westridge Marine Terminal to YVR, and result in a shorter vessel distance in Canadian waters, resulting in a net decrease of some emissions (Table 29).

**Table 29. Summary of net CAC emissions due to proposed Project construction and operations**

Present Fuel Requirements	CAC Emissions (kg)				
	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC
Total Net Emissions <sup>(a)</sup>	- 90	- 64	- 4,132	+ 333	+11,750
Percent change in Total LSA emissions	- 0.02%	- 0.02%	- 0.12%	+ 0.25%	+ 0.29%
Percent change in Total RSA emissions	- 0.004%	- 0.005%	- 0.034%	+ 0.067%	+ 0.09%
Total Net Emissions(a)	- 124	- 76	- 6,702	+ 1,226	+11,568
Percent change in Total LSA emissions	- 0.02%	- 0.02%	- 0.19%	+ 0.93%	+ 0.29%
Percent change in Total RSA emissions	- 0.005%	- 0.005%	- 0.055%	+ 0.25%	+ 0.089%

a. Combined net emissions for tanker delivery trucks, marine vessel deliveries and fuel receiving tanks.  
Note: The values in the table give the maximum amount of net increase (+) or net decrease (-).

### *Fuel Receiving Facility*

The highest concentrations of fugitive VOCs from the tank could potentially impact human health in the immediate vicinity and in two areas between 0.5 and 1 km north and south of the proposed fuel receiving facility. The Proponent predicts that the maximum 1 hr VOC concentrations from fugitive emission at the proposed fuel receiving facility would be 70 µg/m<sup>3</sup> for potentially exposed populations along No. 6 Road. The Proponent determined that concentrations would decrease rapidly with distance from the fuel receiving facility.

The Proponent used Ontario and Alberta VOC objectives to measure the impact of the emissions, as BC does not have objectives for VOCs.

The Proponent considered the US Agency for Toxic Substances and Disease Registry's (ATSDR) Minimum Risk Levels (MRL) for VOCs. MRLs are an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse, non-cancer health effects over a specified duration of exposure. The relevant

VOCs for the Proponent's MRL analysis were benzene, toluene, n-hexane and n-heptane (Table 30).

**Table 30. Comparison of potential increase in VOC concentrations due to the proposed Project and relevant guidelines.**

Pollutant	Averaging Period	Maximum Predicted Ambient Concentration ( $\mu\text{g}/\text{m}^3$ )	Alberta Ambient Air Quality Objectives ( $\mu\text{g}/\text{m}^3$ )	Ontario Point of Impingement Limits and Ambient Air Quality Criteria ( $\mu\text{g}/\text{m}^3$ )
Benzene	1 – Hour	0.1 to 3.1	30	-
Toluene	$\frac{1}{2}$ - Hour <sup>(1)</sup>	0.07 to 2.2	-	2000
	1 - Hour	0.06 to 1.8	1880	-
	24 - Hour	0.01 to 0.4	400	-
N-hexane	$\frac{1}{2}$ - Hour <sup>(1)</sup>	0.2 to 7.3	-	7500
	1 - Hour	0.2 to 6.0	21000	-
	24 - Hour	0.04 to 1.3	7000	2500
N-heptane	$\frac{1}{2}$ - Hour <sup>(1)</sup>	0.1 to 3.1	-	33000
	24 - Hour	0.02 to 0.6	-	11000
Octane	10-minute <sup>(2)</sup>	0.03 to 0.8	-	61800
	$\frac{1}{2}$ - Hour <sup>(1)</sup>	0.02 to 0.6	-	45400
Isomers of hexane	$\frac{1}{2}$ - Hour <sup>(1)</sup>	0.3 to 7.9	-	22500
	24 - Hour	0.05 to 1.4	-	7500

Notes: (1) Calculated based on the maximum 1-hour concentration using a conversion factor of 1.2 (Ontario Ministry of Environment 2005)  
 (2) Calculated based on the maximum 1-hour concentration using a conversion factor of 1.65 (Ontario Ministry of Environment 2005)

### *Marine Terminal*

The maximum predicted SO<sub>2</sub> concentrations from vessel fuel emissions would be an order of magnitude lower than the Metro Vancouver ambient air quality objectives for the 1 hr and 24-hr averaging periods (Table 31).

**Table 31: Maximum Predicted Ambient Concentrations due to Emissions from Panamax-class Vessels Hotelling at the Marine Terminal**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>Maximum Predicted Ambient Concentration (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Maximum Predicted Cumulative Concentration (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Metro Vancouver Ambient Air Quality Objectives (<math>\mu\text{g}/\text{m}^3</math>)</b>
<b>SO<sub>2</sub></b>	1 – Hour	8	22	450
	24 – Hour	4	14	125
<b>PM<sub>10</sub></b>	24 – Hour	1.0	30	50
<b>PM<sub>2.5</sub></b>	24 – Hour	0.9	18	25

Health Canada expressed concern that even though SO<sub>2</sub> emissions would be below air quality objectives, individuals with impaired respiratory function may still experience acute symptoms. Impacts to healthy individuals would be unlikely.

The Proponent provided EAO and the working group with a Memorandum on Human Health Effects<sup>70</sup> that examined the potential impacts of the proposed Project on air quality for more vulnerable groups of people. The proposed Project’s potential impacts would not likely have measurable effects to vulnerable populations.

The Proponent’s memo concludes that during construction, people with compromised respiratory systems may be at risk if they are in close proximity to operating construction equipment if the concentrations are high enough to cause a response in the individual affected. However, the Proponent states that the likelihood of this would be low.

Further, in response to a comment raised by a member of the public, the Proponent clarified that odour was not expected to be a concern.

During Application review, the public expressed concern regarding the impact of the proposed Project to human health in the event of an accident or malfunction. Please see Part D of this report for EAO and VFPA’s assessment of the potential accidents and malfunctions related to the proposed Project.

---

<sup>70</sup> Available on EAO’s ePIC site for the proposed Project.

The measures that the Proponent would be required to undertake to reduce potential impacts to air quality are described in section 5.3 of this Report.

### 9.2.3 Road Traffic Effects

During construction, traffic generated at the marine terminal and fuel-receiving facility would temporarily increase traffic in Richmond. The Proponent assumed a direct relationship between increase in traffic and increase in the risk to public safety, resulting in the inference that there would be an increase in risks to public safety with increased traffic during construction.

Disruptions to Highway 99 motor vehicle traffic flows may cause changes to other roads in the vicinity, including No. 5 Road, Sidaway Road, or No. 6 Road. The Proponent's Traffic Management Plan would be developed to minimize adverse effects on road traffic.

The proposed Project would eliminate current truck traffic from the US to YVR. Approximately 1000 round trips per month would be eliminated. By the same assumption regarding public safety and traffic outlined in the construction effects section above, operations of the proposed Project could result in a decrease in risk to public safety due to traffic.

### 9.2.4 Contaminated Sites:

Potential health effects associated with disturbance of contaminated sites depend on the nature and amount of the agent, as well as the presence or absence of exposure pathways. Exposure routes can occur through skin contact, inhalation or ingestion.

Potentially effected populations would be local residents in close proximity to the marine terminal, fuel receiving facility and pipeline route. Local residents could also benefit from removal of any contamination during proposed Project construction.

The proposed Project's net effect to human health with regard to contaminated sites at the marine terminal, proposed fuel receiving facility, and proposed pipeline route and would be positive<sup>71</sup>. If contaminated sites were found, the Proponent would implement strategies to identify appropriate materials handling procedures. The Proponent's management strategies would include action to eliminate, limit, correct, counteract, mitigate, or remove any contaminant or adverse effects of human health of any contaminant.

---

<sup>71</sup> Section 5.5 of this report has more information on the proposed Project's impact to contaminated sites.

The Proponent would not be excavating during operations. It is unlikely that existing contaminated sites, and therefore potential exposure pathways, would be disturbed during operations.

#### 9.2.5 Recreation:

The proposed Project could involve extension of Richmond's river dyke access trail around the perimeter of the marine terminal property, improving pedestrian and bicycle mobility, potentially increasing the likelihood of trail use by local and regional residents, which could have a positive impact on human health.

### 9.3 Residual Adverse Effects of the proposed Project on Human Health

Local residents in close proximity to proposed Project construction sites would experience short- and medium-term noise effects. As well, during operations, local residents in close proximity to the marine terminal operations would experience long-term and infrequent noise effects.

The proposed Project would result in medium-term disruption to traffic during proposed Project construction of proposed Pipeline which may increase the risk to public safety. However, during operations, the proposed Project could result in increased public safety with regard to motor vehicle traffic due to a decrease in tanker truck movements during operations.

Proposed Project construction would result in management of contaminated sites. As well, during operations the proposed Project would result in improved overall air quality for Metro Vancouver residents as a result of a decrease in tanker trucks on roads and shorter vessel transit distance in Canadian waters.

The proposed Project could result in increased recreational opportunity for Metro Vancouver residents as a result of the extension of Richmond's river dyke access trail.

EAO's assessment of residual effects, where relevant, for the Human Health VCs of noise, air quality, road traffic, and existing contaminated sites are located in sections 5.4, 5.3, 7.3 and 5.5, respectively, of this report.

### 9.4 Significance Analysis

EAO and VFPA's significance assessments for noise, air quality, road traffic and existing contaminated sites are contained in sections 5.4, 5.3, 7.3 and 5.5 of this report.

## 9.5 Conclusion

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to have significant adverse effects to human health.

Please see sections .4, 5.3, 7.3 and 5.5 for EAO and VFPA's assessment of the significance of the proposed Project's potential effects on noise, air quality, road traffic and existing contaminated sites.

## 10 Effects of the Environment on the Proposed Project

In addition to evaluating the effects of the proposed Project on the environment, changes to the proposed Project that may arise as a result of the environment have also been considered. The assessment of the effects of the environment on the proposed Project included identifying the environmental factors deemed to have possible consequences on the proposed Project, the likelihood and severity of their occurrence and mitigation measures planned to minimize their impact.

Chapter 21 of the Application presents the effects of the environment on the proposed Project. The analysis includes consideration of the following:

- Extreme weather and weather-related events (extreme temperatures, precipitation (snow or rain), lightning, and extreme storm or wind events);
- Flooding (in combination with heavy rainfall, snowmelt (freshet), and/or storm events);
- Wildfire;
- Seismic activity; and
- Climate change.

Proposed mitigation, including design strategies, was considered in the evaluation of the effects of the environment on the Project and the determination of their significance.

For effects of the environment that result in an aviation fuel spill or fire, please refer to the Accidents and Malfunctions section of this report in Part D.

### 10.1 Extreme Weather and Weather-Related Events

The primary extreme weather conditions and weather-related events with the potential to adversely affect the proposed Project include, extreme temperatures, significant amounts of precipitation and extreme storm or wind events.

The potential effects of extreme weather on the proposed Project were considered for both the Construction period and for the Operation period of the proposed Project.

An increase in extreme weather events has been recorded and it is expected that these events will continue to increase in the future in association with climate change.

#### 10.1.1 Construction

Extreme temperatures have the potential to induce malfunctions in construction equipment and machinery. During the construction period, appropriate machinery will be used and designed to operate within expected regional temperatures and snow loading.

During construction, significant daily precipitation could halt or slow work progress and increase sediment run-off. Site planning and design will incorporate measures to mitigate and manage the potential precipitation and these measures will be detailed in the Construction Environmental Management Plan.

Extreme storm and wind events have the potential to have the most impact on construction activities associated with the marine terminal. In particular, winds have the potential to affect above-water, on-shore and near-shore construction equipment. Lightening associated with storm events near or at the tanks, equipment or electrical switchgear could initiate a spill and/or fire if the fuel receiving tanks are in use.

#### 10.1.2 Operation

Extreme temperatures in the Project area are not expected to measurably affect the Project during operations.

Extreme precipitation, including accumulated rain and/or snow, is unlikely to hinder operations. Under conditions of heavy snow and ice, however, the marine terminal operations may cease. These conditions could make it difficult for vessel docking, fuel off-loading and transfer activities. Accumulated precipitation is unlikely to result in the shutdown of marine terminal operations.

Extreme temperatures are not a concern for the proposed fuel pipelines, however, in the event that extreme cold temperatures (colder than -10 degrees Celsius) are experienced, the proposed fuel receiving facility may be impacted. The oil/water separator system at the facility could experience cracks and leaks. In addition, piping and equipment that normally or may contain water (for example, the tank water drains), will be insulated. Operations and maintenance manuals and procedures will outline winterization requirements that must be undertaken at the onset of cold weather.

All proposed Project components will be designed according to ambient and climatic conditions as specified in the National Building Code of Canada and as they apply for the City of Richmond.

Fuel off-loading and transfer operations are not expected to be affected by extreme storm or wind events. The equipment will be designed to operate within a safety envelope of movement. In the event of unsafe conditions due to unexpected or extreme weather, off-loading and transfer operations would cease. Vessel mooring will be designed to withstand sustained wind speeds and gusts from all directions. All proposed Project components will be designed to withstand 1 in 100 year hourly wind pressure events.

Vessel transits in the river will be scheduled and will only occur during safe weather conditions as determined by the Fraser River Pilots.

## 10.2 Flooding

Flood threats affect the Lower Fraser River on an annual basis and are a result of a combination of rainfall, snowmelt and/or storm events. There is a 1 in 3 chance that a large flood, similar to those experienced in 1894 and 1948, could occur in the next 50 years. A dyke system surrounds the entire perimeter of Lulu Island, which includes the proposed Project area, and is designed to accommodate a 1 in 200 year flood event. The Richmond South Dike is closest to the marine terminal and fuel receiving facility.

Hydraulic modelling indicates two dominant flood profiles in the Fraser River, including the winter storm surge profile and the spring freshet profile, with the winter storm surge profile exceeding the spring freshet profile by approximately 0.3 metres in the lower Fraser River.

There are concerns about the effectiveness and/or breach of the dike system in the proposed Project area in the event of winter storm surge accompanied by waves or tidal surge and/or forecasted sea level rise. In addition, there is also a risk of flash floods from heavy rainfall events and impermeable landscapes.

The City of Richmond dike inspection and maintenance program is in place and includes weekly inspections, vegetation control, seismic studies and an annual survey program.

Seismic risk in Richmond is high but there is only a slight risk associated with tsunamis or long high ocean waves generated by underwater earthquakes. Vancouver Island is expected to buffer any tsunamis coming from the Pacific Ocean.

### 10.2.1 Construction

Flooding could disrupt above and below ground activities and create greater potential for surface water contamination and siltation. Weather centres will be monitored during construction and detailed flood planning, preparedness and emergency response measures will be included in the Construction Environmental Management Plan.

### 10.2.2 Operation

Flooding could affect the marine terminal and cargo off-loading activities, however damage to Project infrastructure is not expected as all components of the proposed Project would be designed to withstand a 1 in 200 year flood.

In addition, the marine terminal will be designed to withstand all physical river loads and flash floods. Drainage systems will also be designed to withstand rainstorms.

The fuel receiving facility will be located at least 2 metres above mean sea level and will be designed to National Fire Code standards, including for receiving tanks and piping systems.

The pipeline will be designed to withstand buoyant forces and will have shut in to contain all products, should any terminal facility become compromised during flood or seismic event.

## 10.3 Wildfire

Based on the urban and industrial setting, the potential for natural wildfire is considered low. Fire risk as a result of lightning strike in the project area is considered low. The proposed marine terminal is located in a highly altered landscape and wildfire is not likely. Wildfire along the proposed pipeline right-of-way is also considered unlikely and in the event of fire, the pipeline would be located underground and not likely impacted by a wildfire.

## 10.4 Seismic Activity

The proposed Project area is located in an active seismic region in Canada and has high potential for ground movement associated with earthquakes. There is a 30% chance of experiencing significant earthquake-related damage once every 50 years. Liquefaction is a concern in the Project area. There is potentially high ground deformation and strength loss within the subsurface soils induced by strong earthquake shaking.

During the short construction period, risk of an earthquake is low, however, in the event of an earthquake; ground failure poses potential safety threats to on-site workers and

the public in the immediate vicinity of the proposed Project. Geotechnical investigations will be completed to develop an understanding of the specific site conditions and all temporary structures for construction of the various components of the proposed Project will be designed and constructed in accordance with appropriate regulations and codes.

Engineering techniques will be implemented to reduce the potential risk of seismic-related hazards.

Detailed, site specific geotechnical investigations and engineering analyses will be performed during the design of all components of the proposed Project. The potential seismic-induced hazards will be minimized by the implementation of appropriately designed and constructed, earthquake-resistant engineering measures.

The marine terminal will be designed for a one in 475 year seismic event. The fuel receiving facility and pipeline river crossing will be designed to withstand a seismic event with an equivalent return period of 2,475 years, while the sections of the pipeline away from the river will be designed for a 475 year earthquake return period.

Automated electronic /mechanical shut off devices will be installed within the fuel off-loading system and at the new fuel receiving facility and the fuel pipeline system, to reduce loss of product to the environment if there should be a seismic event.

## 10.5 Climate Change

According to climate change models and temperature trends referenced in the Application, climate change is occurring. Climate change is expected to have physical effects such as changes to temperature and precipitation, increasing frequency and severity of extreme weather, changes in river flows, increased flood and wildfire risk, shrinking glaciers and snowpacks, rising sea level and changes to ocean temperature, salinity and density. Global climate change will interact with the natural regional climate changes effects of the Pacific Decadal Oscillation (El Nino and La Nina).

Extreme weather and weather-related events are expected along with increases in sea level. These are expected to impact the proposed Project during construction and operations. In the design of the terminal facilities, the Proponent must follow the "Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use: Sea Dike Guidelines" (Ministry of Environment 2011) to account for potential increases in water levels due to global sea level rise and potential flooding during extreme freshet conditions. As the proposed Project will also need to follow applicable requirements (such as building codes), it would be designed, constructed, operated and managed in a manner that will address the potential adverse effects due to climate change.

## 10.6 Conclusion

The evaluation of potential adverse effects of the environment on the proposed Project is a specific requirement under CEAA.

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), VFPA is satisfied that the environment is not likely to have significant adverse effects on the proposed Project.

## 11 Navigable Waters and Navigation

The Proponent provided its assessment of the navigational issues in Chapter 20 of its Application. As well, a separate and independent navigation risk assessment for tanker traffic was carried out by Det Norske Veritas (DNV) at the request of the VFPA (“Fraser River Tanker Traffic Study”, June 2012), which was also used by the VFPA and Environmental Assessment Office (EAO) to inform this Report<sup>72</sup>.

The Fraser River Tanker Traffic Study report uses a risk assessment statistical model to calculate the frequency and consequence of marine accidents and provide a geographical picture of the distribution of marine risks (navigation accidents and cargo spills), in terms of traffic densities, accident frequencies and accident consequences at specific locations within the study area.

Navigational issues considered in both the Application and in the Fraser River Tanker Traffic Study report are those that could result in accidents or malfunctions with possible environmental implications of spills of cargo. Considering that jet fuel is not currently transported on the Fraser River by ocean going vessels and barges, this Report focuses only on the navigational issues relevant to the Fraser River. Jet fuel and other bulk liquid hydrocarbon cargos are routinely transported in the Salish Sea by ocean going vessels and barges in quantities and vessel movement numbers significantly greater than those planned for the proposed Project, as indicated in the Application and from other information available to the VFPA.

Physical factors that affect navigation in the Fraser River that are considered in both the Application and in the Fraser River Tanker Traffic Study include tide heights, river currents including at freshet and under various tide ebb and flow scenarios, water density, sedimentation and its effect on channel depth and width, wind and waves, and the physical makeup of the river channel. Navigational system and other features

---

<sup>72</sup> The Fraser River Tanker Traffic Study report is available on the Port Metro Vancouver website at: <http://www.portmetrovancover.com/en/users/marineoperations/navigation/TankerTraffic.aspx>.

considered include channel depth and width, dredging, navigational aids, existing and projected vessel traffic, the historical accident record, and traffic management factors including pilotage requirements, speed restrictions, and transit windows.

The Proponent considered these and concluded that transiting partly-laden Panamax-class vessels between its terminal and the river mouth is feasible. With tidal assist, the channel depth is adequate for at least one 2-hour transit window on any given day of the year, and the channel width is adequate for single lane traffic at 11.5 m depth and two-way traffic for vessels of 10.7 m draft or less. All bends meet minimum turning radius requirements and there is adequate turning room at the terminal and in a turning basin upstream of the terminal. This was not contradicted by the findings of the Fraser River Tanker Traffic Study which indicates the overall navigation risks to be low in frequency and consequence (unlikely to result in a spill of liquid cargo).

The Proponent also conducted computer model vessel manoeuvring simulations of Panamax-class vessels arriving at and departing from the terminal with tug assist under various wind, tide and current situations. It concluded that the maximum design vessel proposed will be able to complete the modelled manoeuvres in any of the expected river conditions, with a reserve of rudder capacity, engine speed and tug power. It notes that some of the modelled conditions exceed the upper river current limits imposed by the Fraser River Pilots for berthing and de-berthing manoeuvres. The Proponent also modelled the effects on berthed vessels of vessels passing in the adjacent channel, looking in particular at loads on berthing lines and induced motion in the berthed vessel. It made recommendations regarding the minimum numbers and strengths of berthing lines and passing speed limits. The Fraser River Tanker Traffic Study assumed no specific risk reduction measures are in place to control the risk of striking by passing ships and indicated this to be an area where though risks are low, such measures will be required to be developed and implemented in order to further mitigate the risk of striking at the proposed marine terminal location.

The Proponent describes the proposed marine terminal location as being set back from the navigation channel of the river. Impacts of facility construction and operation on other navigation of the river are indicated as likely to be insignificant after application of mitigations.

The Fraser River Tanker Traffic Study considered and modelled the risks associated with a number of traffic scenarios involving the proposed and hypothetical future operations involving jet fuel and other liquid bulk cargos on the Fraser River. There are no existing liquid bulk terminal operations in the study area and the proposed Project was the only one modelled that is in the proposal stage. Other operations considered in the scenarios were those deemed by the VFPA to be hypothetically possible at some

time in the future, and were included to ensure that the risk assessment was conservative in its traffic volume considerations.

Specific future scenarios and their environmental risk assessment outcomes were as follows:

- Assumed Traffic, 2016, jet fuel (VAFD Project on line) – risk acceptable with justified mitigations; spill frequency once in 192 years, with average spill size 917 tons;
- Hypothetical Traffic:
  - 2021, annual increases in jet fuel) – risk acceptable with justified mitigations; spill frequency once in 123 years, with average spill size 918 tons;
  - 2026, annual increases in jet fuel ) – risk acceptable with justified mitigations; spill frequency once in 87 years, with average spill size 920 tons; and
  - 2021, annual increases in jet fuel plus canola oil plus aggregate) – risk acceptable with justified mitigations; spill frequency (for jet fuel) once in 114 years, with average spill size 931 tons.

Acceptability of (unmitigated) risk was determined through the application of a risk acceptance criteria matrix, with frequencies (of occurrence) rated from Improbable (5) to Highly Probable (1) and consequences rated from Extreme (A) to Low (E). The criteria used in the study are based on the Transport Canada Pilotage Risk Management Methodology, with some small changes to increase its applicability to the Fraser River port context. The matrix generates results coded Green (risk is tolerable although low cost risk reduction measures should still be considered for application), Yellow (risk is “As Low As Reasonably Possible” if all justified risk reduction measures have been implemented) and Red (risk is unacceptable).

Metrics evaluated in the matrix included property (economical considerations), port business (operational considerations), human safety and environment. All metrics except environment scored “green”; environment scored “yellow” because of the potential complexity of effects and consequences that might derive from a spill. Risk was deemed acceptable if justified risk reduction measures are applied. To determine what those reduction measures might be, potential risk reduction options were evaluated for effectiveness, practicality and cost by an expert panel with representatives from government and industry. Options deemed justifiable scored well in all three areas.

The DNV study report identified a number of risk reduction options for consideration to mitigate the identified risks and also provided a coarse evaluation of those options in terms of overall feasibility, practicality and effectiveness.

The responsibility for adopting or implementing most of the identified risk reduction options lies with the VFPA or bodies other than the Proponent of the Project, and will be given consideration by the VFPA in its permitting process and on-going vessel traffic management process. Risk reduction through improved spill response capability and berthing operations safe practices was addressed by the Proponent in its Application.

In consideration of the assessments provided it does not appear that there are any navigational issues associated with the proposed Project that would result in a significant risk.

## **PART C - FIRST NATION CONSULTATION REPORT**

### **12 Purpose and Overview**

The purpose of this section of the Assessment Report is:

- To identify First Nations potentially affected by the proposed Project;
- To describe the process of consultation engaged in by EAO on behalf of the Province, and by the Proponent, under the direction of EAO, for the EA of the proposed Project;
- To summarize the key issues and concerns identified by those First Nations that have established or asserted aboriginal rights, including title, to the area encompassed by the proposed Project;
- To identify the asserted aboriginal rights and the *prima facie* strength of those assertions, the degree of any potential adverse impacts that the proposed Project may have on those asserted rights, and EAO's view as to where on the *Haida* spectrum the proper consultative procedure is located;
- To demonstrate how the Crown has met the duties under the Tsawwassen First Nation Final Agreement;
- To identify Douglas Treaty rights that apply to the geographic area associated with the proposed Project and summarize key issues and concerns identified by Tsawout First Nation;
- To the extent that there is a likelihood that aspects of the proposed Project may impact established or asserted aboriginal rights, including title, or treaty rights, to identify the accommodation measures that have been applied or that are contemplated in respect of those potential impacts as a result of the consultation undertaken during the EA by EAO and the Proponent; and
- With regard to the overall consultation and accommodation process, to describe EAO's conclusion as to the reasonableness of the process in the circumstances and EAO's conclusion as to whether the Crown's duties have been discharged.

## 12.1 Information Sources

In determining which First Nations may have an interest in the EA of the proposed Project and in creating this Report, EAO evaluated a number of information sources including:

- The Tsawwassen First Nation Final Agreement and appendices;
- Information provided by First Nations to EAO (or information provided to the Proponent and passed on to EAO), through personal communications, meetings, correspondence, or involvement in the EA process (including comments received through EAO's Working Group or public comment periods);
- Available relevant information from within the provincial government, such as the Ministry of Aboriginal Relations and Reconciliation;
- Available relevant information from the BC Treaty Commission website, including Statement of Intent maps, status (if applicable) within the treaty negotiations process, and other information on First Nation communities in BC;
- Relevant case law;
- Information compiled in past EAs presented in assessment reports and posted to EAO's (ePIC);
- Information on the Federal Aboriginal Affairs and Northern Development website, including the Douglas Treaties, locations of First Nation reserves/communities, and statistical information on those populations;
- Available individual websites of First Nation communities, tribal councils or associations;
- The Proponent's Application and supporting materials, including archaeological and traditional use/knowledge overviews commissioned by the Proponent, and information regarding the proposed Project alignment in relation to Indian Reserves, asserted traditional territories, Tsawwassen Lands or treaty lands; and
- Available ethnographic information:
  - Clark, Adrian. 2007. Musqueam Nation Statement of Intent Area Report on Strength of Claim Assessment Research. Ministry of Attorney General – Aboriginal Law Group. (Confidential);
  - Clark, Adrian. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Ministry of Attorney General – Aboriginal Research Division. (Confidential);
  - Howes, Kenneth. 2003. Fraser Corridor Transportation Program: Soundness of Claim Report. Ministry of Attorney General – Aboriginal Research Division. (Confidential);

- Suttles, Wayne. 1990. Handbook of American Indians, vol. 7: Northwest Coast. Washington, DC: Smithsonian Institution;
- Tseil-Waututh Nation, Review of Anthropological and Historical Sources (Confidential) [MAG, June 2010];
- Musqueam Nation Statement of Intent Area, Report on Strength of Claim Assessment Research [Adrian Clark, March 30, 2007];
- Analysis of Strength of Claim for the Musqueam Nation and Seriousness of Impact of the Tsawwassen First Nation Final Agreement. Privileged and Confidential. Memo from Debbie Chan (Legal Counsel), MAG to Bronwen Beedle (Chief Negotiator with MARR), Sept 28, 2007;
- The Hul'qumi'num Treaty Group, Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Stz'uminus, Lyackson, Penelakut and Hwlitsum First Nations. (Confidential) Prepared for MAG. June 15, 2007; Revised Oct 12, 2007; Revised Sept 8, 2009;
- Analysis of Strength of Claim for the Hul'qumi'num Treaty Group and its member First Nations (Cowichan, Lake Cowichan, Halalt, Stz'uminus, Lyackson, Penelakut and Hwlitsum) and Seriousness of Impact of the Tsawwassen First Nation Final Agreement. Privileged and Confidential. Memo from Sarah Macdonald (Legal Counsel), MAG to Bronwen Beedle (Chief Negotiator with MARR), Sept 28, 2007;
- The Evergreen Line: A review of the ethnographic, archaeological and historic sources: Squamish Nation, Musqueam Nation, Tseil-Waututh Nation, Kwikwetlem First Nation, Hul'qumi'num Treaty Group and Stó:lō Nation. (Confidential) Prepared by MAG. June 16, 2009;
- Bevan Wells Water Project – Bevan Wells & Stave Lake Project Areas: Review of Historical and Ethnographic Sources. (Confidential) Prepared by MAG. November, 2010; and
- Musqueam Indian Band: Review of Anthropological and Historical Sources Relating to the Use of Land. (Confidential) Prepared for MAG. March, 2007; Revised June, 2010.
- Information provided by First Nations to the Proponent and EAO regarding traditional use of the proposed Project area, including:
  - Tsawwassen First Nation traditional use study report, received December 30, 2008;
  - Hwlitsum First Nation traditional use study report, received January 28, 2009;
  - Penelakut Tribe traditional use study draft report, received February 11, 2009, and final report, received April 14, 2009;
  - Semiahmoo Nation Response to BC [Don Welsh, undated]. Received April 15, 2011. Response to: Semiahmoo First Nation: Review of Ethnographic

Sources regarding the Semiahmoo First Nation's Use and Occupancy Area [Adrian Clark, April 8, 2008];

- The Crown's Duty to Consult and Accommodate the Hwlitsum First Nation. Memo from Jeanie Lanine, December 21, 2006 to HTG, on behalf of Hwlitsum First Nation;
- An Analysis of Cartographic and Archaeological Evidence to Locate Tl'eqtines, A 19th Century "Cowitchen Village," on The South Shore of Lulu Island, B.C. Prepared for the Proponent by John Dewhirst, November 22, 2010; and
- The location of Tl'eqtines, a "Cowichan Village", on the South Shore of Lulu Island, B.C. Prepared for the Proponent by John Dewhirst, May 18, 2010.

The information sources listed above were used by EAO to identify treaty rights and asserted aboriginal rights and title in the area and to determine how they may be impacted by the proposed Project. EAO's detailed analysis is found in the sections below.

## 12.2 First Nations Setting

EAO consulted with the following First Nations regarding the EA of the proposed Project:

- Cowichan Tribes;
- Halalt First Nation;
- Hwlitsum First Nation;
- Katzie First Nation
- Kwantlen First Nation;
- Kwikwetlem First Nation;
- Lake Cowichan First Nation;
- Lyackson First Nation;
- Musqueam Indian Band;
- Penelakut Tribe;
- Qayqayt First Nation;
- Semiahmoo First Nation;
- Stz'uminus First Nation;
- Tsawwassen First Nation;
- Tsawout First Nation; and
- Tseil-Waututh Nation.

### *Non-Treaty First Nations*

Based on available information, including discussions with First Nations, EAO originally determined that the following ten First Nations had overlapping asserted traditional territories that included all or portions of the proposed Project area:

- Hul'qumi'num Treaty Group:
  - Stz'uminus First Nation;
  - Cowichan Tribes;
  - Halalt First Nation;
  - Lake Cowichan First Nation;
  - Lyackson First Nation; and
  - Penelakut Tribe;
- Hwlitsum First Nation<sup>73</sup>;
- Kwantlen First Nation;
- Musqueam Indian Band; and,
- Semiahmoo First Nation.

EAO also contacted the following three First Nations whose traditional territories are less likely to be impacted by the proposed Project and committed to keeping them apprised of key EA milestones:

- Qayqayt First Nation;
- Kwikwetlem First Nation; and,
- Katzie First Nation.

Although readily available information indicated that the proposed Project was located outside of Tsleil-Waututh Nation's traditional territory, EAO consulted with Tsleil-Waututh Nation based on Tsleil-Waututh Nation's assertion that they practiced aboriginal rights, such as gathering and fishing, in the proposed Project area. EAO issued an order under section 13 of the Act on April 8, 2011 to amend the section 11 order, which identifies First Nations to be consulted on the EA for the proposed project, to include the Tsleil-Waututh Nation as a First Nation with whom EAO would consult with directly.

---

<sup>73</sup> Hwlitsum First Nation is a community of Registered Indians under the *Indian Act*, but is not recognized as a First Nation as defined by the *Indian Act*. Hwlitsum First Nation is located at Canoe Pass and does not have any reserves. EAO did consult the Hwlitsum First Nation during the EA.

## *Treaty First Nations*

The proposed Project is located in the Greater Vancouver Regional District and could potentially affect Tsawwassen Lands, residents of Tsawwassen Lands, or Tsawwassen First Nations rights set out in the Tsawwassen Final Agreement. As a result, EAO consulted the Tsawwassen First Nation as per the Tsawwassen Final Agreement.

The proposed Project is also located in an area in which Tsawout First Nation may have traditionally exercised the right to fish under the terms of the Douglas Treaty. Based on potential impacts from the proposed Project on fish and fish habitat, EAO also consulted with Tsawout First Nation.

## **13 Overview of the Consultation Process**

### 13.1 EAO Consultation with First Nations

This section provides an overview of consultation activities undertaken by EAO with all First Nations that EAO consulted with during the EA. For specific consultation activities between EAO and individual First Nations, please see each First Nation's individual section in this report.

Provincial decision-makers have legal obligations to consider and potentially accommodate asserted aboriginal rights and title which might be impacted by provincial decisions. Moreover, decision-makers are required to consult where decisions or actions could potentially infringe proven aboriginal rights (including title) or treaty rights. No infringements can be justified without consultation occurring. In short, government is legally required to consult with First Nations and seek to address their concerns before impacting claimed or proven aboriginal rights (including title) or treaty rights.

For the purposes of this report, EAO has defined the following terms:

- Aboriginal rights are practices, customs or traditions integral to the distinctive culture of the First Nation claiming the right. A practice undertaken for survival purposes can be considered integral to a First Nation's culture. Some examples of aboriginal rights are hunting, fishing, and gathering plants for traditional medicines and spiritual ceremonies. Aboriginal rights may be connected to a particular piece of land, and are generally not exclusive.
- Aboriginal title is a subcategory of aboriginal rights that has its own test for proof. It is a unique interest in land that encompasses a right to exclusive use and occupation of the land for a variety of purposes. Those uses must not be

inconsistent with the nature of First Nation's historical attachment to the land. A claimant must prove exclusive occupation of land prior to sovereignty.

- Treaty rights are rights held by a First Nation in accordance with the terms of a historic or modern treaty agreement with the Crown. Treaties may also identify obligations held by a First Nation and the Crown.

The duty to consult is readily triggered and consultation is required where claimed or proven rights (including title) or treaty rights may be impacted by a potential Crown decision or activity. The extent (or level) of the Crown's obligation to consult will vary with the circumstances, and the nature and scope of the Aboriginal Interests impacted. The extent or levels of consultation are on a spectrum from notification to deep: the stronger the case for supporting a claimed right, or if there is a proven right, and the greater the potential for impacting those, the deeper the consultation that may be required.

Where there is a strong aboriginal rights claim (including title) and the potential for negative impacts on the claimed aboriginal right or title or treaty right is high, and there is a risk of non-compensable damage, the duty is to engage in a deep consultation process.

Where there is a likely impact on a reasonable claim or a reasonable probability of an infringement of a proven aboriginal right or title, or treaty right, consultation and accommodation in the normal range will be required.

When an aboriginal claim is weak or limited, or the potential for infringement of an aboriginal interest is minor, the legal duty may be to give notice or the pending decision or activity, disclose information, and provide opportunity to discuss any issues raised in response to notice.

#### *Pre-Application Stage*

During the pre-Application stage of the EA process, EAO's consultation with First Nations included the following opportunities for the eleven First Nations originally identified in the section 11 Order<sup>74</sup>:

- **February - April 2009:** EAO notified First Nations about the proposed Project and invited them to join a Working Group comprised of First Nation governments and local, provincial, and federal government agencies.

---

<sup>74</sup> Additional information on how EAO consulted the Tsleil-Waututh Nation can be found in the Tsleil-Waututh Nation section below (section 14).

- **April 2009:** First Nations were invited to attend an introductory Working Group meeting organized by EAO, and a tour of the proposed Project site organized by the Proponent;
- **July 2009:** First Nations were provided with an opportunity to review the procedures and methods for conducting the EA, as described in a draft order under section 11 of the Act;
- **November 2009:** after considering comments received by First Nations, EAO finalized and issued the order under Section 11 of the Act. The section 11 order assigned specific responsibilities to the Proponent for undertaking procedural aspects of the Crown's duty to consult with potentially impacted First Nations, including gathering information about how the First Nations' treaty rights or asserted aboriginal rights, including title, may be impacted by the proposed Project;
- **November 2009:** EAO wrote to the Hul'qumi'num Treaty Group First Nations (Lake Cowichan First Nation, Halalt First Nation, Lyackson First Nation, Stz'uminus First Nation, Penelakut Tribe, and Cowichan Tribes) to provide them with EAO's understanding of their preferences for consultation regarding the EA of the proposed Project. EAO requested that the First Nations advise if they had any concerns with EAO's proposed consultation approach. Their preference was to include the HTG First Nations, and EAO accommodated that request;
- **December 2009:** EAO held a Working Group meeting to discuss the (dAIR) and invited First Nations to participate. First Nations were also provided with an opportunity to comment on the first draft of the dAIR;
- **March 2010:** EAO provided the Working Group, including First Nations, with an opportunity to provide follow-up comments on the Proponent's preliminary responses to Working Group comments on the dAIR;
- **June 2010:** First Nations were invited to participate in a Working Group meeting held by EAO to discuss the Proponent's spill modelling and spill contingency planning;
- **August 2010:** EAO circulated the final version of the dAIR to the Working Group, including First Nations, for review and comment; and
- **August 2010:** EAO provided capacity funding to each First Nation listed in the section 11 Order.

### *Application Review Stage*

In early February 2011, EAO notified the Working Group, including First Nations, that EAO had accepted the Proponent's Application for review. EAO also confirmed that First Nations had each received a copy of the Application. During the Application review stage of the EA, the Proponent and EAO continued to consult with First Nations with

respect to their perspectives and opinions about the proposed Project and the potential effects of the proposed Project on asserted aboriginal rights and interests or treaty rights, as outlined below:

- **March 2011:** EAO held a Working Group meeting to discuss the Application and the associated review process, and to establish sub-working groups. Representatives from Hwlitsum First Nation, Cowichan Nation Alliance, Halalt First Nation, Kwantlen First Nation, Musqueam Indian Band, Penelakut Tribe, and Semiahmoo First Nation attended the meeting;
- **March 29, 2011:** EAO held a Working Group meeting to discuss social, heritage and health issues. The meeting was attended by representatives from Cowichan Nation Alliance, Cowichan Tribes, Lyackson First Nation, Hwlitsum First Nation, Kwantlen First Nation, Musqueam Indian Band, Tsawwassen First Nation, Penelakut Tribe, and Tsawout First Nation;
- **April 5, 2011:** EAO held a Working Group meeting to discuss proposed Project risk, spill prevention and response, and fire prevention and response. Representatives from Cowichan Nation Alliance, Hwlitsum First Nation, Lyackson First Nation, Musqueam Indian Band and Tsawwassen First Nation attended the meeting;
- **April 6, 2011:** EAO held a Working Group meeting to discuss spill risk, prevention and response and spill modelling, fate, and effects. Representatives from Cowichan Nation Alliance, Hwlitsum First Nation, Lyackson First Nation, Musqueam Indian Band and Tsawwassen First Nation attended the meeting;
- **April 8, 2011:** EAO issued a section 13 order to amend the Order under section 11 and add the Tsleil-Waututh Nation to the list of First Nations to be consulted with respect to the proposed Project. EAO specified that consultation would be undertaken directly by the Crown;
- **May 24, 2011:** EAO held a Working Group meeting to discuss the proposed Project's potential impacts to aboriginal fisheries and harvesting, as well as the Proponent's socio-economic assessment of the aboriginal communities. Representatives from Cowichan Nation Alliance, Hwlitsum First Nation, Halalt First Nation, Cowichan Tribes, Kwantlen First Nation, Tsawwassen First Nation, Semiahmoo First Nation and Musqueam Indian Band attended the meeting;
- **November 10, 2011:** EAO provided the Proponent's Highway 99 Addendum to First Nations for review and comment;
- **November 18, 2011:** EAO held a Working Group teleconference call to discuss the Proponent's Highway 99 Addendum. Representatives from Tsawwassen First Nation and Cowichan Nation Alliance participated in the call;
- **November 22, 2011:** EAO provided the interim issues tracking table to First Nations for their review and comment (final version in Appendix 2);

- **November 30, 2011:** EAO held a Working Group meeting to discuss the Proponent's Highway 99 Addendum, aboriginal food fisheries, and any outstanding issues from the Application Review issues Tracking Table, as well as the next steps in the EA process. Representatives from Cowichan Nation Alliance, Lyackson First Nation, Tsawwassen First Nation, Hul'qumi'num Treaty Group, Kwantlen First Nation, and Musqueam Indian Band, and Tsawout First Nation attended the meeting;
- **January 24, 2012:** EAO held a Working Group meeting to discuss the Proponent's table of conditions and revised aboriginal fisheries compensation framework. Representatives from Cowichan Nation Alliance, Musqueam Indian Band, Lyackson First Nation and Tsawout First Nation attended the meeting.
- **June, 2012:** EAO provided First Nations with the draft First Nations Consultation Report for review and comment, sending specific sections of the report that describe each First Nation to each First Nation separately, and allowing for a four-week review.;
- **October 12, 2012:** EAO provided First Nations with the draft Assessment Report, draft Table of Conditions, and draft Certified Project Description for review and comment. EAO informed First Nations that if they do not believe their interests have been adequately described and/or accommodated in keeping with the Province's legal duties, EAO will provide an opportunity for First Nations to submit their own report. EAO further advised that any First Nation reports received by EAO would be conveyed directly to Ministers along with EAO's Assessment Report for their consideration during the decision making process; and
- **October 22-23 2012:** EAO held a Working Group meeting to discuss the draft Assessment Report, the draft Table of Conditions, and the draft Certified Project Description. Tsawwassen First Nation, Musqueam Indian Band, Cowichan Nation Alliance, Halalt First Nation, Penelakut Tribe, Lyackson First Nation, Kwantlen First Nation and Hwlitsum attended the meeting.

Out of an abundance of caution, EAO contacted Squamish First Nation and Stolo Tribal Council during Application review to update them on the proposed Project EA, and inviting Squamish First Nation and the Stolo Tribal Council to contact EAO if they had any questions regarding the proposed Project.

EAO ensured that all First Nations had the opportunity to ask questions and submit comments during the EA, and EAO required the Proponent to make reasonable efforts to answer those questions and comments, where appropriate. EAO extended opportunities to all section 11 Order First Nations to meet directly on a government-to-government basis, if requested, to exchange information, discuss potential impacts to

aboriginal interests or treaty rights and collaboratively work towards developing measures to avoid or mitigate potential impacts of the proposed Project.

Additional details regarding the specific consultation activities undertaken by EAO for the 11 First Nations originally identified in the section 11 Order, and the Qayqayt, Kwikwetlem, and Katzie First Nations can be found in Sections 16 through 26.

### 13.2 Proponent Consultation with First Nations

This section provides an overview of consultation activities undertaken by the Proponent with all First Nations EAO directed the Proponent to consult during the EA. For specific consultation activities between the Proponent and individual First Nations, please see each First Nation's individual section in this report.

#### *Pre-Application*

Beginning in June 2008, the Proponent contacted each of the eleven First Nations that EAO directed them to consult with via the section 11 Order. In July 2009, Halalt First Nation, Cowichan Tribes, Hwlitsum First Nation, Lake Cowichan First Nation, Lyackson First Nation, Musqueam Indian Band, Penelakut Tribe, Semiahmoo First Nation and Stz'uminus First Nation participated in the fieldwork associated with the Proponent's Archaeological Overview Assessment.

In July 2009, the Proponent organized a boat tour of the proposed Project area and the eleven First Nations originally identified in the section 11 Order were invited. Halalt First Nation, Hwlitsum First Nation, Lake Cowichan First Nation, Musqueam Indian Band, and Penelakut Tribe participated in the boat tour.

In June 2010, the Proponent shared the results of its study to determine the location of the Cowichan Village of Tl'ektines in relation to the lands that the Proponent is proposing to lease from VFPA (as known as Port Metro Vancouver) with HTG First Nations.

#### *Application Review:*

The Proponent couriered copies of the Application to the eleven First Nations originally identified in the section 11 Order by February 18, 2011. On February 21, 2011 the Proponent wrote to each of the eleven First Nations originally identified in the section 11 Order with an invitation to:

- Discuss and consider the Application;
- Obtain and consider any additional information regarding specific First Nation interests that may be adversely affected by the proposed Project;
- Discuss and consider the potential adverse effects of the proposed Project on First Nation interests; and

- Discuss and consider ways to avoid, mitigate or otherwise accommodate potential adverse effects from the proposed Project.

The February 21, 2011 letter was followed up by a telephone call from the Proponent to each of the First Nations originally identified in the section 11 Order to discuss their preferred consultation approach and arrange for capacity funding.

On May 4, 2012, the Proponent provided their final First Nations Consultation Report to First Nations for their comment by June 1, 2012. No comments were received by EAO or the Proponent on the Proponent's Final First Nations Consultation Report. Cowichan Nation Alliance requested to comment on the Proponent's Final First Nations Consultation Report after reading EAO's draft First Nations Consultation Report.

Additional consultation activities undertaken by the Proponent (at the direction of EAO) specific to each First Nation are summarized in Section 3.

A record of comments received from First Nations during Application review and the Proponent's responses is included in Appendix 2.

## **14 First Nations Setting**

### **14.1 Introduction and Language Overview**

Prior to European contact, the southern end of the Strait of Georgia, most of the Strait of Juan de Fuca, and the Lower Fraser Valley was inhabited by the Central Coast Salish, which included the following five language groups: Squamish, Halkomelem, Nooksack, Northern Straits, and Clallam<sup>75</sup>.

Northern Straits speakers include Semiahmoo First Nation and Tsawout First Nation. On Vancouver Island, the Halkomelem speakers included the following Hul'qumi'num Treaty Group First Nations: Stz'uminus First Nation, Cowichan Tribes, Lake Cowichan First Nation, Lyackson First Nation, Halalt First Nation, Hwlitsum First Nation, and Penelakut Tribe, as well as Hwlitsum First Nation.

At a very broad level, the Northern Straits speakers were Central Coast Salish people who exploited the Fraser River salmon runs before the fish reached the river, while the Halkomelem speakers principally exploited the fish after they had entered the Fraser River. The Northern Straits-speaking people harvested their major stores of salmon on the sea.

---

<sup>75</sup> Suttles, Wayne. 1990. Handbook of American Indians, vol. 7: Northwest Coast. Washington, DC: Smithsonian Institution, p. 453.

On the mainland of British Columbia, the Halkomelem language is further divided into Hung'uminum, a downriver dialect spoken by First Nations (including Musqueam Indian Band and Tsawwassen First Nation) at the mouth of the Fraser River to Stave River, and Halq'emeylem, an upriver dialect spoken by the Stó:lō in the Fraser River Canyon, including Kwantlen First Nation.

## 15 Hul'qumi'num First Nations

### 15.1 Hul'qumi'num First Nations Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation

The Hul'qumi'num Treaty Group is made up of the following Coast Salish First Nations:

- Cowichan Nation;
- Lake Cowichan First Nation;
- Halalt First Nation;
- Stz'uminus First Nation;
- Lyackson First Nation; and,
- Penelakut Tribe.

Hwlitsum First Nation members are acknowledged by the Hul'qumi'num Treaty Group as Hul'qumi'num people, but they are not a member of the Treaty Group.

The term 'Cowichan' has often been used to refer to all speakers of Halkomelem, or for all those on Vancouver Island from Malahat to Qualicum<sup>76</sup>. Ethnologists have agreed to let the term Cowichan include the First Nations located on Vancouver Island between Nanoose Bay and Saanich Inlet and the First Nations of the Fraser River from the coast to the mountains at Yale<sup>77</sup>. Figure 9 is a historical map illustrating the location of *Tl'ektines*, which is identified on the map as 'Cowichan Village'.

---

<sup>76</sup> Suttles, Wayne, *Coast Salish Essays*, Burnaby: Talonbooks. 1987, (page. 170), as cited in: Ministry of Attorney General, Legal Services Branch, Aboriginal Research Division. 2009. *Cowichan Tribes: Review of Ethnographic, Historical and Archaeological Resources*. (page. 5.)

<sup>77</sup> Curtis, Edward, 1970. *The North American Indian*, vol. 9, New York: Johnson Reprint Corp, (page. 32), as cited in Ministry of Attorney General, Legal Services Branch, Aboriginal Research Division. 2009. *Cowichan Tribes: Review of Ethnographic, Historical and Archaeological Resources*. (page. 6).

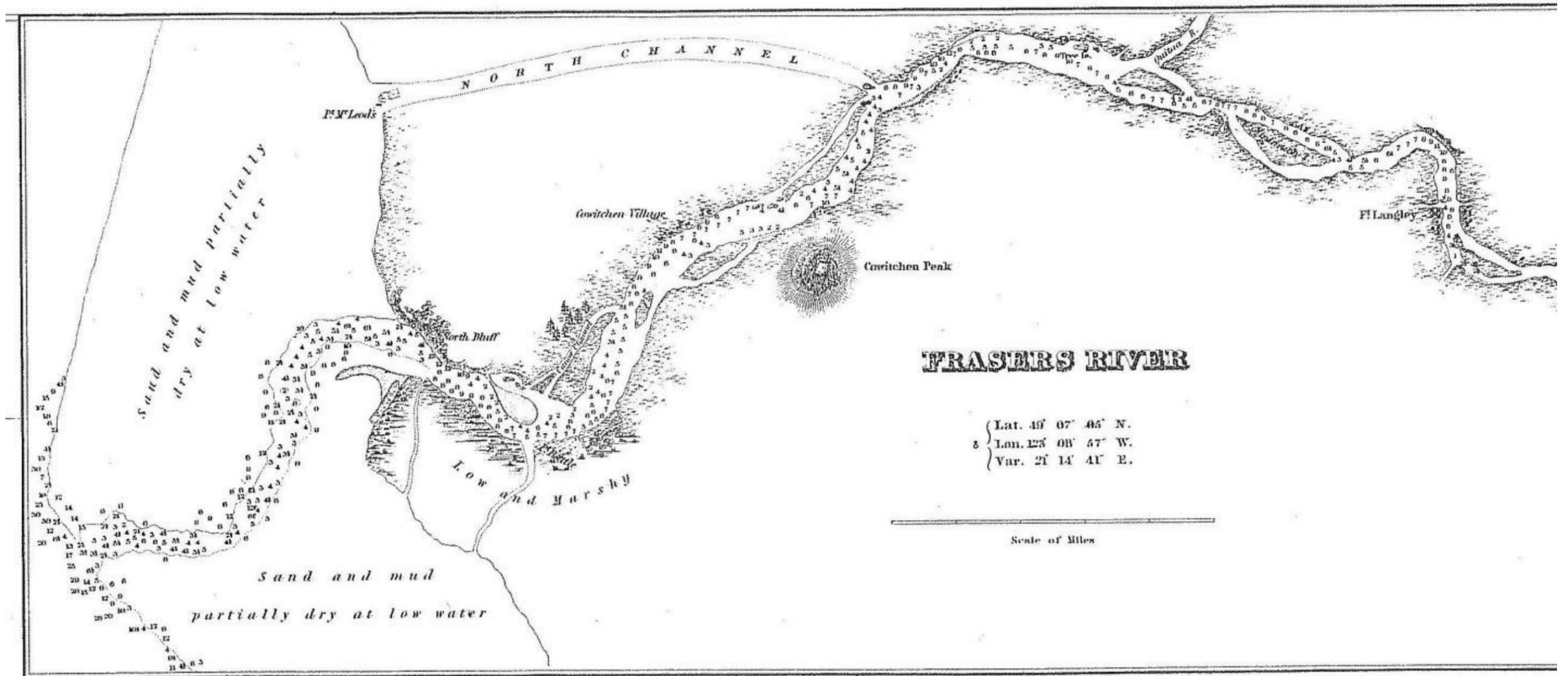


Figure 9. Map insert showing presence of Cowichan Village on the South Arm of the Fraser River (from 1841 US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey Map, Archipelago of Arro, Gulf of Georgia, Ringholds Channel and Straits of Juan de Fuca, Oregon Territory).

The Hul'qumi'num Treaty Group claims the east coast of Vancouver Island between Dodd's Narrows and Saanich Inlet as traditional territory, including all of Cowichan Lake to the west, and the Gulf Islands and the lower Fraser River to the east<sup>78</sup>. Each First Nation followed a seasonal round of resource exploitation on Vancouver Island, the Gulf Islands, and the lower Fraser River, staying in the permanent village on Lulu Island called *Tl'ektines*, or using temporary camps in other locations<sup>79</sup>. The mouth of the Fraser River and Canoe Pass are specifically mentioned as the areas used by the Vancouver Island Halkomelem speakers<sup>80</sup>. Point Roberts and the area near present-day Tsawwassen lands were also summer fishing and camping locations for the Vancouver Island Halkomelem peoples<sup>81</sup>.

The Central Coast Salish were organized into local groups of one or more households and included a central kingroup and dependant households; the local group named for the site it occupied<sup>82</sup>. The local group occupied the permanent house(s) of winter villages<sup>83</sup>. Descent was traced bilaterally, marriage was between different families and different groups, and marriage ties provided reciprocal access to and promoted cooperation for the exploitation of resources<sup>84</sup>.

Individuals who married into a community gained the right to share in the ownership of common lands, but rights to access common lands in the individual's original village had to be arranged<sup>85</sup>. Access to resources other than one's own required explicit permission of the owner<sup>86</sup>. Some property rights were exclusively held by descent groups, and other lands were held in common by village groups<sup>87</sup>. Coast Salish also spoke of a "joint

---

<sup>78</sup>Ministry of Attorney General, Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations*. (page. 2).

<sup>79</sup> Ibid.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

<sup>82</sup> Kennedy, Dorothy Irene. 1995. *Looking for Tribes in All the Wrong Places: an examination of the central Coast Salish Social Network*, MA thesis, Department of Anthropology, University of Victoria, (page. 50), as cited in Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations*. (page. 14).

<sup>83</sup> Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations*. p. 14

<sup>84</sup> Ibid, (page. 16)

<sup>85</sup> Ibid, (page. 19)

<sup>86</sup> Ibid.

<sup>87</sup> Thom, Brian. 2005. *Coast Salish Senses of Place: Dwelling, Meaning Power, Property and Territory in the Coast Salish World*, PhD. Dissertation, Department of Anthropology, McGill University, (pages. 199-200, 291-2), as cited in Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological*

title” for ownership to shared territory for specific resource areas where property rights merged due to interlocking kinship ties creating overlapping claims which over time became jointly held<sup>88</sup>. The Cowichan use of the Fraser River was said to be held jointly<sup>89</sup>.

Coast Salish First Nations also asserted a joint title to shared territory for specific resource areas where property rights merged due to interlocking kinship ties, creating overlapping claims<sup>90</sup>.

Fish were a very important resource for all Coast Salish First Nations and many species were utilized, including salmon, dogfish, herring and herring spawn, and halibut<sup>91</sup>. Fraser River salmon runs were exploited each summer<sup>92</sup>. Beach foods were harvested and waterfowl, sea mammals, and land mammals were hunted in the Gulf Islands region<sup>93</sup>. Various plant species were also important resources for Coast Salish First Nations<sup>94</sup>.

## 15.2 Tl'ektines

Tl'ektines was a fishing camp located on the south shore of Lulu Island, just east of the George Massey Tunnel. Figure 10 provides a historical map of the location of *Tl'qutinus*. The Brealey Report suggests that *Tl'ektines* was approximately 1,000 acres in size and located from at least the area of the proposed marine terminal and east along the south coast to Nelson Road, with approximately 100 acres of fluvial space into the Fraser River from *Tl'ektines*<sup>95</sup>. *Tl'ektines* contained permanent structures, and was occupied in

---

*Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations.* (page. 17)

<sup>88</sup> Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations.* (page. 20)

<sup>89</sup> Thom, Brian. 2005. *Coast Salish Senses of Place: Dwelling, Meaning Power, Property and Territory in the Coast Salish World*, PhD. Dissertation, Department of Anthropology, McGill University, (pages. 199-200, 291-2, p 369, 374), as cited in Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations.* (page. 20)

<sup>90</sup> Ibid, (page. 20)

<sup>91</sup> Ibid. (page. 22).

<sup>92</sup> Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations.* p. 22

<sup>93</sup> Ibid.

<sup>94</sup> Ibid, (pages. 22 – 23).

<sup>95</sup> Brealey, Kenneth G. 2010. *Historical Geography of Cowichan Land Use and Occupancy on the Lower Fraser River.* (page. 87).

the spring, summer, and fall<sup>96</sup>. In 1827, a chief trader roughly estimated that the population of *Tl'ektines* was 1500 people<sup>97</sup>, with an 1852 estimate of a population of 2100 people<sup>98</sup>.

The Brealey Report states that Governor Douglas had requested that the Lands and Works department create Indian Reserves for First Nations to extend several hundred acres around each village. The Lands and Works Department initially did not survey as far as *Tl'ektines* when establishing Indian Reserves and as a result, a reserve was not created at *Tl'ektines*<sup>99</sup>.

The Cowichan Nation Alliance's Strength of Claim submission to Aboriginal Title at *Tl'ektines* states that the Cowichan people exclusively occupied *Tl'ektines* prior to, at, and after 1846, including Sections 27 and 34 of Block 4 North, Range 5 West, New Westminster District<sup>100</sup>. Provincial government ethnography reports indicate that *Tl'ektines* was historically claimed by Tsawwassen First Nation, Kuper Island (Penelakut and Hwlitsum First Nations), Stz'uminus First Nations, and Cowichan Groups. Lyackson First Nation indicated to EAO during the EA that they used the area.

---

<sup>96</sup> Cowichan Nation Alliance. 2012 *Strength of Claim Submission to Aboriginal Title at Tl'uq̓tinus as made to British Columbia's Environmental Assessment Office and Ministry of Justice*. 2012. (pages. 2, 8, 26, 34).

<sup>97</sup> MacLachlan, Morag, ed., 1998. *The Fort Langley Journals, 1827-1830*, Vancouver: UBC Press, (pages 8, 27), at exhibit "H" to Lane Affidavit; Lane Affidavit, at paras. 19-20; Brealey Report, at (pages. 17-18), as cited in Cowichan Nation Alliance. 2012. *Strength of Claim Submission to Aboriginal Title at Tl'uq̓tinus as made to British Columbia's Environmental Assessment Office and Ministry of Justice*. (page. 7).

<sup>98</sup> Douglas, James, August 27, 1852, "Report of a Canoe expedition along the east coast of Vancouver island", The journal of the Royal Geographic Society London, Vol. 24, at Statutory Declaration #2 of Dr. Ken Brealey, dates March 30, 2012, Exhibit "1", at paras, 1, 3-4; Brealey Report, p. 52. As cited in Cowichan Nation Alliance. 2012. *Strength of Claim Submission to Aboriginal Title at Tl'uq̓tinus as made to British Columbia's Environmental Assessment Office and Ministry of Justice*. (page. 12)

<sup>99</sup> Brealey, Kenneth G. 2010. *Historical Geography of Cowichan Land Use and Occupancy on the Lower Fraser River*. (page. ).

<sup>100</sup> 2012. Submitted to BC Environmental Assessment Office. (page. 2).

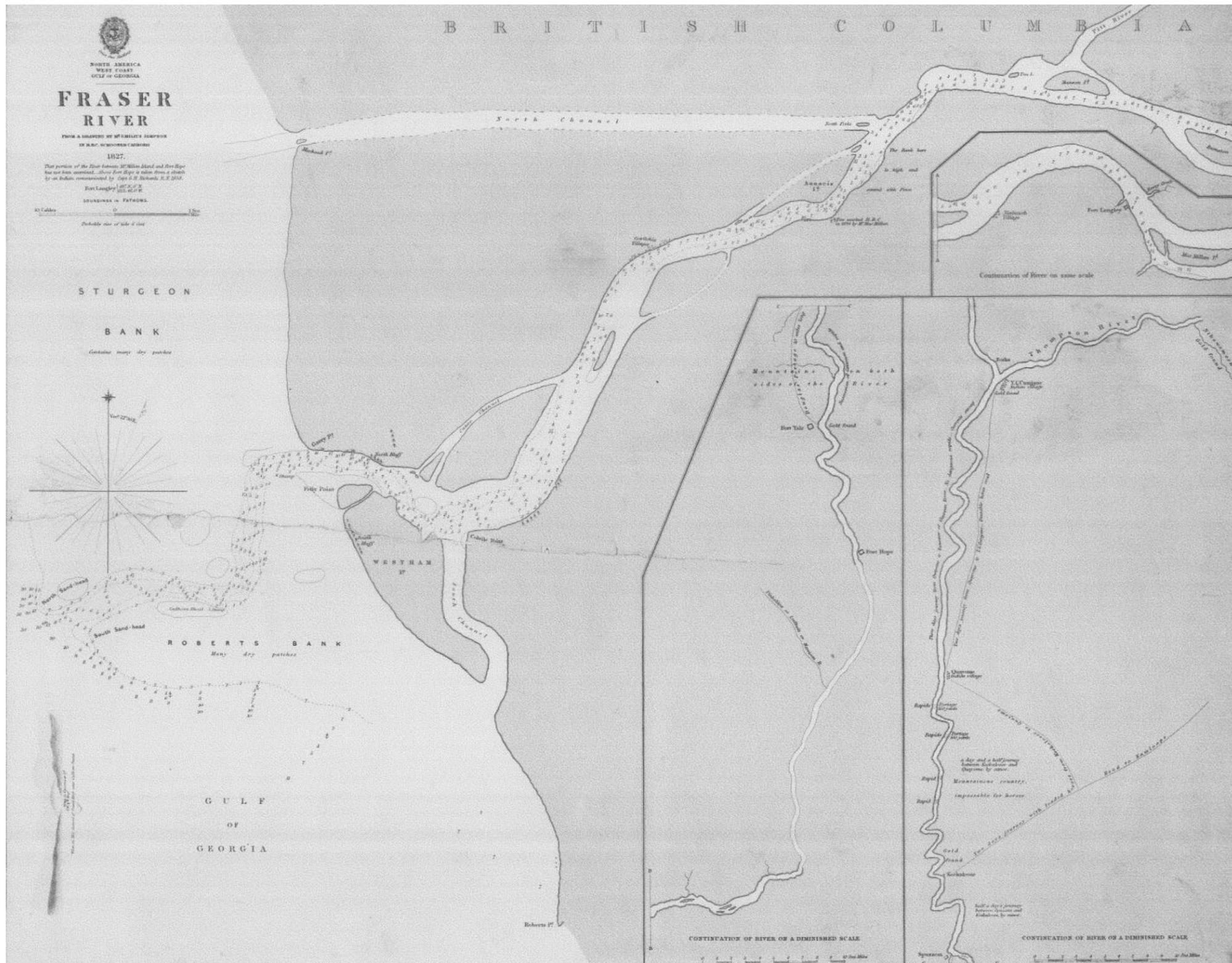


Figure 10: 1827 Map depicting the location of a Cowichan village on the South Arm of the Fraser River

The Cowichan fished for salmon and sturgeon, gathered and cultivated berries and other plants, hunted waterfowl, and used *Tl'ektines* as a trading base for dried clams and camas<sup>101</sup>. The Cowichan would migrate from Vancouver Island to the south shore of Lulu Island with their possessions to take advantage of the salmon season<sup>102</sup>. In 2001, Abner Thorne, a Cowichan elder, stated that *Tl'ektines* was a year round settlement<sup>103</sup>.

During the EA, Lyackson First Nation provided information that characterized the Hul'qumi'num use of the *Tl'ektines* area as each of the six Hul'qumi'num First Nations having a house and house lands in the village, sharing the title interest, but not each other's houses. There were harvesting areas that would be recognized as the property of specific families or individuals of the Lyackson. There were also areas that several Hul'qumi'num-speaking First Nations would consider appropriate for resource sharing, although this may have been more prevalent on the Southern Gulf Islands and Vancouver Island than on the lower Mainland. *Tl'ektines* was described by Lyackson elders as being a "little New York." It was a powerful trading centre for the south-central Vancouver Island Coastal Salish First Nations and a permanent site for many trade commodities.

The Proponent commissioned a report to locate *Tl'ektines* in relation to the Vancouver Fraser Port Authority's Fraser-Richmond properties on the south shore of Lulu Island. This report, using historic maps superimposed on modern maps, sited the western reach of *Tl'ektines* 500m northeast of the Proponent's lease area<sup>104</sup>. This report also reviewed the archaeological evidence associating *Tl'ektines* with archaeological site DgRs-017, and suggests that due to massive land alterations via dyking and landfilling along the shoreline of southern Lulu Island, land-based physical evidence of *Tl'ektines* would not be found<sup>105</sup>.

Archaeological site DgRs-17 was located in 1973, extending along the shore near No. 8 Road and approximately 200 meters inland in what was then a sanitary landfill, although

---

<sup>101</sup> Ibid. pp. 2, 20, 21, et al.

<sup>102</sup> Grant, W.C. Description of Vancouver Island, *Journal of the Royal Geographic Society in London*, 27: 2687-320, quote at 301, at Brealey Declaration, Exhibit "7"; Brealey Report, at p 31m, as cited in Cowichan Nation Alliance. 2012. *Strength of Claim Submission to Aboriginal Title at Tl'uqtinus as made to British Columbia's Environmental Assessment Office and Ministry of Justice*. (page. 14).

<sup>103</sup> Thom, Brian. 2005. *Coast Salish Senses of Place: Dwelling, Meaning Power, Property and Territory in the Coast Salish World*, PhD. Dissertation, Department of Anthropology, McGill University, (page. 371), at Boulton Declaration #2, Exhibit "H"; Brealey Report, at p. 41. Cowichan Nation Alliance. 2012. *Strength of Claim Submission to Aboriginal Title at Tl'uqtinus as made to British Columbia's Environmental Assessment Office and Ministry of Justice* (page. 39)

<sup>104</sup> Dewhurst, John. 2010. *The Location of Tl'eqtines, a "Cowitchen Village," on the South Shore of Lulu Island, BC*. (page. 11).

<sup>105</sup> Ibid, (page. 23).

no physical evidence of *Tl'ektines* was found at that time<sup>106</sup>. In 1986 and 1987, an archaeological survey estimated the location of *Tl'ektines* to be slightly west of the 1973 estimate, from the shoreline between No. 7 and No. 8 Roads<sup>107</sup>. Two fragments of boiling stones were found in the 1986 and 1987 survey<sup>108</sup>. In 2001, an archaeological study was done on a 50-centimetre deep trench from No. 7 Road eastward for 150 meters and no artefacts were found. The site may be buried under extensive dyke fill and the former Richmond landfill dump. In 2001, an archaeological survey was taken during the construction of the No. 8 Road storm outfall and no artefacts were found. In 2010, an archaeological study was done to locate the previously located archaeological remains and survey the area, although no archaeological remains were located. The stakes and fire broken rock may have been buried under the fluvial sands or under the extension of the dyke.

The Tsawwassen Final Agreement sites *Tl'ektines* as located at DgRs-17. In Appendix O-3 of the Tsawwassen Final Agreement, *Tl'ektines* is listed to be designated as a Provincial Heritage Site.

It is clear that *Tl'ektines* was a very important site for First Nations; however, it is also clear that its specific location in proximity to the proposed Project cannot be determined with great certainty based on the information available. The site is registered in the Provincial Heritage Register, is protected by the *Heritage Conservation Act*, and has not yet been designated. DgRs-17 is located on VFPA lands.

## **16 Cowichan Tribes, Penelakut Tribe, Stz'uminus First Nation, Halalt First Nation, and Hwlitsum First Nation as represented by the Cowichan Nation Alliance**

For the purposes of dealing with Fraser River matters, Cowichan Tribes, Stz'uminus, Penelakut, Halalt, and Hwlitsum Communities have formed the Cowichan Nation Alliance.

### **16.1 Cowichan Tribes Regional Context, Asserted Aboriginal Rights and Depth of Consultation**

#### ***Regional Context:***

Cowichan Tribes has a registered population of approximately 4,550, with approximately 2,670 members living on reserve. Cowichan Tribes has nine reserves in

---

<sup>106</sup> Ibid, (page. 9).

<sup>107</sup> Ibid, (page. 10).

<sup>108</sup> Ibid

the Cowichan, Shawinigan, Shalom, and Lake Cowichan districts of Vancouver Island, encompassing a total area of approximately 2,430 hectares.

***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment:***

Cowichan Territory was stated to extend from Sicker Mountain in the north to Hatch Point in the south, encompassing Lake Cowichan to the west and included the Gulf Islands of Saltspring, Galiano, and Prevost<sup>109</sup>. The main winter village sites were located on Cowichan and Koksilah Rivers and on Cowichan Bay<sup>110</sup>.

At the winter villages, Cowichan Tribes fished, hunted, and gathered. Fish such as perch and lingcod, beach foods and sea mammals were fished, hunted and gathered<sup>111</sup>. Waterfowl and birds were also important food sources<sup>112</sup>. The Cowichan used Active Pass as their route to the mainland, as well as for fishing halibut, herring and marine mammals<sup>113</sup>. Cowichan Nation used Lulu Island to fish for sturgeon or salmon, or to trade dried clams<sup>114</sup>.

During the pre-Application stage of the EA, Cowichan Tribes commissioned Kenneth Brealey to prepare a report entitled "Historical Geography of Cowichan Land Use and Occupancy on the Lower Fraser River" (Brealey Report), which included a series of land use and occupancy maps. The Brealey Report states that Cowichan Tribes' traditional territory extended from just before the forks of the North and South Arms of the Fraser River at Annacis Island, and down both sides of the North and South Arms to the mouth of the Fraser River, including *Tl'ektines*. The Cowichan occupied lands and waters of

---

<sup>109</sup> Rozen, David. 1972. *Place Names of the Island Halkomelem Indian People*, MA Thesis. Department of Anthropology and Sociology, University of British Columbia, (pages. 77-235), as cited in Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations*. (page. 23).

<sup>110</sup> Senses of Place, (pages. 199-200, 291-2), as cited in Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations*. (page. 24).

<sup>111</sup> Thom, Brian. 2005. *Coast Salish Senses of Place: Dwelling, Meaning Power, Property and Territory in the Coast Salish World*, PhD. Dissertation, Department of Anthropology, McGill University, pp. 199-200, 291-2, as cited in Ministry of Attorney General: Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty Group: Review of Ethnographic, Historical and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut, and Hwlitsum First Nations*. (page. 28).

<sup>112</sup> Ibid.

<sup>113</sup> Ibid.

<sup>114</sup> Ministry of Attorney General, legal Services Branch, Aboriginal Research Division. 2009. *Cowichan Tribes: Review of Ethnographic, Historical and Archaeological Resources*, (page. 31).

the South Arm of the Fraser River<sup>115</sup>. The Brealey Report stated that the Cowichan were quite powerful in the Fraser River, and were the dominant Coast Salish nation on the lower Fraser River culturally, economically, and politically, capable of controlling territory with the ability to secure their interests, from before time of contact through to after 1846<sup>116</sup>.

### ***EAO's Preliminary Strength of Claim Assessment***

The information reviewed by EAO to date suggests that Cowichan Tribes has a strong *prima facie* claim to the aboriginal right to fish in the proposed Project area, based on information supporting that the proposed Project area was within the Cowichan Tribes' traditional territory, and traditionally engaged in fishing in the proposed Project area at time of contact.

EAO considers the *prima facie* case for aboriginal title for Cowichan Tribes to be at best moderate within the proposed Project area. The Province does not have sufficient evidence to suggest exclusive use and occupation of *Tl'ektines* by Cowichan Tribes. Cowichan Tribes occupied *Tl'ektines* seasonally, and had winter villages on Vancouver Island, and Saltspring, Galiano, and Prevost Islands.

### ***Depth of Consultation***

Cowichan Tribes provided EAO with information regarding traditional land uses in the proposed Project vicinity and potential impacts from the proposed Project on those uses by the Cowichan Tribes. EAO also used other available information as referenced in this report to ascertain the *prima facie* case for aboriginal rights.

EAO considered the potential impacts from the proposed Project on Cowichan Tribes' asserted aboriginal rights to fish in the Fraser River. As discussed above, EAO determined that Cowichan Tribes has a strong *prima facie* claim for aboriginal rights to fish in the Fraser River. The Cowichan Tribes' asserted aboriginal right to fish could be affected in the event of a spill.

EAO considers the Cowichan Tribes to have at best a moderate claim to aboriginal title and a strong claim to aboriginal rights in the proposed Project area. Taking into account the potential impact to Cowichan Tribes' aboriginal rights in the event of a spill, EAO

---

<sup>115</sup> Lane Affidavit, at para. 13, as cited in Cowichan Nation Alliance. 2012 *Strength of Claim Submission to Aboriginal Title at Tl'uq̓tinus as made to British Columbia's Environmental Assessment Office and Ministry of Justice*. (page. 6).

<sup>116</sup> Brealey Report, at (pages. 5, 46-51, 92), as cited in Cowichan Nation Alliance. 2012 *Strength of Claim Submission to Aboriginal Title at Tl'uq̓tinus as made to British Columbia's Environmental Assessment Office and Ministry of Justice*. (pages. 8, 30).

determined that the required duty to consult with the Cowichan Tribes fell towards the deeper end of the *Haida* spectrum.

EAO has made available opportunities for deep consultation with the Cowichan Tribes by:

- providing all information and opportunities for comment;
- affording opportunities for involvement with all stages of the EA;
- offering to meet individually with elected representatives of the Cowichan Tribes for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and
- providing this Assessment Report to show that First Nations' concerns were considered.

## 16.2 Penelakut Tribe Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation

### ***Regional Context:***

The Penelakut Tribe has approximately 890 registered members, with approximately 565 members living on reserve. The Penelakut Tribe has four reserves, located on Galiano Island, Kuper Island, Tent Island, and near Bonsall Creek, totalling approximately 635 ha in area.

### ***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment***

Penelakut Tribe traditionally occupied Kuper Island and the north end of Galiano Island and Bonsall Creek on Vancouver Island<sup>117</sup>. Traditionally, Penelakut Tribe consisted of three independent but closely associated groups, each with a winter village site on Kuper Island<sup>118</sup>. The Lamalchi (now Hwlitsum) were considered by historic accounts to be a "sub-tribe" of Penelakut Tribe<sup>119</sup>.

---

<sup>117</sup> Duff, Wilson, Fieldnotes, file 154, as cited in Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2008. *Penelakut Tribe: A Preliminary Review of Ethnographic, Historical, and Archaeological Resources*. (page. 19).

<sup>118</sup> Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2008. *Penelakut Tribe: A Preliminary Review of Ethnographic, Historical, and Archaeological Resources*. (page. 20).

<sup>119</sup> Sproat, Letter, February 15, 1877, as cited in Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2008. *Penelakut Tribe: A Preliminary Review of Ethnographic, Historical, and Archaeological Resources*. (page. 20).

Penelakut Tribe used Valdes Island to harvest beach foods and gather plants, while marine mammals were hunted in the areas around the Gulf Islands<sup>120</sup>. Penelakut Tribe would also use Thetis Island for hunting and collecting beach foods. Telegraph Harbour was used to rake herring, collect herring spawn, fish for skate, and harvest beach foods<sup>121</sup>. Penelakut Tribe used other Gulf Islands for traditional activities, such as Norway Island, Reid Island, Saltspring Island, as well as the Chemainus River and Bonsall Creek<sup>122</sup>.

Historic sources suggest that there was a Penelakut Tribe fishing camp on a slough at the bridge at No. 4 road east of the Steveston Highway<sup>123</sup>. A second Penelakut Tribe fishing camp was located on the south shore of canoe pass, just below Brunswick Point on a little bay<sup>124</sup>. Penelakut Tribe was reported to use *Tl'ektines* seasonally<sup>125</sup>.

In May 2009, Penelakut Tribe provided EAO with a letter asserting that Penelakut Tribe has aboriginal rights to fish in the Fraser River and holds aboriginal title to a Penelakut village site on Lulu Island, as well as aboriginal rights on waters and lands in the vicinity of the village site.

#### ***EAO's Preliminary Strength of Claim Assessment:***

The information reviewed by EAO to date suggests that Penelakut Tribe has strong *prima facie* claim to the aboriginal right to fish in the proposed Project area, based on information supporting that the proposed Project area was within the Penelakut Tribe's traditional territory and Penelakut Tribe traditionally engaged in fishing in the proposed Project area at time of contact. Penelakut Tribe's village at No. 4 Road is located outside the proposed Project area, but their asserted aboriginal right to fish in that area could potentially be impacted by the proposed Project in the event of a spill.

EAO considers the *prima facie* case for aboriginal title for Penelakut Tribe to be at best moderate within the proposed Project area. The Province does not have sufficient

---

<sup>120</sup> Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2008. *Penelakut Tribe: A Preliminary Review of Ethnographic, Historical, and Archaeological Resources*. (page. 21).

<sup>121</sup> Ibid.

<sup>122</sup> Ibid, (page. 22).

<sup>123</sup> Dewhirst, John. 2003. *Aboriginal Use and Occupation of Canoe Passage and the Lower South Arm of the Fraser River, BC*, unpublished report, (page. 37) as cited in Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2008. *Penelakut Tribe: A Preliminary Review of Ethnographic, Historical, and Archaeological Resources*. (page. 25).

<sup>124</sup> Ibid.

<sup>125</sup> MacLachlan, Morag, ed. 1998. *The Fort Langley Journals 1827-1830*. Vancouver: UBC Press, (pages. 10-12), as cited in Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2008. *Penelakut Tribe: A Preliminary Review of Ethnographic, Historical, and Archaeological Resources*. (page. 26).

evidence to suggest exclusive use and occupation of *Tl'ektines* by the Penelakut. The Penelakut Tribe occupied *Tl'ektines* seasonally.

### ***Depth of Consultation***

Penelakut Tribe provided EAO with information on their traditional uses of the land in the proposed Project vicinity and potential impacts on those uses by the Penelakut Tribe from the proposed Project. As well, EAO used other available information as referenced in this report to ascertain the *prima facie* case for aboriginal rights.

EAO considered the potential impacts of the proposed Project to Penelakut Tribe's aboriginal rights. As discussed above, EAO considers Penelakut Tribe to have a strong *prima facie* claim for aboriginal rights to fish in the Fraser River. Although the potential for impacts from the proposed Project on the right to fish during normal operations was determined by the Proponent to be low, Penelakut Tribe's asserted aboriginal right to fish could be affected in the event of a spill.

Given EAO's preliminary assessment of an at best moderate claim to aboriginal title and strong claim to aboriginal rights for Penelakut Tribe in the proposed Project area, and taking into account the potential impact to Penelakut Tribe's aboriginal rights in the event of a spill, EAO concludes that the required duty to consult with the Penelakut Tribe falls toward the deeper end of the *Haida* spectrum.

EAO has made available opportunities for deep consultation with Penelakut Tribe by:

- providing all information and opportunities for comment;
- affording opportunities for involvement with all stages of the EA;
- offering to meet individually with elected representatives of the Penelakut Tribe for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and
- providing this Assessment Report to show that First Nations' concerns were considered.

### **16.3 Stz'uminus First Nation Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation**

#### ***Regional Context:***

Stz'uminus First Nation has a population of approximately 1,180 registered members, with approximately 765 members living on reserve. Stz'uminus First Nation has four reserves located near Ladysmith and in Chemainus District, with a total area of approximately 1225 hectares.

### ***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment***

The traditional territory of the Stz'uminus First Nation was described as the east coast of Vancouver Island from Coffin Point to Joan Point (where Crofton is today), extending an unspecified distance inland<sup>126</sup>. Kulleet Bay, on Vancouver Island across from the northern tip of Thetis Island, was an important village site<sup>127</sup>.

Stz'uminus First Nation would fish, hunt, gather, and otherwise use their territory on Vancouver Island much like the other Hul'qumi'num First Nations. Gabriola Passage was used to rake herring and to collect herring spawn, as well as to harvest plant material<sup>128</sup>. Kulleet Bay was used to harvest beach foods and fish for salmon, while waterfowl were hunted in Ladysmith Harbour<sup>129</sup>. Thetis Island and the Chemainus River were also used for similar hunting, fishing, and harvesting activities, as were other areas within Stz'uminus First Nation's traditional territory<sup>130</sup>.

In January 2010, Stz'uminus First Nation informed EAO that they have title interests in the proposed Project area, stating that the proposed Project would be located directly within lands and waters which Stz'uminus First Nation has never ceded or surrendered to any level of government, individual, or agency. Stz'uminus First Nation stated that the lands and waters that would be used for the proposed Project include lands and waters that have been inhabited by Stz'uminus First Nation since time immemorial. Stz'uminus First Nation provided EAO with *The Hul'qumi'num Treaty Group Review of Ethnographic, Historical, and Archaeological Resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut and Hwlitsum First Nations* prepared by the Ministry of Attorney General, which EAO considered during the EA of the proposed Project.

### ***EAO's Preliminary Strength of Claim Assessment***

The information reviewed by EAO to date suggests that Stz'uminus First Nation has a strong *prima facie* claim to aboriginal rights to fish in the proposed Project area, based on information supporting that the proposed Project area was within the Stz'uminus First Nation's traditional territory at time of contact, and Stz'uminus First Nation traditionally engaged in fishing in the proposed Project area at time of contact..

---

<sup>126</sup> Ministry of Attorney General, Legal Services Branch, Aboriginal Research Division. 2010. *Stz'uminus (Chemainus) First Nation: A Review of Ethnographic, Historical and Archaeological Sources*, (page. 2)

<sup>127</sup> Ibid.

<sup>128</sup> Ibid, (page. 26).

<sup>129</sup> Ibid.

<sup>130</sup> Ibid, (Pages. 26-27).

EAO considers the *prima facie* case for aboriginal title for Stz'uminus First Nation to be at best moderate within the proposed Project area. The Province does not have sufficient evidence to suggest exclusive use and occupation of *Tl'ektines* by St'uzuminus, or a larger Cowichan Group. Stz'uminus First Nation occupied *Tl'ektines* seasonally.

### ***Depth of Consultation***

Stz'uminus First Nation provided EAO with information on their traditional uses of the land in the proposed Project vicinity and potential impacts on those uses by Stz'uminus First Nation from the proposed Project. EAO has also used other available information, as referenced in this report, to ascertain the *prima facie* case for aboriginal rights.

EAO considered the potential impacts of the proposed Project to Stz'uminus First Nation's asserted aboriginal rights. As discussed above, EAO considers Stz'uminus First Nation to have a strong *prima facie* claim for aboriginal rights to fish in the Fraser River. Although the potential for impacts from the proposed Project on the right to fish during normal operations was determined by the Proponent to be low, Stz'uminus First Nation's asserted aboriginal right to fish could be affected in the event of a spill.

Given Stz'uminus First Nation's at best moderate claim to aboriginal title and strong claim to aboriginal rights in the proposed Project area, and taking into account the potential impact to Stz'uminus First Nation's aboriginal rights in the event of a spill, EAO concluded that the required duty to consult with the Stz'uminus First Nation falls toward the deeper end of the *Haida* spectrum.

EAO has made available opportunities for deep consultation with Stz'uminus First Nation by:

- Providing all information and opportunities for comment;
- Affording opportunities for involvement with all stages of the EA;
- Offering to meet individually with elected representatives of the Stz'uminus First Nation for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and
- Providing this Assessment Report to show that First Nations' concerns were considered.

## 16.4 Halalt First Nation Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation

### **Regional Context:**

Halalt First Nation has a registered population of approximately 215 members, with approximately 110 individuals living on reserve. Halalt First Nation has two reserves located on the Chemainus River (one on Willy Island), totalling approximately 160 hectares. Ethnographically and historically, the Halalt have been identified as both Cowichan and Stz'uminus<sup>131</sup>.

### **Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment**

Halalt First Nation territory was reported to be located along the coast on both sides of the Chemainus River and extending an unspecified distance inland<sup>132</sup>. The village of Halalt on Willy Island was the main village of the Halalt First Nation<sup>133</sup>. Halalt First Nation seasonally occupied *Tl'ektines* during the summer salmon season<sup>134</sup>.

Halalt First Nation fished on the Fraser River<sup>135</sup>. The resource use of Halalt First Nation during their seasonal round was the same as for other Hul'qumi'num groups. Halalt harvested herring spawn in Gabriola Passage, as well as harvested clams, halibut, porpoise, and herring on Prevost Island<sup>136</sup>. Halalt First Nation also used Active Pass on the way to the Fraser River to hunt marine mammals and gather beach foods<sup>137</sup>.

### **EAO's Preliminary Strength of Claim Assessment:**

The information reviewed by EAO to date suggests that Halalt First Nation has strong *prima facie* claims to aboriginal rights to fish in the proposed Project area as the proposed Project area was within Halalt First Nation's traditional territory at time of contact and Halalt First Nation traditionally engaged in fishing in the proposed Project area at time of contact. .

EAO considers the *prima facie* case for aboriginal title for Halalt First Nation to be at best moderate within the proposed Project area. The province does not have sufficient

---

<sup>131</sup> Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2008. *Halalt First Nation: Review of Ethnographic, Historical, and Archaeological Resources*. p. 8

<sup>132</sup> Ibid, (page. 3).

<sup>133</sup> Ibid.

<sup>134</sup> Ibid, (pages. 3, 20).

<sup>135</sup> Ibid.

<sup>136</sup> Ibid, (page. 23).

<sup>137</sup> Ibid.

evidence to suggest exclusive use and occupation of *Tl'ektines* by the Halalt, or a larger Cowichan Group. The Halalt First Nation occupied *Tl'ektines* seasonally.

***Depth of Consultation:***

Halalt First Nation provided EAO with information on traditional uses of the land in the proposed Project vicinity and potential impacts on those uses from the proposed Project. EAO has also used other available information, as referenced in this report, to ascertain potential aboriginal rights and the *prima facie* case for aboriginal rights.

EAO considered the potential impacts of the proposed Project to Halalt First Nation's aboriginal rights to fish in the Fraser River. As discussed above, EAO considers Halalt First Nation to have a strong *prima facie* claim for aboriginal rights to fish in the Fraser River. The proposed Project would have a small potential impact to the exercise of this right during normal operations. However, in the event of a spill, Halalt First Nation's aboriginal right to fish could be affected.

Given Halalt First Nation's at best moderate claim to aboriginal title, and strong claim to asserted aboriginal rights in the proposed Project area, and taking into account the potential impact to Halalt First Nation's asserted aboriginal rights in the event of a spill, EAO concludes that the required duty to consult with the Halalt First Nation falls on the deep end of the *Haida* spectrum.

EAO has made available opportunities for deep consultation with Halalt First Nation by:

- Providing all information and opportunities for comment;
- Affording opportunities for involvement with all stages of the EA;
- Offering to meet individually with elected representatives of the Halalt First Nation for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and
- Providing this Assessment Report to show that First Nations' concerns were considered.

## 16.5 Hwlitsum First Nation Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation

***Regional Context:***

Hwlitsum First Nation is a community of Registered Indians under the *Indian Act*, but is not recognized as a First Nation as defined by the *Indian Act*. Hwlitsum First Nation is located at Canoe Pass and does not have any reserves. Court of Appeal material for the Certificate of Public Convenience and Necessity for the Interior to Lower Mainland Transmission Project by the British Columbia Transmission Corporation states that the

population of Hwlitsum First Nation is approximately 350 members, with 340 living off reserve. Hwlitsum First Nation considers Canoe Pass, located on the northern shore of Delta across from Westham Island, their reserve.

In May 2000, Hwlitsum First Nation applied under the *Indian Act* to have Indian and Northern Affairs Canada (now Aboriginal Affairs and Northern Development Canada) to create a new band at the site of their original Hwlitsum summer village at Canoe Pass; this process is still in progress. Hwlitsum First Nation is currently at stage 2 of the BC Treaty Commission process. Hwlitsum traditional territory encompasses a large portion of BC's Lower Mainland, the Gulf Islands, and a portion of Vancouver Island. In 2000, the Registrar<sup>138</sup> determined that the Hwlitsum ancestors were Status Indians, and Indian status was assigned to the group. The Hul'qumi'num Treaty Group acknowledges the Hwlitsum as Hul'qumi'num people<sup>139</sup>.

The Hul'qumi'num Treaty Group stated that Hwlitsum First Nation was located on Hul'qumi'num Treaty Group traditional territory and had historic village sites located at Canoe Pass and various places along the Fraser River.

Hwlitsum First Nation's *Traditional Use and Occupation of the Area now known as British Columbia* study provided to EAO states that Hwlitsum First Nation is a continuation of the Lamalchi First Nation. Hwlitsum First Nation and Penelakut Tribe had strong ties that were severed in 1904; since that time, no member of Hwlitsum First Nation has been a member of the Penelakut Tribe<sup>140</sup>.

Hwlitsum First Nation's seasonal round was over the Gulf Islands and Fraser River, with a winter village (November/December to February/March) on Kuper Island, and a spring and summer village (March/April to October/November) at the mouth of the South Arm of the Fraser River at Canoe Pass<sup>141</sup>. At the Lamalchi village, the Lamalchi (or Hwlitsum), harvested fish, shellfish, seaweeds and algae, as well as deer, elk, bear,

---

<sup>138</sup> The Registrar is the sole authority for determining which names will be added, deleted or omitted from the Indian Register. The Indian Register is the official record identifying all Registered Indians in Canada, as per the terms of the *Indian Act*,

<sup>139</sup> Submissions of the Intervener, Hul'qumi'num Treaty Group, BCUC Hearing, BCTC Application for Certificate of Public Convenience and Necessity for the Interior to Lower Mainland, as cited in Ministry of Attorney General, Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty group: Review of Ethnographic, Historical and Archaeological resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut and Hwlitsum First Nations*. (page.59).

<sup>140</sup> Ibid, (page. 28).

<sup>141</sup> McCrady, Dr. David, Affidavit, p.3 as cited in: Ministry of Attorney General, Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty group: Review of Ethnographic, historical and archaeological resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut and Hwlitsum First Nations*. (page.62).

seal, otter and other terrestrial and marine mammals<sup>142</sup>. Hwlitsum First Nation spent part of the salmon harvesting season in the shared Hul'qumi'num village at *Tl'ektines*. Hwlitsum First Nation's traditional use and occupation report states that *Tl'ektines* was located on the north shore opposite Deas Island on the Fraser River. Hwlitsum First Nation would primarily harvest salmon and eulachon at their Hwlitsum village, but they would also travel upriver to the Coquitlam and Pitt Rivers to harvest plants for medicinal and food purposes, as well as salmon and sturgeon, shellfish, terrestrial and marine mammals, ducks, geese and birds<sup>143</sup>

In 1863, the British Navy bombed and burned the Lamalchi village, preventing the Lamalchi from wintering at their village on Kuper Island<sup>144</sup>. Some Lamalchi began to live year-round at Hwlitsum, or Canoe Pass, and called themselves Hwlitsum after their village<sup>145</sup>. During the reserve process, the Lamalchi were viewed as a subtribe of the Penelakut Tribe<sup>146</sup>.

Comments provided by the Hwlitsum First Nation on the dAIR state that the storage tanks and the marine terminal for the proposed Project would be built directly on the *Tl'ektines* site, an area that was traditionally used by Hwlitsum First Nation and other Hul'qumi'num groups to grow and harvest berries and wapato. Hwlitsum First Nation also informed EAO and the Proponent that this area is near a very sensitive fishing area.

### ***EAO's Preliminary Strength of Claim Assessment:***

EAO considers that Hwlitsum First Nation's *prima facie* case for aboriginal rights in the proposed Project area is strong since they state that they practiced their asserted aboriginal rights of fishing and gathering seasonally at *Tl'ektines*, which they consider

---

<sup>142</sup> Wilson, Chief Raymond; Granville Miller, Dr. Bruce; Angelbeck, Dr. Bill; and Alan Grove, n.d. *The Hwlitsum First Nation's Traditional Use and Occupation of the Area now known as British Columbia*. (page. 11).

<sup>143</sup> Wilson, Chief Raymond; Granville Miller, Dr. Bruce; Angelbeck, Dr. Bill; and Alan Grove, n.d. *The Hwlitsum First Nation's Traditional Use and Occupation of the Area now known as British Columbia*. (page. 12).

<sup>144</sup> Testimony of Horace Smith, Superintendent of Policy, in *R. v. A-chee-wun, Shanah-saluk and Qualatul-tun* (24 June 1863) Victoria (Court of Assize) as cited in Wilson, Raymond; Granville, Bruce; Angelbeck, Bill; and Alan Grove, n.d. *The Hwlitsum First Nation's Traditional Use and Occupation of the Area now known as British Columbia*. (page. 5).

<sup>145</sup> Wilson, Chief Raymond; Granville Miller, Dr. Bruce; Angelbeck, Dr. Bill; and Alan Grove, n.d. *The Hwlitsum First Nation's Traditional Use and Occupation of the Area now known as British Columbia*. (page. 5).

<sup>146</sup> Sproat, letter, February 15, 1877, as cited in: Ministry of Attorney General, Legal Services Branch, Aboriginal Research Division. 2009. *The Hul'qumi'num Treaty group: Review of Ethnographic, historical and archaeological resources: Cowichan, Lake Cowichan, Halalt, Chemainus, Lyackson, Penelakut and Hwlitsum First Nations*. (page.62).

was located where the marine terminal is proposed. Hwlitsum First Nation asserts that they resided year-round at Canoe Pass on the south side of the South Arm of the Fraser River across from Westham Island. Ethnographic reports state that after Hwlitsum First Nation moved from Lamalchi, their primary village was at Canoe Pass.

The information reviewed by EAO to date suggests that Hwlitsum First Nation has strong *prima facie* claims to aboriginal rights to fish in the proposed Project area, based on information supporting that the proposed Project area was within Hwlitsum First Nation's traditional territory, and Hwlitsum First Nation states that they traditionally engaged in fishing and gathering in the proposed Project area at time of contact.

EAO considers the *prima facie* case for aboriginal title for Hwlitsum First Nation to be at best moderate within the proposed Project area. The province does not have sufficient evidence to suggest exclusive use and occupation of *Tl'ektines* by the Hwlitsum, or a larger Cowichan Group. Hwlitsum First Nation occupied *Tl'ektines* seasonally.

***Depth of Consultation:***

Hwlitsum First Nation provided EAO with their Traditional Use and Occupation document, as well as comments on the dAIR that outlined their use of the proposed Project area. EAO has also utilized other available information as referenced in this document to assess the *prima facie* case for Hwlitsum First Nation's assertions regarding aboriginal rights.

EAO determined that Hwlitsum First Nation has a strong claim for asserted aboriginal rights and an at best moderate *prima facie* claim to title in the area of the proposed marine terminal. In the event of a spill, Hwlitsum First Nation's claimed reserve land and practice of traditional activities at Canoe Pass could be adversely affected.

Given Hwlitsum First Nation's at best moderate claim to aboriginal title, and strong claim to asserted aboriginal rights in the proposed Project area, and taking into account the potential impact to Hwlitsum First Nation's asserted aboriginal rights in the event of a spill, EAO concludes that the required duty to consult with the Hwlitsum First Nation falls toward the deeper end of the *Haida* spectrum.

EAO has made available opportunities for deep consultation with Hwlitsum First Nation by:

- Providing all information and opportunities for comment;
- Affording opportunities for involvement with all stages of the EA;
- Offering to meet individually with elected representatives of the Hwlitsum First Nation for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and

- Providing this Assessment Report to show that First Nations' concerns were considered.

## 16.6 Specific Consultation Activities Undertaken with Cowichan Nation Alliance First Nations

### ***Cowichan Tribes***

In May 2009, Cowichan Tribes wrote to EAO, outlining their asserted aboriginal rights and title for the proposed Project area. EAO replied in June 2009, explaining that EAO's relationship with First Nations is based on respect for asserted and established aboriginal rights and title, and confirmed that EAO would consult Cowichan Tribes toward the deeper end of the *Haida* spectrum.

In August 2009, Cowichan Tribes wrote to EAO expressing concern regarding the wording concerning accommodation for First Nations in the draft section 11 Order, capacity funding, and strength of claim. EAO and Cowichan Tribes discussed this letter at their September 2009 meeting. At that meeting, the scope of the EA, the Federal-Provincial cooperative EA, the Crown's legal obligations for consultation, EAO's strength of claim analysis and opportunities for Cowichan Tribes to participate in the EA were discussed. After the meeting, EAO provided Cowichan Tribes with the Canada-BC Agreement on Environmental Assessment Cooperation, followed-up with Cowichan Tribes regarding capacity funding, and shared EAO's ethnographic research with Cowichan Tribes. EAO also shared this information with other Hul'qumi'num Treaty Group First Nations.

In January 2010, Cowichan Tribes requested a one-week extension to the deadline to provide comments to EAO on the dAIR. EAO granted this extension. In January 2010, EAO requested to meet with Cowichan Tribes to discuss the EA. Cowichan Tribes responded that they would be unable to meet until mid-February, and later informed EAO that Cowichan Tribes would not be meeting with EAO until after EAO had received and reviewed a letter addressed to the Minister of Environment from Cowichan Tribes, copying EAO. In March 2010, EAO followed up with Cowichan Tribes, as EAO was not in receipt of a letter to the Minister of Environment, and repeated EAO's request to meet with Cowichan Tribes. EAO repeated this meeting request in April 2010.

EAO and Cowichan Tribes met in July 2010 to discuss the Brealey Report, Cowichan Nation Alliance First Nations' use of the proposed Project area, the EA process, and federal involvement in the EA.

EAO met with Cowichan Tribes, Stz'uminus First Nation, and Penelakut Tribe in July 2010. These three groups share a common ancestral group, and had agreed to work together on the Tl'ektines Land Recovery Strategy and on the EA of the proposed

Project. Cowichan Tribes provided the Brealey Report to EAO, outlining Cowichan interests within the proposed Project area, and stating that, in their opinion, there is a strong case for aboriginal title in this area. EAO provided an update on the EA process and the federal process. Cowichan Tribes expressed concern regarding capacity to participate in the EA process. EAO informed the group that EAO could provide some capacity funding.

In March 2011, EAO replied to Cowichan Tribes' January 2011 correspondence. EAO outlined that issues associated with allegations of past infringement of aboriginal title are not part of the *Haida* duty to consult. EAO reiterated that it understands that Cowichan Tribes has concerns about potential offsite environmental effects associated with the proposed Project, and aboriginal rights claimed by Cowichan Tribes. EAO confirmed that it would continue to consult about these concerns and consider measures which accommodate these concerns, if appropriate.

In March 2011, Cowichan Tribes replied to EAO expressing concern regarding EAO's consultation process and the time provided for review and comment of documents, and requested a meeting to discuss the EA process and Cowichan Tribes' interests and use in the proposed Project area. EAO responded to Cowichan Tribes' letter. EAO recognized that Cowichan Tribes was working with Penelakut Tribe, Halalt First Nations, Stz'uminus First Nation, and Hwlitsum First Nation as the Cowichan Nation Alliance. EAO clarified how and when comments could be received during the EA process, and offered to meet with Cowichan Tribes.

During the Application Review stage of the EA, Cowichan Tribes' concerns were represented by the Cowichan Nation Alliance. Please see the section below that outlines the consultation activities undertaken by EAO and the Proponent with the Cowichan Nation Alliance.

### ***Penelakut Tribe***

In May 2009, Penelakut Tribe wrote to EAO, outlining their requests for consultation before EAO finalized the section 11 Order, and requesting the development of a traditional use study. In June 2009, EAO replied suggesting that Penelakut Tribe, as well as other Hul'qumi'num Treaty Group First Nations, review existing traditional use material to identify gaps that would inform a potential traditional use study.

In January 2010, EAO requested to meet with Penelakut Tribe to discuss the EA. EAO and Penelakut Tribe met in February 2010 to discuss the EA process, the proposed Project, and potential impacts to Penelakut Tribe. EAO met again with Penelakut Tribe in April 2010 to discuss the EA and the proposed Project with new Chief and Council. EAO met again with Penelakut Tribe in May 2010 to discuss the EA and potential impacts of the proposed Project on Penelakut Tribe interests.

During the Application Review stage of the EA, Penelakut Tribe's concerns were represented by the Cowichan Nation Alliance. Please see the section below that outlines the consultation activities undertaken by EAO and the Proponent with the Cowichan Nation Alliance.

Penelakut Tribe attended the October 2012 working group meeting. Concerns raised at the meeting by Penelakut include a decrease in traditional activities caused by a decrease in available resources due to development, and the potential effects of a spill on the Gulf Islands.

### ***Stz'uminus First Nation***

In January 2010, EAO requested to meet with Stz'uminus First Nation to discuss the EA. Stz'uminus First Nation postponed meeting until after Stz'uminus First Nation met with legal counsel. EAO repeated its request to meet with Stz'uminus First Nation in March and May 2010. Stz'uminus First Nation did not meet on a government-to-government basis with EAO during the pre-Application stage of the EA.

During the Application Review stage of the EA, Stz'uminus First Nation's concerns were represented by the Cowichan Nation Alliance. Please see the section below that outlines the consultation activities undertaken by EAO and the Proponent with the Cowichan Nation Alliance.

### ***Halalt First Nation***

In a meeting with the Proponent in September 2008, Halalt First Nation identified initial concerns regarding the proximity of the proposed Project to a traditional village site, as well as potential impacts to fisheries and other traditional activities. Halalt First Nation also indicated that they would require capacity funding and would likely submit a capacity funding proposal via the Hul'qumi'num Treaty Group.

In November 2008, the Proponent met with Halalt First Nation to further discuss the proposed Project. At this meeting, Halalt First Nation stated that they would be submitting a capacity funding proposal independently from the Hul'qumi'num Treaty Group. Although a capacity funding agreement was not finalized until April 2010, the parties proceeded to engage in a series of activities.

In January 2010, the Proponent sent a letter to the Halalt First Nation requesting a meeting to discuss Halalt First Nation's interests so that the parties could consider what effect the proposed Project may have on these interests, and how the Proponent may avoid or mitigate any adverse effects on the identified interests. Halalt First Nation agreed to prepare a "background report and assessment of related historical and project data." To date, this study has not been provided to the Proponent or EAO.

EAO, Halalt First Nation, and the Proponent met in February 2010 to provide Halalt First Nation with presentations on the EA process, the proposed Project, and to share information with Chief, Council, and the community. The group discussed shellfish harvesting areas, and concerns regarding a spill. The meeting included a presentation by the First Nations EA Technical Working Group, informing the group of the support and information available on the EA process.

In January 2011, the Halalt First Nation representative informed the Proponent that the community had joined the Cowichan Nation Alliance. During the Application Review stage of the EA, Halalt First Nation's concerns were represented by the Cowichan Nation Alliance. Please see the section below that outlines the consultation activities undertaken by EAO and the Proponent with the Cowichan Nation Alliance.

Halalt First Nation attended EAO's October 2012 working group meeting. Concerns raised by Halalt include potential effects of a spill to Gulf Islands, as well as identifying authorities responsible for spill cleanup.

### ***Hwlitsum First Nation***

In August 2008, Hwlitsum First Nation was contacted by the Proponent with an invitation to meet to discuss the proposed Project. In September 2008, the Proponent met with Hwlitsum First Nation, where the proposed Project was introduced and Hwlitsum First Nation articulated the importance of the fishery to their community, their concerns about increased risks to salmon, and the need to ensure contingency funds in the event of a spill from the proposed Project. They also articulated their need for capacity funding to support their participation in reviewing the proposed Project.

In October 2008, the Proponent and Hwlitsum First Nation met again to discuss capacity funding. The Hwlitsum First Nation requested that the Proponent sponsor a boat tour of the Fraser River so they could view the marine terminal and proposed location of the fuel receiving facility from the water, as well as to travel the route to be taken by vessels during proposed Project operations. They also suggested that the boat tour would provide the opportunity for the Proponent to learn some of the issues and background related to their interests in the area from First Nations.

Hwlitsum First Nation provided a proposal for capacity funding in November 2008, and an agreement with the Proponent was entered into later that month.

During the AOA, Hwlitsum First Nation sought information on dredging, level of marine traffic, number of future storage tanks, and proposed security measures. They also reiterated the need for the Proponent to consider the concept of a bond in the event that the Proponent operations create an environmental problem to the fishery. Hwlitsum First Nation also suggested that the Proponent recognize that the proposed Project area is

within a traditional fishing site and that the Proponent consider preserving First Nations access to the area through the provision of a boat launch.

In January 2010, EAO requested to meet Hwlitsum First Nation to discuss the proposed Project. EAO and Hwlitsum First Nation met in February 2010. In August 2010, Hwlitsum First Nation requested an extension to provide comments on the dAIR. EAO granted this request.

EAO requested to meet with Hwlitsum First Nation during the Application review stage of the EA. During the Application Review stage of the EA, Hwlitsum's concerns were represented by the Cowichan Nation Alliance. Please see the section below that outlines the consultation activities undertaken by EAO and the Proponent with the Cowichan Nation Alliance.

In July 2012, EAO met with an Hwlitsum First Nation representative to discuss the Hwlitsum section of EAO's draft First Nation Consultation Report. Hwlitsum First Nation raised questions regarding the inclusion of *Tl'ektines* in Appendix O-3 of the Tsawwassen Final Agreement, statements in the draft report that non-Island Hul'qumi'num First Nations may have used *Tl'ektines*, and sources used in the drafting of the report. Hwlitsum First Nation suggested a number of clarifications and changes to the report, which EAO was able to accommodate.

Hwlitsum attended EAO's October 2012 working group meeting. Hwlitsum raised concerns about the effects of a spill on First Nation communities.

### ***Cowichan Nation Alliance***

In September 2010, Cowichan Nation Alliance provided EAO comments regarding the dAIR. Cowichan Nation Alliance had several concerns about the format and scope of the information to be included in the Application, as per the dAIR.

In March 2011, the Cowichan Nation Alliance and the Proponent met to discuss the Application review consultation process.

In June 2011, the Cowichan Nation Alliance wrote to EAO to provide comments on the Heritage Effects section of the Application. Cowichan Tribes requested that *Tl'ektines* be considered a heritage site in that section of the Application. Cowichan Tribes requested that the consideration of the nature of *Tl'ektines* be broadened in area and use. EAO responded in August 2011, providing Cowichan Nation Alliance's comments to the Proponent for comment.

In September 2011, the Proponent held a meeting with the Cowichan Nation Alliance and the Western Canada Marine Response Corporation (WCMRC) to discuss spill response planning.

In November 2011, Cowichan Nation Alliance requested an extension to provide comments on the proponent's Highway 99 Addendum. EAO granted this request.

In December 2011, the Cowichan Nation Alliance contacted the Proponent to request that the Proponent provide the Cowichan Nation Alliance with all of the archaeological reports referenced by the Proponent in their application. The Proponent provided the Cowichan Nation Alliance with these reports.

In January 2012, the Cowichan Nation Alliance contacted the Proponent to request the opportunity to provide input regarding the proposed Highway 99 pipeline alignment for the proposed Project. The Proponent recommended that they contact EAO and submit a comment during the public comment period, and offered to meet with the Cowichan Nation Alliance. EAO received Cowichan Nation Alliance's comments on the proposed Highway 99 pipeline alignment.

Cowichan Nation Alliance requested a nest survey be conducted and requested that Cowichan Nation Alliance participate in the nest survey. Cowichan Nation Alliance also provided concerns regarding the proposed Highway 99 alignment on aquatic birds and contaminated sites, requested that traditional place names be used by the Proponent, and requested that the Proponent conduct an AIA prior to construction. These comments were considered during the EA.

In February 2012, the Proponent conducted a site tour with the Cowichan Nation Alliance and WCMRC.

In March 2012, EAO met with the Cowichan Nation Alliance to discuss the EA process, site remediation and spill response.

In July 2012, EAO met with the Cowichan Nation Alliance to discuss Cowichan Nation Alliance's comments on EAO's draft Assessment Report as well as their comments on the Proponent's Highway 99 Addendum.

Cowichan Nation Alliance attended EAO's Oct 2012 working group meeting, and provided EAO with comments on the draft Table of Conditions and draft Certified Project Description. Cowichan Nation Alliance requested the draft Table of Conditions include fisheries compensation, a communications protocol for the Proponent and First Nations regarding vessel traffic and the OPEP include spill prevention measures. Cowichan Nation Alliance's concern with the draft Certified Project Description was that the fuel receiving location was not demarcated as specifically as they would have liked. EAO was able to incorporate all of Cowichan Nation Alliance's suggested changes and additions to the draft Certified Project Description and draft Table of Conditions, except their request for an increase from six hours to 24 hours notification of vessel arrival and departure in the Fraser River. The Proponent receives 24 hours notice of vessel arrival

and departure, and therefore, they may not be able to provide 24 hours notice to First Nations. EAO was able to increase the notification time to twelve hours.

The Cowichan Nation Alliance attended each of the working group meetings and provided comment at every opportunity during the EA. Key concerns provided by the Cowichan Nation Alliance<sup>147</sup> to EAO include potential impacts of the proposed Project on *Tl'ektines*; potential social, economic, and environmental effects of a spill on Cowichan Nation Alliance members' social, ceremonial, and food fisheries in the South Arm of the Fraser River; remediation of contaminated sites found during construction and operations; and a standing request that an Archeological Impact Assessment be performed before the EA concludes.

On November 26, 2012, EAO received a letter from the Cowichan Nation Alliance stating that the Cowichan Nation Alliance member First Nations do not oppose the proposed Project, the issuance of an EA Certificate, or any related provincial and federal approvals necessary for the proposed Project to proceed.

## **17 Lake Cowichan First Nation**

### **17.1 Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation**

#### ***Regional Context:***

Lake Cowichan First Nation has a registered population of approximately 20 members, with one 39-hectare reserve located on the north end of Lake Cowichan.

#### ***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment:***

Members of Lake Cowichan First Nation descended from Ditidaht and Cowichan (Somenos) individuals<sup>148</sup>. In 1916, the Lake Cowichan Reserve was created<sup>149</sup>. Lake Cowichan First Nation's traditional territory is suggested to have been located at Lake Cowichan and in the Skutz Falls area, and may have included areas on Nitinat Lake<sup>150</sup>. Lake Cowichan First Nation hunted and fished in the areas in and around Lake

---

<sup>147</sup> Please see Appendix 2 for more information on the concerns raised by First Nations during the EA.

<sup>148</sup> Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2009. *Lake Cowichan First Nation: A Preliminary Review of Ethnohistoric, Historical and Archaeological Resources*. p. 16

<sup>149</sup> Ibid, (page.18).

<sup>150</sup> Ibid

Cowichan; elk and deer were reported to be abundant and salmon and trout were taken from the Lake<sup>151</sup>.

EAO did not find an ethnographic record of people identified specifically as Lake Cowichan participating in the Fraser River fishery<sup>152</sup>. However, ethnographies recorded that Somenos spent part of each year on the Fraser River, owning houses there in 1827<sup>153</sup>.

### ***EAO's Preliminary Strength of Claim Assessment:***

Lake Cowichan First Nation did not provide EAO with information on traditional uses of the land in the proposed Project vicinity or potential impacts from the proposed Project. EAO used other available information as referenced in this report to assess the *prima facie* case for asserted aboriginal rights.

EAO considers the Lake Cowichan First Nation's *prima facie* case for asserted aboriginal rights in the proposed Project area to be strong, as their Somenos ancestors fished seasonally in the Fraser River near the proposed Project area at *Tl'ektines*.

EAO considers the *prima facie* case for aboriginal title for Lake Cowichan First Nation to be at best moderate within the proposed Project area. Lake Cowichan First Nation's winter village was located on Vancouver Island, and they used *Tl'ektines* seasonally.

### ***Depth of Consultation***

EAO considered the potential impacts of the proposed Project to Lake Cowichan First Nation's asserted aboriginal rights. As discussed above, EAO considers Lake Cowichan First Nation to have a moderate *prima facie* claim for aboriginal rights to fish in the Fraser River. The proposed Project would have a small potential impact to the exercise of this right during normal operations. However, in the event of a spill, Lake Cowichan First Nation's aboriginal right to fish could be affected

Given Lake Cowichan First Nation's at best moderate claim to aboriginal title and strong claim to aboriginal rights in the proposed Project area, and taking into account the

---

<sup>151</sup> Brown, Robert. 1864. *Report of the Vancouver Island Exploring Expedition*, (page.58), as cited in Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2009. *Lake Cowichan First Nation: A Preliminary Review of Ethnohistoric, Historical and Archaeological Resources*. (page. 16).

<sup>152</sup> Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2009. *Lake Cowichan First Nation: A Preliminary Review of Ethnohistoric, Historical and Archaeological Resources*. (page. 20).

<sup>153</sup> MacLachlan, Morag, ed. 1998. *The Fort Langley Journals 1827-1830* Vancouver: UBC Press, (pages: 7-8), as cited in Aboriginal Research Division, Legal Services Branch, Ministry of Attorney General. 2009. *Lake Cowichan First Nation: A Preliminary Review of Ethnohistoric, Historical and Archaeological Resources*. (page. 20).

potential impact to Lake Cowichan First Nation's aboriginal rights in the event of a spill, EAO concludes that the required duty to consult with the Lake Cowichan First Nation falls toward the deeper end of the *Haida* spectrum.

EAO has made opportunities for deep consultation available to the Lake Cowichan First Nation by:

- Providing all information and opportunities for comment;
- Affording opportunities for involvement with all stages of the EA;
- Offering to meet individually with elected representatives of the Lake Cowichan First Nation for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and
- Providing this Assessment Report to show that First Nations' concerns were considered.

## 17.2 Specific Consultation Activities Undertaken

### ***Consultation Activities Undertaken by the Proponent***

In November 2008, Lake Cowichan First Nation was contacted by the Proponent with an invitation to meet to discuss the proposed Project. The Proponent met with Lake Cowichan First Nation in November 2009, at which time the Proponent described the proposed Project and entered into discussions with Lake Cowichan First Nation on developing a consultation approach. It was agreed that Lake Cowichan First Nation would submit a capacity funding proposal.

In August 2009, the Lake Cowichan First Nation confirmed that they would be submitting a capacity funding proposal. Although both parties did not sign off the capacity funding agreement until December 2009, an informal understanding was achieved in the summer of 2009.

In January 2010, the Proponent sent a letter to Lake Cowichan First Nation requesting a meeting to discuss Lake Cowichan First Nation's interests so that the parties could consider what effect the proposed Project may have on these interests, and how the Proponent may avoid or mitigate any adverse effects.

From March through October 2011, the Proponent communicated regularly with Lake Cowichan First Nation, discussing opportunities to meet to discuss the Application and any outstanding issues. A meeting took place in early October 2011.

Although Lake Cowichan First Nation did not provide comments on the Application, the Proponent advised that Lake Cowichan First Nation had reviewed the Application. The Proponent has also stated that Lake Cowichan First Nation is satisfied with the Proponent's efforts to reduce and mitigate any potential environmental impacts from the

proposed Project, and that Lake Cowichan First Nation will continue to monitor key issues, such as spill response through their participation on the working group.

### ***Consultation Activities Undertaken by EAO***

In January 2010, EAO invited Lake Cowichan First Nation to attend the meeting that EAO was planning with Halalt First Nation in February 2010. Lake Cowichan First Nation opted not to attend.

In February 2010, the Lake Cowichan and Halalt First Nations jointly organized a community meeting that was attended by representatives of EAO and the Proponent. While the meeting did not attract any Lake Cowichan First Nation community members, a representative of Lake Cowichan First Nation attended and expressed an interest in having the Proponent attend a meeting in their community.

In June 2011, EAO requested a meeting with Lake Cowichan First Nation to discuss the Application review stage of the EA of the proposed Project. Lake Cowichan First Nation confirmed a meeting for July 2011. At the meeting, EAO provided an overview of the EA and Lake Cowichan First Nation requested information on how the public had been consulted and expressed concern regarding capacity funding.

Lake Cowichan First Nation requested EAO explain how it assessed aboriginal rights and title in the EA process. EAO responded that it performs an initial preliminary strength of claim assessment at the beginning of the EA process and provides First Nations with an opportunity to review and comment on the preliminary assessment or submit more information. Lake Cowichan First Nation clarified that they assert aboriginal rights that extend to the proposed Project area, which are connected to historical use, trading, and family ties.

Aside from the issues raised above, Lake Cowichan did not provide comments on any EA document nor did they attend any working group meetings or request a to meet government-to-government during the Application Review stage

## **18 Lyackson First Nation**

### **18.1 Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation**

#### ***Regional Context:***

Lyackson First Nation has approximately 200 registered members, with approximately 30 members living on reserve. Lyackson First Nation has three reserves located on Valdes Island, totalling approximately 745 hectares. Lyackson First Nation is governed by a chief and three councillors under a custom electoral system.

### ***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment:***

Lyackson First Nation were the sole occupants of Valdes Island and had three winter villages on Valdes Island<sup>154</sup>. Lyackson First Nation would fish for salmon, lingcod and other groundfish, rake herring and collect herring spawn, harvest beach foods, hunt for marine mammals, as well as gather plant materials and foods on Valdes, Thetis, Hall, and Reid Islands, among other islands in the vicinity<sup>155</sup>. Lyackson was noted to have a house on the north bank of the main channel of the Fraser River opposite Deas Island<sup>156</sup>.

EAO considers Lyackson First Nation's *prima facie* case for aboriginal rights in the proposed Project area to be strong, as they practiced their fishing rights seasonally in the Fraser River near the proposed Project area at *Tl'ektines*.

EAO considers the *prima facie* case for aboriginal title for Lyackson First Nation to be at best moderate within the proposed Project area. Lyackson First Nation's winter village was located on Vancouver Island and Lyackson First Nation states that they used *Tl'ektines* seasonally, but did not hold exclusive rights to *Tl'ektines*.

### ***Depth of Consultation***

Lyackson First Nation provided EAO with information regarding traditional use of the land in the proposed Project vicinity. As well, EAO used other available information as referenced in this report to ascertain potential aboriginal rights and the *prima facie* case for aboriginal rights.

EAO considered the potential impacts of the proposed Project to Lyackson First Nation's asserted aboriginal rights and title. As discussed above, EAO considers Lyackson First Nation to have a strong *prima facie* claim for aboriginal rights to fish in the Fraser River. In the event of a spill, Lyackson First Nation's aboriginal right to fish could be affected.

Given Lyackson First Nation's at best moderate claim to aboriginal title and strong claim to aboriginal rights in the proposed Project area, and taking into account the potential impact on Lyackson First Nation's aboriginal rights in the event of a spill, EAO

---

<sup>154</sup> Aboriginal Research Division, Legal Services Branch, Ministry of the Attorney General. 2008. *Lyackson First Nation: Review of Ethnographic, Historical and Archaeological Resources*. (page 19).

<sup>155</sup> Ibid, pp 22-23.

<sup>156</sup> Duff, Wilson Field Notes, file 154:n.p., as cited in: Aboriginal Research Division, Legal Services Branch, Ministry of the Attorney General. 2008. *Lyackson First Nation: Review of Ethnographic, Historical and Archaeological Resources*. (page 25).

concluded that the required duty to consult with the Lyackson First Nation falls toward the deeper end of the *Haida* spectrum.

EAO has made opportunities for deep consultation available to Lyackson First Nation by:

- Providing all information and opportunities for comment;
- Affording opportunities for involvement with all stages of the EA;
- Offering to meet individually with elected representatives of the Lyackson First Nation for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and
- Providing this Assessment Report to show that First Nations' concerns were considered.

## 18.2 Specific Consultation Activities Undertaken

### ***Consultation Activities Undertaken by the Proponent***

In September 2008, the Proponent met with Lyackson First Nation. Lyackson First Nation expressed concerns about potential of impacts related to the disposal of dredged materials and asked the Proponent to consider employment opportunities for Lyackson First Nation if the proposed Project proceeds. In response to the Proponent's offer to provide capacity funding, Lyackson First Nation indicated that it would likely be responding via the Hul'qumi'num Treaty Group. In October 2008, Lyackson First Nation confirmed that discussions on capacity funding should occur with the Hul'qumi'num Treaty Group.

The Proponent met with Lyackson First Nation again in November 2008 to introduce the proposed Project to the Lyackson First Nation Director of Operations and to receive input from Lyackson First Nation on preferred archaeologists to lead fieldwork. At this meeting, the Proponent was informed that the Lyackson First Nation would be submitting a capacity funding proposal independently from the Hul'qumi'num Treaty Group.

In November 2009, the Proponent received a capacity funding proposal from Lyackson. In December 2009, the Proponent replied requesting a meeting to discuss the Lyackson proposal.

In January 2010, the Proponent sent a letter to Lyackson First Nation requesting a meeting to discuss Lyackson First Nation's interests so that the parties could consider the potential effects the proposed Project may have on these interests, and how the Proponent may avoid or mitigate any adverse effects on the identified First Nations interests. To date, the Proponent has not received written information from the

Lyackson on their interests; however some information on their issues has been determined from their comments on the draft Application Information Requirements document.

In February 2010, the Proponent was invited to meet with EAO and Lyackson First Nation representatives to discuss the consultation process and capacity funding issues.

In March 2010, the Proponent submitted a letter to the Lyackson asking for a meeting to discuss outstanding consultation and capacity funding issues. Lyackson responded to this March letter in June and the Proponent replied later in June reiterating their interest in convening a meeting.

In July 2010, Lyackson First Nation and the Proponent communicated by telephone. Lyackson First Nation informed the Proponent that they were conducting a traditional use study and expressed concerns regarding the consultation process. The Proponent reiterated their willingness to provide some capacity funding to Lyackson and to respond to any questions that the Lyackson First Nation may have regarding the proposed Project.

Lyackson First Nation and the Proponent met in April 2011. Lyackson First Nation reiterated earlier concerns that they believed that it was challenging to respond to the Application without having completed a traditional use study and a First Nations socio-economic study. The Proponent was also informed that the draft Lyackson Traditional Use Study and a socio-economic study were nearing completion and that copies may be provided to the Proponent. These studies were not provided to the Proponent during the EA.

In February 2012, the Proponent met twice with Lyackson First Nation to discuss outstanding concerns and potential accommodations. The Proponent met with Lyackson again in June 2012 and discussions are ongoing.

### ***Consultation Activities Undertaken by EAO***

In October 2009, Lyackson First Nation requested a meeting with EAO to discuss the draft section 11 Order, capacity funding, a traditional use study, and EAO's assessment of the rights and title of Hul'qumi'num Treaty Group First Nations in relation to the proposed Project. EAO met with Lyackson First Nation in November 2009, and EAO's confidentiality policy was discussed, as well as aspects of the draft section 11 Order that pertained to First Nations consultation and document review. In December 2009, in response to Lyackson First Nation's November 2009 letter, EAO reiterated its confidentiality policy and clarified portions of the section 11 Order, including EAO's consultation duties.

In January 2010, Lyackson First Nation requested a three-day extension to submit comments on the dAIR EAO granted the extension request.

In January 2010, Lyackson First Nation requested a meeting with EAO. EAO, the Proponent, and Lyackson First Nation met in February 2010 to establish the consultation process and discuss the EA, the proposed Project, and Lyackson First Nation's collaboration with other Hul'qumi'num Treaty Group First Nations.

In February 2010, Lyackson First Nation communicated to EAO that they would not be working collaboratively with the Hul'qumi'num Treaty Group due to concerns regarding the manner in which the Hul'qumi'num Treaty Group agreed to comment on the Application.

In February 2010, Lyackson First Nation wrote to EAO regarding their participation in the EA process and capacity funding. EAO responded to Lyackson First Nation by outlining the opportunities for participation during the EA process.

In April 2010, Lyackson First Nation requested a meeting with EAO to discuss the consultation process.

In June 2011, EAO requested a meeting with Lyackson First Nation to discuss the action items coming out of the Aboriginal Fisheries Working Group meeting. Lyackson did not respond to EAO's meeting request.

In June 2012, Lyackson requested to meet with EAO and VFPA to discuss the EA. EAO informed VFPA that Lyackson wanted to meet, and responded to Lyackson with a potential meeting date. Lyackson did not respond further to EAO regarding that meeting.

Lyackson First Nation attended EAO's October 2012 working group meeting. Concerns raised by Lyackson at that meeting include EAO's Certified Project Description format, potential light pollution from ships, fugitive dust during construction, not completing an AIA during the EA, and requested to meet with EAO to discuss the EA, specifically the draft Certified Project Description and draft Table of Conditions.

In response, a condition was added to the Table of Conditions to limit light pollution caused by vessels used for the proposed Project, dust would be managed by the Proponent's Construction Environmental Management Plan, and if an EA Certificate was issued for the proposed Project, an AIA would be required by all other major permits, as well as a condition of the EA Certificate. Lyackson did not respond to EAO's request for a meeting.

Another key concern raised by Lyackson First Nation during the Application Review stage of the EA was compensation to First Nations' food, social and ceremonial fisheries in the event of a spill.

On November 26, 2012, EAO received a letter from Lyackson First Nation stating that Lyackson is not opposed to the proposed Project as described in the Application, the issuance of a provincial EA Certificate, or any related provincial or federal approvals.

## **19 Kwantlen First Nation**

### **19.1 Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation**

#### ***Regional Context:***

Kwantlen First Nation has a registered population of approximately 220 members, with approximately 90 members living on-reserve. Kwantlen First Nation has six reserves located on the Fraser and Stave Rivers in New Westminster District, BC, with an approximate total area of 565 hectares. Kwantlen First Nation's main reserve is located approximately 40 kilometres from the proposed marine terminal and fuel receiving facility.

According to historians and ethnographers, Kwantlen First Nation had one of the most extensive territories in the lower mainland in the mid-1800s. Prior to contact, Kwantlen's main villages were located on the north and south banks of the Fraser River at New Westminster<sup>157</sup>. Kwantlen First Nation used an area around Boundary Bay, the drainage of the Salmon River into the Fraser River at Fort Langley, and also the drainage of the Serpentine River into Mud Bay, including between New Westminster and Boundary Bay, as well as the eastern half of Point Roberts<sup>158</sup>. Kwantlen used Boundary Bay to harvest clams<sup>159</sup>.

Ethnographic information states that Kwantlen First Nation was once a large and powerful tribe that was known to have kept undisputed control of the Fraser River from its southern mouth to the borders of the Nicomen River, sixty or seventy miles inland, and that Kwantlen First Nation inhabited or purported to control more than half of the

---

<sup>157</sup> Howes, K. 2003. Fraser Corridor Program – Soundness of Claim Report. Prepared by Ministry of Attorney General Aboriginal Research Division. (page 18).

<sup>158</sup> Duff, as cited in Clark, Adrian. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Aboriginal Research Division, Ministry of Attorney General. (page 34).

<sup>159</sup> Bouchard and Kennedy 1988:A24, as cited in Clark, Adrian. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Aboriginal Research Division, Ministry of Attorney General. (page 40).

Halkomelem lands of the mainland<sup>160</sup>. Duff states that Tl'ektines was located within Kwantlen territory but was held in common by several Cowichan groups<sup>161</sup>.

In April 2011, Kwantlen First Nation informed EAO that the marine terminal and the fuel storage facility for the proposed Project would be within their traditional territory, specifically 15 kilometres from current Kwantlen First Nation shore resource sites on the Fraser River and 38 kilometres from Kwantlen communities on MacMillan Island in the Fraser River. Kwantlen First Nation also stated that the community made a deliberate move away from the New Westminster area after 1827 to take advantage of the amenities and trading opportunities at the newly-constructed Fort Langley.

These comments were considered during the EA and are included in the Agency and First Nations Issues Tracking Table in Appendix 2.

***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment:***

Kwantlen First Nation ancestors appear to have occupied areas along the lower reaches of the Fraser River and were historically known to travel the South Arm of the Fraser River at the time of sovereignty in 1846. EAO determined Kwantlen First Nation's *prima facie* case for aboriginal rights to fish in the vicinity of the proposed Project to be moderate to strong.

Kwantlen First Nation was more focused around the New Westminster and Fort Langley areas historically and in contemporary times, and there is a lack of evidence of exclusive use or occupation by Kwantlen First Nation of the proposed Project area. EAO determined the *prima facie* case for aboriginal title for Kwantlen First Nation is likely weak within the proposed Project area.

***Depth of Consultation:***

Kwantlen First Nation provided EAO with information confirming their traditional uses of the land in the vicinity of the proposed Project and potential impacts from the proposed Project as discussed in the Proponent's Application. EAO also used ethnographic reports and available information, listed in section 12.1 of this report, to understand the nature and strength of the claims for aboriginal rights in the proposed Project area.

---

<sup>160</sup> Hill-Tout 1978b:69, as cited in Clark, Adrian. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Aboriginal Research Division, Ministry of Attorney General. (page 34).

<sup>161</sup> Duff (1952:27) as cited in Clark, A. 2007. Musqueam Nation Statement of Intent Area Report on Strength of Claim Assessment Research. Prepared for Aboriginal Law Group, Ministry of Attorney General. (page 39).

EAO considered the potential for impacts from the proposed Project on Kwantlen First Nation's asserted aboriginal rights. As discussed above, EAO considers Kwantlen First Nation to have a moderate to strong *prima facie* claim for aboriginal rights to fish in the Fraser River. According to the Proponent, the proposed Project would have a small potential impact on the exercise of this right during normal operations and in the absence of any accidents or malfunctions. However, in the event of a jet fuel spill from the proposed Project, Kwantlen First Nation's ability to exercise its asserted aboriginal right to fish could be affected.

EAO determined that the required duty to consult with the Kwantlen First Nation was toward the deeper end of the *Haida* spectrum, given the moderate to strong claim to aboriginal rights in the proposed Project area. This conclusion takes into account the weak claim to aboriginal title at that location, so that the focus of the consultation is on possible aboriginal rights practices.

EAO has made available opportunities for deep consultation with Kwantlen First Nation by:

- Providing all information and opportunities for comment;
- Affording opportunities for involvement with all stages of the EA;
- Offering to meet individually with elected representatives of the Kwantlen First Nation for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and
- Providing this Assessment Report to show that First Nations' concerns were considered.

## 19.2 Consultation with Kwantlen First Nation

### ***Consultation Undertaken by the Proponent***

The Proponent first met with Kwantlen First Nation to discuss the proposed Project in August 2008. Kwantlen First Nation indicated that they would review the proposed Project information and would be submitting a Protocol Agreement for the Proponent to consider.

The Kwantlen First Nation submitted a Protocol Agreement for the Proponent's consideration in November 2008, and a meeting to discuss the content was held later that month. The Protocol Agreement was signed in December 2008, in which it was agreed that the Proponent would sponsor a half-day workshop to learn more about the Kwantlen First Nation and discuss a consultation approach for the proposed Project.

The workshop was held in January 2009 and was attended by the Proponent and representatives of Kwantlen First Nation's council and elders. Kwantlen First Nation

outlined their traditional territory, system of governance, and expectations in terms of consultation. The Proponent described the proposed Project and offered to provide capacity funding to assist Kwantlen First Nation's participation in the EA.

In July 2009, the Proponent received a capacity funding proposal from Kwantlen First Nation. A series of meetings and discussions were held by the Proponent with Kwantlen First Nation to discuss their capacity funding proposal and the consultation process. An understanding was reached in the fall of 2009.

In January 2010, the Proponent sent a letter to Kwantlen First Nation requesting a meeting to discuss Kwantlen First Nation interests, potential effects from the proposed Project on those interests, and how the Proponent could avoid or mitigate any adverse effects.

In April 2010, a meeting was held between the Proponent and Kwantlen First Nation to provide an update on the proposed Project and the timing of the Application, as well as to review the capacity funding agreement and engage in further discussions regarding Kwantlen First Nation's interests in the proposed Project. At the meeting it was agreed that Kwantlen First Nation would provide written information regarding their interests to the Proponent. The Proponent followed up with Kwantlen representatives throughout 2010 and into 2011 asking for information.

In February and March 2011, the Proponent made repeated efforts to communicate with representatives of Kwantlen First Nation to arrange to meet to discuss the Application or any outstanding issues.

An offer was extended by the Proponent to schedule a meeting in June 2011 to discuss Kwantlen First Nation questions and the responses provided by the Proponent.

In July 2011, the Proponent extended a further invitation to the Kwantlen First Nation to meet to discuss the Application with no response from Kwantlen First Nation.

In December 2011, Kwantlen First Nation provided comments that focused on risk, insurance, aboriginal rights, environmental effects, and cumulative effects.

In February 2012, the Proponent responded to Kwantlen First Nation's comments. Kwantlen representatives asked for additional clarification in March 2012, and the Proponent responded to these questions in April 2012.

## ***Consultation Undertaken by EAO***

In January 2010, Kwantlen First Nation's request for a three-day extension to provide comments on the dAIR was granted by EAO.

In February 2010, EAO requested a meeting with Kwantlen First Nation to discuss the EA process, potential impacts of the proposed Project on Kwantlen First Nation's interests, and any outstanding concerns regarding the dAIR. EAO repeated its request for a meeting in March, April and May 2010. Kwantlen First Nation requested a meeting with EAO in June 2010. The group met on June 14, 2010 to discuss the EA process, the proposed Project, and Kwantlen First Nation's concerns regarding the proposed Project.

On April 19, 2011 Kwantlen First Nation submitted their comments on the Application to EAO. Key concerns raised by Kwantlen First Nation during the EA include the proximity of proposed Project components to Kwantlen First Nation's traditional territory, the potential effects of a spill including the effects on area marshes, compensation to First Nations food, social, and ceremonial fisheries in the event of a spill, and potential impact of vessels to Kwantlen's fisheries.

EAO provided Kwantlen First Nation with the responses to the questions they had identified in their review of the Application in June 2011.

In June 2011, EAO requested a meeting with Kwantlen First Nation to discuss the Application review stage of the EA and any additional concerns that Kwantlen First Nation may have regarding the proposed Project. EAO repeated its request for a meeting in October 2011 and again in December 2011. EAO did not meet further with Kwantlen First Nation outside of working group meetings during the EA. Kwantlen First Nation attended EAO's October 2012 working group meeting.

## **20 Musqueam Indian Band**

### **20.1 Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation**

#### ***Regional Context:***

Musqueam Indian Band has a registered population of approximately 1,280 members, with approximately 755 members living on reserve. The Musqueam Indian Band has three reserves located at the mouth of the Fraser River: north of Sea Island and south of South West Marine Drive, on Sea Island, and southeast of Ladner, with a total area of approximately 255 hectares. Musqueam Indian Band's main residential reserve is located south of South West Marine Drive, approximately 12 kilometres north of the proposed Project's marine terminal.

During the EA, Musqueam Indian Band identified the nature and general location of the aboriginal rights they are asserting in the proposed Project area. Beyond what has been made available to EAO through consultation with the Musqueam Indian Band, EAO considered information from case law, the treaty process, websites, and historical information to make reasonable conclusions as to the potential nature and scope of aboriginal rights that could be claimed by Musqueam Indian Band in the vicinity of the proposed Project.

Musqueam Indian Band informed EAO that their present and historic fishery occurs downstream of the Port Mann Bridge to the Strait of Georgia in the Salish Sea, including the North Arm of the Fraser River, the Middle Arm of the Fraser River between Sea Island and Lulu Island, and the South Arm of the Fraser River from the Port Mann Bridge to the river mouth, the latter part of which falls within the proposed Project area<sup>162</sup> (Figure 11). The earliest ethnographer to describe the Musqueam depicted the Musqueam area as the southern half of the Point Grey Peninsula from Point Grey to New Westminster, Sea Island, and the northern half of Lulu Island<sup>163</sup>. Another account of Musqueam territory was that Musqueam held the North Arm of the Fraser River below Kwantlen, most of Lulu Island, Sea Island, and Burrard Inlet to Point Atkinson<sup>164</sup>. At the time of contact, the Musqueam occupied the mouth of the North Arm of the Fraser River and Burrard inlet<sup>165</sup>. By the mid-1800s, the Musqueam were described as having only one village site (or two adjacent sites, Mahli and Stselax) on the North bank of the Fraser River, at the site of the present day Musqueam Reserve I.R. #2<sup>166</sup>. The Musqueam also had summer fishing camps on Sea Island, the west end of Lulu Island, as well as the South Arm of the Fraser River<sup>167</sup>.

---

<sup>162</sup> Howes, K. 2003. Fraser Corridor Program - Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 9).

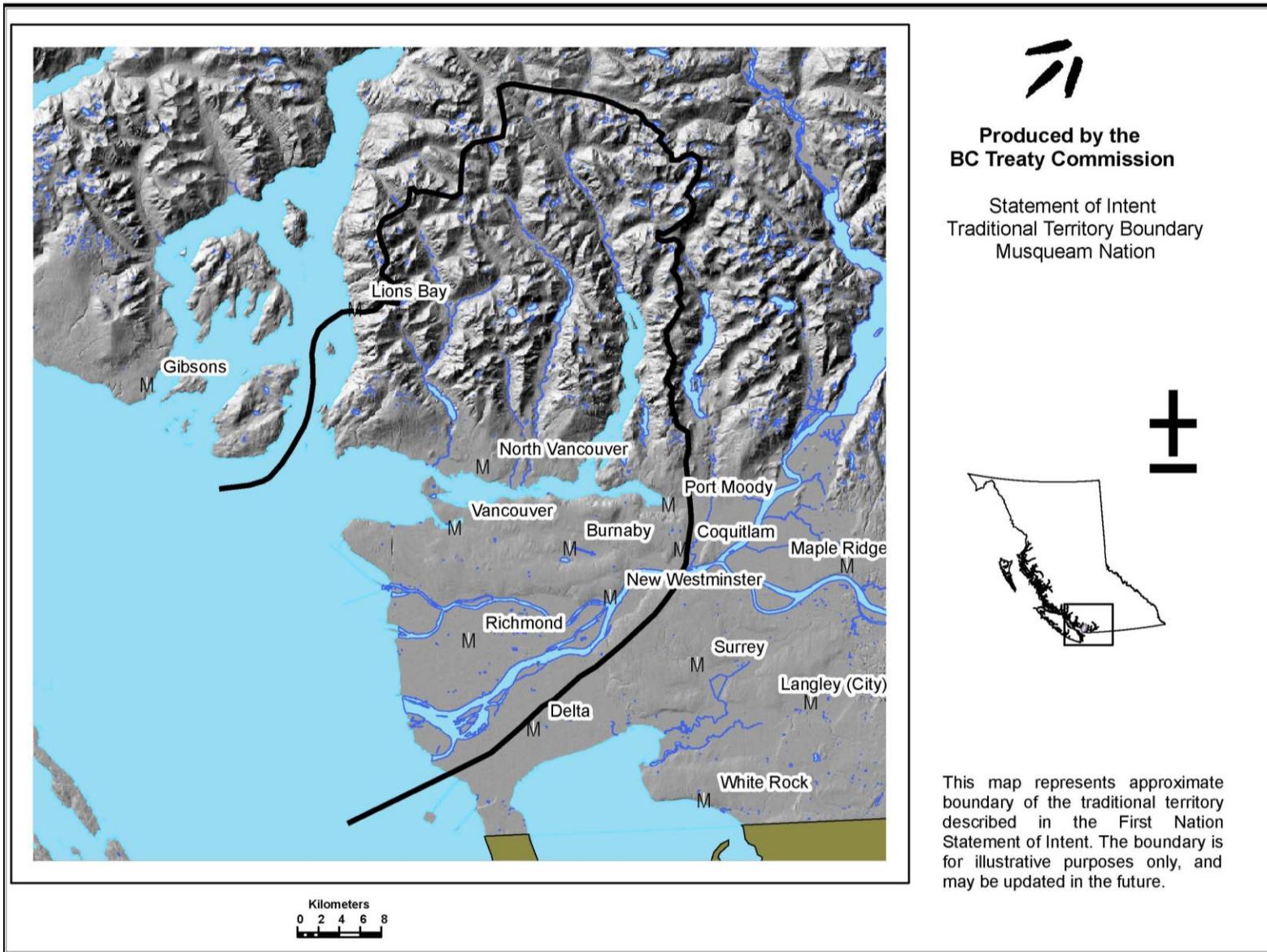
<sup>163</sup> Boaz 1887, as cited in Clark, A. 2007. Musqueam Nation Statement of Intent Area: Report on Strength of Claim Assessment Research. Prepared for Aboriginal Law Group, Ministry of Attorney General. (page 15).

<sup>164</sup> Duff 1952:27, as cited in Clark, A. 2007. Musqueam Nation Statement of Intent Area Report on Strength of Claim Assessment Research. Prepared for Aboriginal Law Group, Ministry of Attorney General. (page 16).

<sup>165</sup> Suttles 1955:12, Duff 1952: 27, as cited in Howes, K. 2003. Fraser Corridor Program - Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 22).

<sup>166</sup> Clark, A. 2007. Musqueam Nation Statement of Intent Area Report on Strength of Claim Assessment Research. Prepared for Aboriginal Law Group, Ministry of Attorney General. (page 15).

<sup>167</sup> Howes, K. 2003. Fraser Corridor Program - Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division (page 22).



**Figure 11. Musqueam Statement of Intent Traditional Territory Boundary**

### ***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment:***

Musqueam Indian Band's ancestors appear to have lived in areas of Sea Island (where Vancouver International Airport is located), areas within the northern portion of Lulu Island, along the north shore of the northern arm of the Fraser River, and were known to travel the South Arm of the Fraser River prior to contact with Europeans. Although there were former village sites located in these areas, the ethnohistoric information indicates that a shift in the areas occupied by the Musqueam had occurred such that by the mid-1800s, the Musqueam were described as occupying only one village site (or two adjacent sites) on the north bank of the Fraser River, and the other sites were used seasonally.

EAO acknowledges that the Supreme Court of Canada confirmed that the Musqueam Indian Band has an aboriginal right to fish in the area in Canoe Passage in the South Arm of the Fraser River where Mr. Sparrow had been fishing at the time he was charged under the *Fisheries Act*. The court considered the evidence that the taking of salmon was an integral part of the lives of the Musqueam long before the coming of European settlers into the area.

In addition to the proven aboriginal right to fish described above, EAO understands that the Musqueam Indian Band assert an aboriginal right to fish in other areas of the proposed Project area. Musqueam Indian Band provided EAO with information clarifying that their fishing areas in the South Arm of the Fraser River were in the vicinity of the proposed Project. Given the importance of fish resources to the Musqueam Indian Band, the information reviewed to date indicating that the Musqueam fished in this area prior to contact, EAO's preliminary assessment of the strength of Musqueam's *prima facie* claim to an aboriginal right to fish in the proposed Project area is strong.

There is no information supporting a good *prima facie* claim to aboriginal title by the Musqueam Indian Band. That is, there is no information to support exclusive occupation or regular and intensive use of any sites by the Musqueam within the proposed Project area.

### ***Assessment of Potential Impacts***

In reading paragraphs 28-30 of *R v. Sparrow*, paragraph 28 states that the appeal is directly related to the Musqueam's right to fish at Canoe Passage, and a broader fishing area is described in paragraphs 29 and 30. Although there was indeed evidence provided regarding Musqueam historic use of an area of the Fraser River that was broader than the location of where Mr. Sparrow was charged with violating the *Fisheries Act*, this was a regulatory proceeding that considered only whether there was an aboriginal rights defence to the *Fisheries Act* charges pursuant to s. 35 of the

*Constitution Act*. Case law, such as *Adams*, *Côté*, *Mitchell*, and *Powley* emphasize that aboriginal hunting and fishing rights are site-specific, and even if a right exists independent from title, it does not become a right exercisable anywhere, it continues to be a right to hunt or fish on the tract of land in question (*R. v. Adams*, para 30).

By applying *Haida* to areas beyond Canoe Passage, the area discussed in *R. v. Sparrow*, EAO is not minimizing the significance of Musqueam's traditional fishing practices in those areas, EAO is adhering to the Crown's legal obligations set out in *Haida*.

In consideration of differing views between EAO and Musqueam regarding the scope of Musqueam's aboriginal right to fish as described in *R. v. Sparrow*, as well as differing views on the serious of impact of the proposed Project to Musqueam's fishing rights, EAO has provided a justification analysis, although EAO emphasizes that it remains unclear whether in the circumstances and the nature of the potential impacts, that the potential impacts of the proposed Project are significant, so as to constitute an infringement to Musqueam's fishing rights, recognizing this is a low threshold. It is not clear the potential impacts of the proposed Project cause an undue hardship or interfere with Musqueam's fishing rights in a significant way. However, EAO notes that many of the components of the justification analysis set out in *Sparrow* overlaps with the consultation and accommodation requirements under *Haida* in terms of minimizing the infringement and adequate consultation.

EAO considered the potential impacts of the proposed Project on Musqueam Indian Band's strong claims to an aboriginal right to fish in this area. The proposed Project would have a potential to impact the exercise of the right to fish due to a proposed Project-related increase of three to five vessels per month in the South Arm of the Fraser River, vessel traffic that may require Musqueam fishers to pull out their nets and move their boats out of the direct path of such vessels. EAO does not consider vessel traffic or Musqueam fishing in the South Arm of the Fraser River to be mutually exclusive, and EAO recognizes that there may be some impact of the proposed Project in terms of if vessel traffic were to spatially and temporally interfere with the exercise of Musqueam's fishing rights. Musqueam does not agree with EAO's characterization of the potential impact of vessel traffic on Musqueam's fishing rights.

There is also a possibility that Musqueam Indian Band's aboriginal right to fish could be affected by a jet fuel spill. Given the anticipated low level of vessel traffic arising from the proposed Project, and EAO's determination of the risk of a jet fuel spill, as discussed in Part D of this Report, the potential impact or limitation of the proposed Project on Musqueam's proven and claimed aboriginal right to fish in this area was not considered to be unreasonable, an undue interference, nor resulting in a denial of a preferred means of exercising the aboriginal right to fish. The nature of the proposed

activity was also not considered to result in a significant interference with the meaningful exercise of Musqueam's right to fish within its traditional territory. EAO's assessment is the proposed Project would have a minor impact on Musqueam's aboriginal right to fish.

***Legislative Objective:***

In describing the first component of the justification test, the court in *R. v. Gladstone*, [1996] 2 S.C.R. 723 stated the following (at para. 75):

Although by no means making a definitive statement on this issue, I would suggest that with regards to the distribution of the fisheries resource after conservation goals have been met, objectives such as the pursuit of economic and regional fairness, and the recognition of the historical reliance upon, and participation in, the fishery by non-aboriginal groups, are the type of objectives which can (at least in the right circumstances) satisfy this standard. In the right circumstances, such objectives are in the interest of all Canadians and, more importantly, the reconciliation of aboriginal societies with the rest of Canadian society may well depend on their successful attainment.

The proposed Project would provide YVR with access to more dependable, diverse, and competitive offshore fuel supply sources to meet YVR's long-term fuel requirements, and assist with the general economic competitiveness of Metro Vancouver, BC, and Canada and thus, relates to economic and regional fairness.

The economic and social benefits of the proposed Project include capital costs between approximately \$93 million and \$108 million. Construction of the proposed Project would be expected to result in an estimated 762 person years of direct, indirect and induced employment in BC, based on a conservative estimate of \$80 million in construction expenditures. During operations, the proposed Project would generate approximately 14 full time equivalent jobs and potential economic development as a result of increased capacity at YVR during operations. (More detailed economic and social analysis for the proposed Project is included in Sections 6 and 7 of this Report.)

EAO is of the view that the economic and regional benefits of the proposed Project is a government objective that is sufficiently weighty to justify any infringement to Musqueam's fishing right.

***Minimize Impact:***

EAO has worked with the Proponent to minimize the potential impacts of the proposed Project to Musqueam's fishing rights as much as possible. To avoid spatial and temporal conflict between vessels and Musqueam Fishers, a condition was included in the Table of Conditions to ensure that the Proponent provides First Nations, including Musqueam, with 12 hours notice of ships arriving or departing the marine terminal. To avoid a fuel spill, a number of conditions were added (see section 26 of this report and

the Table of Conditions). Section 28 of this report describes the probability and consequence of a spill, and specifically details the small likelihood of a fuel spill.

### ***Depth of Consultation:***

Given the existence of both proven and asserted aboriginal rights in the proposed Project area, the concerns expressed by the Musqueam regarding the potential impact of the proposed Project on its right to fish from vessel traffic and in the event of a spill from the proposed Project, EAO has proceeded with consultation with the Musqueam Nation towards the deeper end of the *Haida* spectrum. Adequate consultation is also a consideration under *Sparrow*.

EAO has made available opportunities for consultation with Musqueam Indian Band by:

- Providing Musqueam with all information and opportunities for comment;
- Providing opportunities for involvement with all stages of the EA;
- Offering to meet individually with representatives of Musqueam Indian Band for specific discussions regarding asserted and proven aboriginal rights outside of the Working Group forum, seeking input from the Musqueam regarding potential impacts to its Aboriginal Interests and options to avoid and mitigate such impacts; and
- Providing this Assessment Report for review and comment to show how Musqueam's concerns were considered.

## 20.2 Consultation with Musqueam Indian Band

### ***Consultation Undertaken by the Proponent***

In August 2008, the Proponent met with the Musqueam Indian Band. Musqueam Indian Band identified potential concerns with the proposed Project including, but not limited to, the impact of a spill on the Fraser River fishery, the impact on their community of increased air traffic, and possible risks to migratory birds.

In September 2008, the Proponent provided the Musqueam Indian Band with additional information on the proposed Project as per their request and offered to provide capacity funding to assist their participation in the EA. Representatives of Musqueam Indian Band and the Proponent met again in November 2008. The Proponent provided additional information regarding the proposed Project, listened to the issues raised by Musqueam Indian Band, and discussed opportunities for capacity funding for the EA.

In January 2010, the Proponent sent a letter to Musqueam Indian Band requesting a meeting to discuss Musqueam Indian Band's interests, potential effects from the proposed Project on those interests, and how the Proponent may avoid or mitigate any

adverse effects. Also in January 2010, the Proponent received a capacity funding proposal from Musqueam Indian Band.

In April 2010, the Proponent met with Musqueam Indian Band to discuss Musqueam Indian Band's proposal for capacity funding. Following the meeting, the Proponent provided Musqueam Indian Band with a summary of the discussions on capacity funding and, in May, Musqueam Indian Band and the Proponent came to an agreement regarding capacity funding.

In March 2011, the Proponent received Musqueam Indian Band's comments on the Application and responded in writing in June 2011.

The Proponent was informed that Musqueam Indian Band did not wish to meet with consultants hired by the Proponent, but would meet directly with the President of the Proponent, who is based in Montreal. As an alternative, the Proponent provided the name of the Richmond-based Project Director to Musqueam Indian Band representatives, along with an authorization letter from the Vice-President of the Proponent for the Project Director to represent the Proponent.

A meeting between the Proponent and Musqueam Indian Band was convened in May 2011 and was attended by the President as well as the Project Director. The meeting provided an opportunity for the Proponent and Musqueam Indian Band to share information and discuss concerns. The participants agreed to meet again in mid-June 2011 to further discuss the proposed Project.

In May, June and July 2011, the Proponent initiated communication with the representatives of the Musqueam Indian Band to seek direction regarding next steps and identify further opportunities to meet. Musqueam Indian Band suggested that, based on the June 2011 meeting, it would be useful to have an exchange of information with their fishers and for the Proponent to invite them onto the Fraser River to exchange information.

In response, the Proponent organized a boat trip in September 2011 and arranged for their marine geologist, maritime planning engineers, and representatives from Western Canada Marine Resources Corporation to meet with representatives of Musqueam Indian Band.

In February 2012, Musqueam Indian Band's consultant emailed the Proponent a preliminary list of concerns regarding the location of spill equipment caches, long-term compensation for a loss of a sensitive fishery, development of specific spill remediation or restoration plans, and the development of baseline conditions to assist in the effectiveness of possible restoration measures, noting that the consultant had not confirmed whether the issues identified were consistent with direction from Musqueam

Indian Band. The Proponent provided Musqueam Indian Band with responses to their questions.

### ***Consultation Undertaken by EAO***

EAO requested a meeting with Musqueam Indian Band in March 2010, as Musqueam Indian Band could not meet earlier due to their responsibilities during the 2010 Olympics. EAO wished to discuss the EA process, the involvement of other crown agencies in the EA, the proposed Project, and Musqueam Indian Band's concerns. Musqueam Indian Band opted to postpone meeting with EAO until after they had met with the Proponent and EAO approached Musqueam Indian Band in April, May, and June 2010 to schedule the meeting. In June 2010, EAO met with Musqueam Indian Band to discuss the EA process, and potential impacts from the proposed Project on Musqueam Indian Band's interests and aboriginal right to fish for food, social and ceremonial purposes.

During the Application review stage of the EA, EAO and Musqueam Indian Band exchanged email correspondence to attempt to set up another meeting.

EAO and Musqueam Indian Band met on August 8, 2012 to discuss the proposed Project. Musqueam Indian Band expressed concern regarding how their right to fish had been characterized by EAO in the draft First Nations Consultation Report stating that the proposed Project would infringe on Musqueam Indian Band's right to fish, and that they did not support the proposed Project. EAO revised the draft First Nations Consultation Report to address Musqueam's concerns raised at the meeting, and provided the revised Musqueam section of the First Nations Consultation Report to Musqueam for comment.

Musqueam Indian Band attended EAO's October 2012 working group meeting. Concerns raised by Musqueam at the working group meeting included the protocol for contaminated sites, completion of an AIA during the EA, and avoidance of archaeological sites, specifically DgRs-26.

Musqueam Indian Band provided EAO with their comments on the Musqueam section of the draft First Nations Consultation Report on November 28, 2012. Musqueam notes that they do not agree that consultation has been undertaken or completed for the EA of the proposed Project. It is EAO's view that we have consulted with Musqueam in good faith, with the intention of substantially addressing concerns regarding Musqueam's rights and interests that would be potentially affected by the proposed Project. During the EA, EAO provided Musqueam with a number of opportunities to provide their views on the proposed Project to enable EAO to gain a proper understanding of Musqueam's Aboriginal Interests, including participation on the working group for the proposed Project and opportunities to be consulted on a government-to-government basis.

Paragraph 11.1 of the section 11 Order issued by EAO for the proposed Project directs the Vancouver Airport Fuel Facilities Corporation (Proponent) to consult with First Nations with respect to their perspectives and opinions about the proposed Project and potential effects of the proposed Project on First Nation's Aboriginal Interests. It is EAO's view that the Proponent adhered to this condition of the section 11 Order.

Musqueam strongly disagrees that collection and distribution of information about the proposed Project has been adequately carried out. It is EAO's view that Musqueam Indian Band was provided all relevant information about the proposed Project in a timely manner, and Musqueam had opportunities for review and comment on all relevant proposed Project documents.

Musqueam raised a concern that the First Nations Consultation Report does not reference potential impacts to fish spawning, rearing, nursery or migration areas, as well as surrounding air, soil and water quality, or the health of plants or marine species. The Application and Assessment Report for the proposed Project contain information on impacts to fisheries, aquatics and surface water quality, vegetation, wildlife and wildlife habitat, air and climate, contaminated sites, accidents and malfunctions, and spill risk, including baseline conditions.

Musqueam raised a concern regarding upstream manoeuvring of tankers. To clarify, there would be limited manoeuvring of proposed Project-related vessels upriver of the proposed Project area.

Musqueam raised a concern regarding the assessment of ditches in proximity to the proposed pipeline. The potential effects on proposed Project-area ditches are detailed in Chapters 5.2 and 15 of the Application, as well as EAO's Assessment Report, a draft of which was made available to Musqueam for review.

Musqueam strongly disagrees that issues identified during the EA were adequately addressed by the Proponent during application review. It is EAO's view that the EA for the proposed Project examined all potentially adverse environmental, economic, social, heritage and health effects that may occur during the life cycle of the proposed Project.

Musqueam provided recommendations on the manner in which the Proponent's AIA should be performed, if the proposed Project is certified, as well, Musqueam requested that they be consulted during the Proponent's AIA. EAO provided the Proponent with Musqueam's recommendations, and has included a provision for First Nations consultation during the AIA in the Table of Conditions.

### 20.3 Measures to Avoid and Minimize Impacts:

### ***Increase in Vessel Traffic:***

As discussed, the proposed Project could have a minor potential impact on the exercise of Musqueam's proven and asserted aboriginal right to fish during normal Project operations due to a proposed Project-related increase of vessel traffic in the South Arm Fraser River that may require Musqueam members to move any nets or fishing boats in the direct path of any such vessels.

The Proponent has committed to a communication protocol to facilitate communication between the Proponent and First Nations with regard to vessel traffic and First Nations fishing practices. This would provide First Nations and proponents with advance notice of any potential vessel-fishing conflicts. This communication protocol would potentially reduce spatial and temporal conflicts between First Nations fishers and the proposed Project-related vessel traffic in the South Arm of the Fraser River.

EAO understands that VFPA is discussing the broader issue of the management of vessel traffic during key periods of fishing in the South Arm of the Fraser River with the Fisheries and Oceans Canada and other federal agencies. Further options to avoid or minimize impacts of vessel traffic generally in the South Arm of the Fraser River can be further explored by VFPA with First Nations through these discussions.

### ***Jet Fuel Spill Event:***

Musqueam Indian Band's proven and asserted aboriginal right to fish could also be affected in the event of a jet fuel spill.

The Proponent would be required to finalize their OPEP, which would describe measures to contact and coordinate planning and spill response with First Nations, describe environmentally sensitive areas that could potentially be affected in the event of a spill, and describe the response measures that would be implemented to prevent and reduce the potential for spill contact, among other measures to minimize the potential effects of a spill. The Proponent and vessels would be insured for pollution liability at prevailing industry standard coverage limits sufficient to pay for emergency spill response and to compensate for loss to the environment or the licensed aboriginal food, social, and ceremonial fishery caused by a spill of aviation fuel from their vessel. Spill prevention measures would ensure that spills are prevented or that instances of a spill would be reduced. In the event of a spill, the Proponent's and vessel's operator's insurance would compensate First Nations, as well as provide funding for spill cleanup.

### ***Consultation and Accommodation Summary:***

The Minister of Environment and the Minister of Energy and Mines will decide whether to issue an EA Certificate for the proposed Project, taking into account this Report and

its conclusions, and whether the Crown's duty to consult and accommodate, and to avoid unjustified infringements, has been discharged. This includes the proposed Project's impact to Musqueam Indian Band's asserted and proven aboriginal right to fish in the proposed Project area.

The decision with respect to the conclusions of the federal EA will be made by the Director of Environmental Programs for VFPA. Areas under federal jurisdiction for the proposed Project include shipping, the water lot lease for the marine terminal, fuel receiving facility lands, and airport lands.

As documented in sections 13.1 and 20.2, EAO consulted First Nations on this proposed Project in both government-to-government and WG meetings.

EAO met with Musqueam Indian Band to discuss the proposed Project and to discuss how the proposed Project may impact the exercise of Musqueam Indian Band's aboriginal Interests, in particular, their proven and asserted aboriginal right to fish in the proposed Project area. Musqueam Indian Band was provided opportunities to review and comment on all major documents during the EA process, and EAO meaningfully incorporated Musqueam Indian Band's comments on those documents, where applicable.

EAO met with Musqueam Indian Band in good faith to discuss and document how the proposed Project may impact Musqueam's Aboriginal Interests. EAO followed up with the Musqueam Indian Band and other stakeholders, such as provincial government experts, to provide Musqueam Indian Band with the information they requested to substantially address their concerns.

EAO communicated EAO's findings with regard to Musqueam Indian Band's concerns regarding the proposed Project, and provided opportunities for Musqueam to be heard and responded to, such as review and comment on EAO's draft First Nations Consultation Report and Assessment Report, and a government-to-government meeting held to discuss the draft First Nations Consultation Report. Musqueam Indian Band had the opportunity to specify the nature and scope of the potential impact of the proposed Project on their right to fish from their point of view. Musqueam informed EAO that they view the proposed Project as infringing on their right to fish, and requested that EAO provide Musqueam with justification and compensation to accommodate their perceived impact.

It is EAO's view that the potential for impacts of the proposed Project on Musqueam's traditional fishing activities in the South Arm of the Fraser River would be minor, infrequent, temporary, and does not constitute an infringement. The potential impacts would be reasonably accommodated and significantly minimized by requiring the proponent to develop and implement a communication protocol to avoid any potential

interference between Musqueam fishers and vessel traffic related to the proposed Project. Furthermore, the proponent should be required to comply with general safety best practices to reduce the risk of a spill as outlined in the Proponent's OPEP, and to provide compensation and remediation in the event of a spill as required by the Proponent's and vessel's pollution liability, as outlined in detail in Schedule B of the EA Certificate (Table of Conditions).

## **21 Semiahmoo First Nation**

### **21.1 Regional Context, Asserted Aboriginal Rights, Strength of Claim, and Depth of Consultation**

#### ***Regional Context:***

The registered population of Semiahmoo First Nation is approximately 85 members, with approximately 55 members living on reserve. Semiahmoo First Nation has one reserve, located one kilometre southeast of White Rock near the Canadian-United States Border on Semiahmoo Bay, with an area of approximately 130 hectares.

Semiahmoo is a member of the Sencot'en Alliance, which is an association of four Coast Salish First Nations including the Tsawout, Tsartlip, and Pauquachin First Nations from the Saanich Peninsula<sup>168</sup>.

Relevant ethnographic information suggests that Semiahmoo First Nation's activities were focused in the Boundary Bay area<sup>169</sup>. In the past and present, Semiahmoo First Nation utilized the vicinity of the proposed Project area for fishing during the summer months and for gathering. Semiahmoo First Nation also reef-net fished sockeye at Cannery Point on the Point Roberts Peninsula<sup>170</sup>. Semiahmoo used weirs to fish on the Salmon River<sup>171</sup>. In the fall, Semiahmoo First Nation gaffed salmon in Dakota and California creeks, used a weir on the Campbell and Nicomekl rivers to capture chum salmon<sup>172</sup>, and trolled for salmon in front of their village on Tongue Spit in Drayton

---

<sup>168</sup> Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division, (page 4).

<sup>169</sup> Ibid.

<sup>170</sup> Suttles 1951:27, as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division (page 8).

<sup>171</sup> Semiahmoo First Nation. n.d. Semiahmoo First Nation Response to BC (page 24).

<sup>172</sup> Suttles 1951:29 &150, and Suttles 1951:114, as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division (page 8).

Harbour<sup>173</sup>. Semiahmoo First Nation also fished for sturgeon, halibut, eulachon, herring, as well as sea mammals, including hair seals, sea lions and porpoises<sup>174</sup>. Beach foods were also important to Semiahmoo First Nation. Shellfish are not found at the mouth of the Fraser River due to the influence of fresh water, so Semiahmoo and other First Nations shared the shellfish resource in Boundary Bay<sup>175</sup>. Semiahmoo First Nation also hunted deer and elk inland at Lake Terrell south of Birch Bay, hunted bear and beaver at the heads of the Serpentine and Nicomekl rivers, and hunted beaver at Lake Terrell<sup>176</sup>. Semiahmoo First Nation used raised duck nets at Tongue Spit and at the mouth of Dakota and California creeks<sup>177</sup>. Semiahmoo First Nation harvested camas on Waldron Island in the United States and had prairies behind their winter villages where they could harvest camas and other bulbs<sup>178</sup>. Semiahmoo received potatoes from the Snokomish at Blackie Spit after the founding of Fort Langley<sup>179</sup>. Around 1850, the majority of Semiahmoo First Nation had relocated from Drayton Harbour to Campbell River<sup>180</sup>.

Semiahmoo First Nation had important connections with the Northern Straits-speaking Saanich groups, intermarrying and sharing their reef-netting grounds at Cannery Point with groups such as Saanich<sup>181</sup>.

An ethnographic report prepared regarding Tsawout First Nation asserts that the whole peninsula below the mouth of the Fraser River was typically referred to as Point Roberts

---

<sup>173</sup> Suttles 1951:119, as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division (page 8).

<sup>174</sup> Suttles 1951:27, 114, 119, 458, as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division (page 8).

<sup>175</sup> Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division. (page 8).

<sup>176</sup> Suttles 1951:27, 29, as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division (page.9).

<sup>177</sup> Suttles 1951:30 as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division, (page 9).

<sup>178</sup> Suttles 1951:29 as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division (page 9).

<sup>179</sup> Suttles 1987:150, as cited in Semiahmoo First Nation. n.d. Semiahmoo First Nation Response to BC (page 26).

<sup>180</sup> Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division, (page 18).

<sup>181</sup> Ibid, (page 13).

and that this area was the largest reef-netting grounds, claimed to be owned by several groups, including Semiahmoo and Saanich<sup>182</sup>.

At the February 18, 2010, meeting between Semiahmoo First Nation and provincial Crown agencies (including EAO), Semiahmoo First Nation explained that the traditional economy was based on animals or fish that move around, and that there is a circulatory effect from the Fraser River into Boundary and Semiahmoo Bays. Semiahmoo First Nation also noted that they historically traded and stayed at *Tl'ektines* through intermarriage with Cowichan Tribes, and that they prefer river salmon over ocean salmon. Semiahmoo First Nation provided EAO with a map of their traditional territory, although no supporting documents were submitted.

***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment:***

Semiahmoo First Nation state that they practiced their fishing rights seasonally in the Fraser River near the proposed Project area at *Tl'ektines*. Ethnographic reports state that Semiahmoo First Nation primarily fished in the open ocean and used weirs in the Nicomekl and other rivers near Boundary Bay. Semiahmoo First Nation also utilized the beaches of Boundary Bay and area rivers and gathering areas to hunt and gather<sup>183</sup>. EAO considers the Semiahmoo First Nation's *prima facie* case for aboriginal rights in the proposed Project area to be moderate.

Ethnographic sources state that Semiahmoo First Nation was based in the Boundary Bay area, and did not have a permanent occupation site in the proposed Project area. Semiahmoo First Nation did not provide EAO with any information regarding use or occupation of the proposed Project area to counter EAO's view. Therefore, EAO has determined that there is likely a low potential for the proposed Project to adversely impact Semiahmoo First Nation's asserted aboriginal title, as the proposed Project would not be located in the Boundary Bay area, and there is a lack of ethnographic evidence indicating exclusive use of the proposed Project area by Semiahmoo First Nation. EAO considers the *prima facie* case for aboriginal title for Semiahmoo is likely weak within the proposed Project area.

***Depth of Consultation:***

---

<sup>182</sup> Ibid.

<sup>183</sup> Suttles 1951:29 as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division, (page 9).

EAO considered the potential impact of the proposed Project on Semiahmoo First Nation's asserted aboriginal right to fish in the Fraser River. While reports indicate that Semiahmoo First Nation fished for salmon in the open ocean and that they were based in Boundary Bay, Semiahmoo First Nation assert that they used *Tl'ektines* seasonally.

EAO considered available historic and ethnographic information, listed in section 12.1 of this report, as well as information provided by Semiahmoo First Nation. As discussed above, EAO considers Semiahmoo First Nation to have a moderate *prima facie* claim for aboriginal rights to fish in the Fraser River. The proposed Project would have a small potential impact to the exercise of this right during normal operations. However, in the event of a spill, Semiahmoo First Nation's aboriginal right to fish could be affected.

EAO concludes that the required duty to consult with the Semiahmoo First Nation falls towards the deeper end of the *Haida* spectrum. EAO has made available opportunities for deep consultation with Semiahmoo First Nation by:

- Providing all information and opportunities for comment;
- Affording opportunities for involvement with all stages of the EA;
- Offering to meet individually with elected representatives of Semiahmoo First Nation for specific discussions regarding asserted aboriginal rights outside of the Working Group forum; and
- Providing this Assessment Report to show that First Nations' concerns were considered.

## 21.2 Specific Consultation Activities Undertaken

### ***Consultation Activities Undertaken by the Proponent***

In March 2009, the Proponent received an enquiry from Semiahmoo First Nation requesting information on the proposed Project. In early April, the Proponent was provided information on Semiahmoo First Nation's initial interests in the proposed Project and a meeting was held to provide Semiahmoo First Nation with proposed Project information, to learn about their interests, and discuss their request for capacity funding. The parties met again in May 2009 and reached an agreement regarding capacity funding.

In October 2009, the Proponent met with Semiahmoo First Nation to discuss ideas they had regarding establishing an Environmental Management Fund for advancing projects that promote the environmental enhancement of the Lower Fraser River.

In January 2010, the Proponent sent a letter to Semiahmoo First Nation requesting a meeting to discuss Semiahmoo First Nation's interests, any potential effects the proposed Project could have on these interests, and how the Proponent could avoid or

mitigate any potential adverse effects. At the meeting, Semiahmoo First Nation presented an overview of its interests in the proposed Project area. Following the meeting, the Semiahmoo First Nation also provided a written summary of their interests.

In March 2011, the Proponent met with Semiahmoo First Nation to discuss the Application, clarify information in the Application, and to discuss the consultation process. At this meeting, Semiahmoo First Nation reiterated many of their initial issues and questions. Answers and clarifications were provided by the Proponent. Semiahmoo First Nation agreed to provide any additional issues they might have in writing. It was agreed that once the written response was received by EAO and passed onto the Proponent, written responses to the questions would be provided and if needed, further discussions could take place to resolve or discuss outstanding issues.

Semiahmoo First Nation provided their comments on Part C of the Application to EAO on April 10, 2011, and a meeting between the Proponent and Semiahmoo First Nation took place in late April. The Proponent reported that Semiahmoo First Nation indicated that the environmental standards and measures adopted by the Proponent for the proposed Project up to that point were positive and that they appreciated the Proponent's consultation approach. Semiahmoo First Nation noted that they are keenly interested in reviewing the draft spill response plans being prepared by Western Canada Marine Response Corporation. Semiahmoo First Nation was provided the opportunity to review the Proponent's Oil Pollution Emergency Plan.

The Proponent and Semiahmoo First Nation continued with regular communications to address outstanding issues, and these discussions led to the establishment of a formal understanding between Semiahmoo First Nation and the Proponent in June 2012.

### ***Consultation Activities Undertaken by EAO***

In January 2010, EAO requested a meeting with Semiahmoo First Nation to discuss the EA process, the proposed Project, and any concerns Semiahmoo First Nation may have regarding the proposed Project. Although EAO scheduled a meeting with Semiahmoo First Nation for February 2010, Semiahmoo First Nation cancelled the meeting. EAO rescheduled the meeting for February 2010, at which time the group discussed the EA process, potential impacts of the proposed Project (specifically impacts on fish and impacts from spills), and DFO's involvement in the EA.

In March 2011, Semiahmoo First Nation requested a meeting with EAO to discuss Semiahmoo oral history and ethnographic information that demonstrates that the proposed Project site is within traditional territory of the Semiahmoo First Nation. EAO and Semiahmoo First Nation met in April 2011, at which time Semiahmoo First Nation acknowledged that Cowichan Tribes fished in the South Arm of the Fraser River and that access to this area was gained by Semiahmoo First Nation via a series of marriage ties between Semiahmoo First Nation and Cowichan Tribes.

Key concerns raised by Semiahmoo First Nation include potential impacts of the proposed Project to plants and animals of traditional importance, spill prevention and remediation, and emergency response.

On July 14, 2012, EAO received a letter from Semiahmoo First Nation stating that they are satisfied that the proposed Project would not adversely affect Semiahmoo First Nation's aboriginal rights and interests if the proposed mitigation measures in the Table of Conditions are implemented. Semiahmoo stated that they support the proposed Project and the issuance of an EA Certificate and all related provincial and federal approvals for the proposed Project.

## **22 Tsawout First Nation**

### **22.1 Regional Context, Treaty Rights, and Depth of Consultation**

The registered population of Tsawout First Nation is approximately 810 members, with approximately 565 members living on reserve. Tsawout First Nation has six reserves, located on Mandarte Island, south Saanichton Bay, southern Saltspring Island, west South Pender Island, east Saturna Island, and at the mouth of Goldstream River, with an approximate total area of 420 hectares.

#### ***Douglas Treaty***

According to the Ministry of Aboriginal Relations and Reconciliation website, British administrators had developed a colonial policy recognizing aboriginal possession of land by the time the colony of Vancouver Island was established in 1849. In 1850, the Hudson's Bay Company, which was responsible for British settlement of Vancouver Island as part of its trading license agreement with the Crown, began purchasing lands for colonial settlement and industry from aboriginal peoples on Vancouver Island. Between 1850 and 1854, fourteen treaties were concluded with First Nations living on Vancouver Island, resulting in lands being surrendered "entirely and forever" in exchange for cash, clothing, or blankets. The signatories of the Douglas Treaties and their descendants retained existing village sites and fields for their continued use, as well as the "liberty to hunt over unoccupied lands" and the right to "carry on their fisheries as formerly."

On February 7, 1852, the Saanich Tribe (South Saanich) signed a treaty at Fort Victoria. EAO's understanding is that the members of the modern-day Tsawout First Nation trace their ancestry to this Douglas Treaty tribe. The February 7, 1852 Douglas Treaty describes the lands surrendered as those lands situated between Mount Douglas and Cowichan Head, and extending to the centre of North and South Vancouver Island.

## **Douglas Treaty Rights:**

Tsawout First Nation provided EAO with information regarding their traditional fishing practices in the vicinity of the proposed Project. Tsawout First Nation traveled to the Mainland every summer to undertake reef net fishing, including at Point Roberts (south of Tsawwassen) and on the Salmon River, a tributary of the Fraser River near Fort Langley.

As a signatory to a Douglas Treaty, Tsawout First Nation has the right to hunt over unoccupied lands and the right to carry on their fisheries as formerly practiced. Mud Bay, located on Canoe Pass was a significant fishing site for the Tsawout First Nation. Tsawout First Nation's traditional fishing activities at Boundary Bay and Mud Bay depended on the health of the salmon stocks moving up the Fraser River. Tsawout First Nation also reef-net fished in the summer on Stuart and Pender Islands.

While Tsawout First Nation's Douglas Treaty covers the area of south Saanich and does not include areas on the Fraser River, the treaty enables Tsawout First Nation to continue to hunt and fish in the surrendered lands, as well as anywhere they traditionally hunted and fished pre-treaty, with the exception of hunting over "occupied" lands. The proposed Project would not impact the right of Tsawout First Nation to hunt and fish on Vancouver Island, but in the event of a spill, it could impact other areas used by Tsawout First Nation, such as Canoe Pass.

### ***Depth of Consultation***

EAO considered available historic and ethnographic information listed in section 12.1 of this report, as well as the Douglas Treaties, and information provided by Tsawout First Nation. In the event of a spill, Tsawout First Nation's treaty right to fish could be affected.

EAO has made available opportunities for deep consultation with Tsawout First Nation by:

- Providing all information and opportunities for comment;
- Affording opportunities for involvement with all stages of the EA;
- Offering to meet individually with elected representatives of Tsawout First Nation for specific discussions regarding treaty rights outside of the Working Group forum; and
- Providing this Assessment Report to show that First Nations' concerns were considered.

## 22.2 Specific Consultation Activities Undertaken

### ***Consultation Activities Undertaken by the Proponent***

In April 2009, the Proponent met with Tsawout First Nation to discuss capacity funding for the EA process. In June 2009, Tsawout First Nation prepared a funding proposal, and the Proponent and Tsawout First Nation reached an understanding.

In January 2010, the Proponent requested a meeting with Tsawout First Nation to discuss their interests and consider how the Proponent could avoid, mitigated or accommodate and potential impacts from the proposed Project

In March 2010, the Proponent met with representatives from Tsawout First Nation to provide information regarding the proposed Project and discuss Tsawout First Nation's interests. At the end of the meeting, the Proponent and Tsawout First Nation established a commitment to work together, and Tsawout First Nation requested that the Proponent consider concerns regarding the proposed Project from Tsawout First Nation students.

Tsawout First Nation provided their comments on the Application in March 2011 and the Proponent informed Tsawout First Nation that they would be preparing written responses. It was agreed that once the Tsawout First Nation had reviewed the responses, a meeting would be arranged to discuss any outstanding issues.

In June and July 2011, the Proponent contacted Tsawout First Nation to extend an invitation to meet to discuss the Application or any questions they may have regarding the proposed Project. In mid July 2011, Tsawout First Nation informed the Proponent that they would be forwarding a letter to the Proponent in the next few days.

In late July 2011, the Proponent contacted Tsawout First Nation and was informed that the letter had not been sent, but that Chief and Council would like to meet with the Proponent on August 21, 2011. As this date approached, the Proponent was informed that the meeting was deferred until September 14, 2011. On September 9, 2011, Tsawout First Nation cancelled the meeting. Tsawout First Nation informed the Proponent that a new contact person had taken over the file. The Proponent offered to meet with the new representative multiple times.

In response to the December 2011 discussion paper provided to EAO and the Proponent by Tsawout First Nation, the Proponent has made attempts to advance discussions with Tsawout First Nation regarding their comments during the EA. In January 2012 the Proponent confirmed its ongoing willingness to meet and discuss the proposed Project with Tsawout First Nation.

## ***Consultation Activities Undertaken by EAO***

EAO requested a meeting with Tsawout First Nation in April 2010 to discuss potential impacts to Tsawout First Nations interests and their participation in the EA process. EAO and Tsawout First Nation met in May 2010, at which time Tsawout First Nation shared their concerns regarding fuel spills and impacts to plants and salmon.

In June 2011, EAO requested a meeting with Tsawout First Nation to discuss the Application review stage of the EA, and to hear any additional concerns Tsawout First Nation may have regarding the proposed Project. EAO repeated this request in October 2011. While Tsawout First Nation chose not to meet government-to-government, they did participate in EAO's January 2012 working group meeting.

Key concerns raised by Tsawout First Nation during the Application Review stage of the EA include potential impacts of the proposed Project to their treaty rights, risk of spills and spill clean-up, and reburial procedures should human remains be found.

## **23 Tsawwassen First Nation**

### **23.1 Regional Context and the Tsawwassen First Nation Final Agreement**

#### ***Regional Context:***

Tsawwassen First Nation has a registered population of approximately 430 members, with approximately 217 members living on Tsawwassen Lands. Tsawwassen Lands are located on the Salish Sea between the Tsawwassen Ferry Terminal and Deltaport. The Tsawwassen First Nation Final Agreement (TFA) land package consists of approximately 725 hectares of treaty settlement lands, including 290 hectares of former reserves and 370 hectares of former Provincial Crown land. Tsawwassen First Nation owns an additional 62 hectares of fee simple land near Boundary Bay and the Fraser River, which remains under the jurisdiction of the Corporation of Delta.

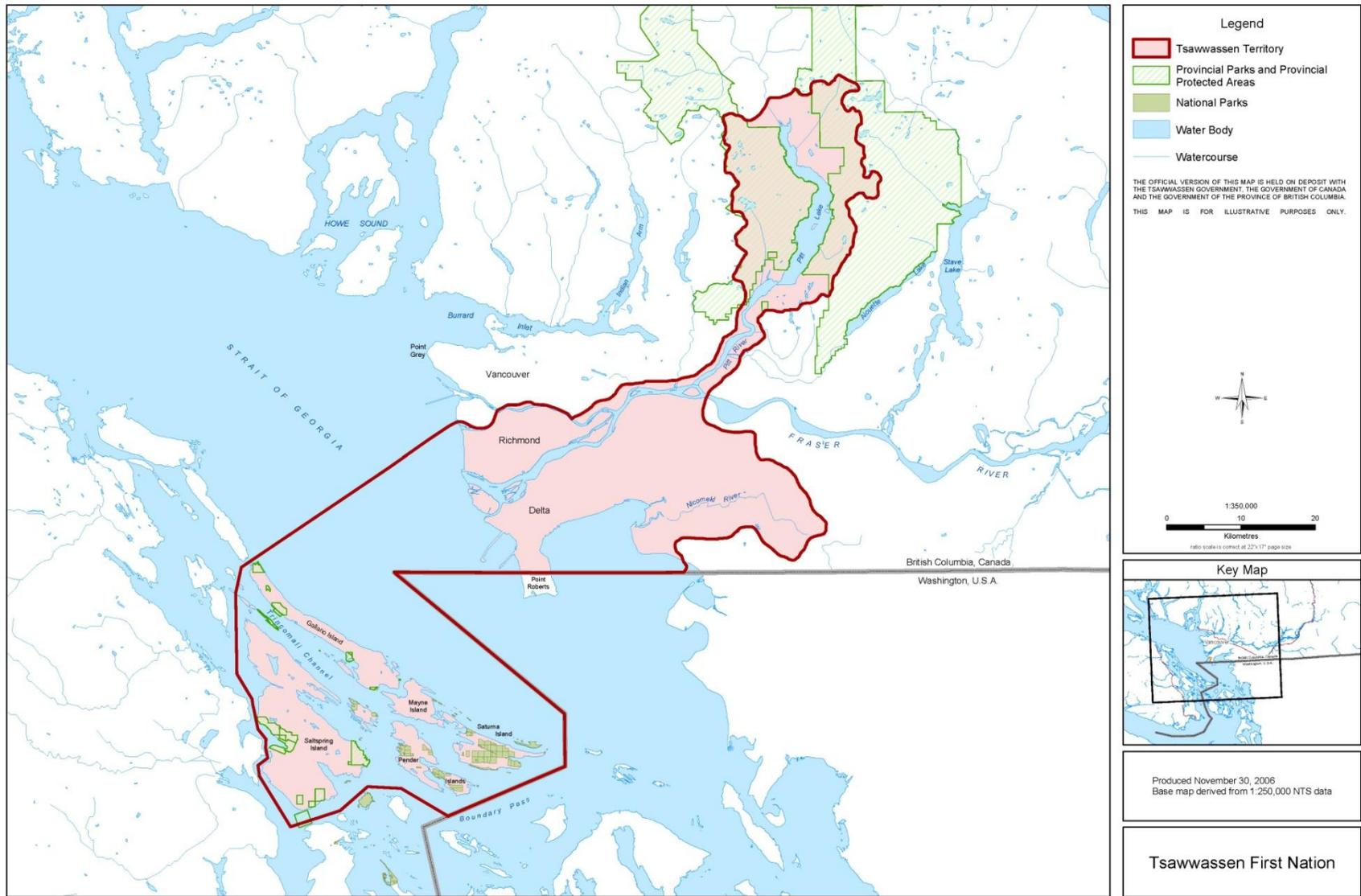
#### ***Tsawwassen First Nation Final Agreement:***

The Tsawwassen First Nation ratified the TFA on July 25, 2007. The TFA was ratified in the provincial legislature, and received federal Royal Assent on June 26, 2008. The Treaty came into effect on April 3, 2009.

With respect to provincial EA, chapter 15 (3) of the TFA states the following:

“3. Within Tsawwassen Territory, Tsawwassen First Nation has the right to participate in provincial Environmental processes and to receive referrals on Environmental matters from British Columbia on the same basis as Local Governments or other First Nations.”

Chapter 1 of the TFA states that “Tsawwassen Territory” means the area of land that Tsawwassen First Nation identified in its Statement of Intent to the British Columbia Treaty Commission (Figure 12).



**Figure 13. Tsawwassen Traditional Territory**

With respect to federal EA, chapter 15(4) of the TFA states the following:

“4. If a proposed Federal Project may reasonably be expected to adversely affect Tsawwassen Lands or Tsawwassen First Nation rights set out in this Agreement:

a. Canada will ensure that Tsawwassen First Nation is provided with timely notice of the Environmental Assessment and information describing the Federal Project in sufficient detail to permit Tsawwassen First Nation to determine whether it is interested in participating in the Environmental Assessment;

b. if Tsawwassen First Nation confirms that it is interested in participating in the Environmental Assessment of the Federal Project, Canada will provide Tsawwassen First Nation with an opportunity to comment on the Environmental Assessment conducted under the *Canadian Environmental Assessment Act*, including:

- i. the scope of the Federal Project;
- ii. the environmental effects of the Federal Project;
- iii. any mitigation measures to be implemented; and
- iv. any follow-up programs to be implemented;

c. during the course of the Environmental Assessment conducted under the *Canadian Environmental Assessment Act*, Canada will give full and fair consideration to any comments provided by Tsawwassen First Nation under subclause 4.b, and will respond to the comments, before taking any decision to which those comments pertain; and

d. Canada will provide to Tsawwassen First Nation access to information in Canada’s possession related to the Environmental Assessment of the Federal Project, in accordance with the public registry provisions in the *Canadian Environmental Assessment Act*.

While the proposed Project would not be located on Tsawwassen Lands, it would be located within the Tsawwassen Fishing, Wildlife Harvest, Migratory Bird Harvesting, and Plant Gathering Areas defined in the TFA. According to the Proponent’s Application, there are several TFA rights that are applicable to the proposed Project, including the right to harvest fish, wildlife (including migratory birds), and plants.

Appendix O-3 of the TFA also lists the historical village of *Tl’ektines* as a “site of cultural and historical significance to Tsawwassen First Nation to be designated a provincial heritage site”.

Based on a review of the TFA and the Proponent’s Application, EAO believes there may be a potential impact from the proposed Project to Tsawwassen First Nation’s treaty right to harvest fish. Although the potential for the proposed Project to impact Tsawwassen First Nation’s treaty right to harvest fish would be low under normal

operating conditions, the proposed Project could have a large impact in the event of a jet fuel spill. Therefore, EAO considers the potential impacts from the proposed Project on Tsawwassen First Nation's treaty rights could be moderate to high in the event of a spill or leakage.

EAO has fulfilled the requirements set out in the TFA as they relate to the EA of the proposed Project by providing Tsawwassen First Nation with information and opportunities for input and involvement in all stages of the EA. EAO also offered to meet with representatives of Tsawwassen First Nation outside of the Working Group forum to discuss TFN's treaty rights on a government-to-government basis.

## 23.2 Consultation Activities Undertaken with Tsawwassen First Nation

### ***Consultation Undertaken by the Proponent***

The Proponent met with Tsawwassen First Nation in August 2008. Tsawwassen First Nation shared concerns regarding potential effects from the proposed Project on migratory birds and fish and expressed an interest in participating in any required remediation work.

Tsawwassen First Nation and the Proponent met again in November 2008 to discuss capacity funding opportunities. Tsawwassen First Nation reiterated their interest in understanding if the proposed Project would impact migratory birds and fisheries. Tsawwassen First Nation also expressed concern regarding potential impacts to air quality and noise.

In December 2008 Tsawwassen First Nation submitted a proposal for capacity funding to the Proponent and an agreement was signed in January 2009.

In January 2010, the Proponent requested a meeting with Tsawwassen First Nation to discuss Tsawwassen First Nation's treaty rights, potential impacts of the proposed Project on those rights, and how the Proponent could avoid or accommodate these rights. Tsawwassen First Nation and the Proponent met in February 2010, and Tsawwassen First Nation noted that the proposed Project was not adjacent to any Settlement Lands and would not directly affect Settlement Lands.

On February 2, 2011, prior to the acceptance of the Application for review by EAO, a representative of the Proponent met with the newly appointed representative of the Tsawwassen First Nation to provide an overview of the proposed Project and information on the dialogue which had taken place to date with Tsawwassen First Nation representatives.

The Proponent and Tsawwassen First Nation met on June 23, 2011 to discuss the proposed Project, including the following:

- Past and future First Nation consultation;
- Impacts to the TFA;
- Risk management and emergency response;
- Cumulative impacts; and
- Economic opportunities.

Following the June 23, 2011 meeting, the Proponent and Tsawwassen First Nation agreed on following next steps:

- Meeting again if Tsawwassen First Nation has any questions regarding the Proponent's responses to the Tsawwassen First Nation's comments on the Application;
- Having Tsawwassen First Nation provide any information to EAO regarding the proposed Project and treaty rights;
- Discussing potential economic opportunities; and
- Reviewing the Spill Response Plan.

On March 13, 2012, the Proponent received a letter from Tsawwassen First Nation requesting clarification on the Proponent's Aviation Fuel Spill Compensation Framework and Oil Pollution Emergency Plan. The Proponent provided Tsawwassen First Nation a written response in April.

### ***Consultation Undertaken by EAO***

In January 2010, EAO requested a meeting with Tsawwassen First Nation. Tsawwassen First Nation and EAO met in February 2010 to discuss potential impacts from the proposed Project on Tsawwassen First Nation's treaty rights and the EA process, including requirements under Chapter 15 of the TFA. EAO provided an update and overview of the EA for the proposed Project and VFPA gave an overview of the federal review process. Tsawwassen First Nation provided copies of the TFA and presented the relevant sections of the appendices with maps that included the proposed Project area. Tsawwassen First Nation confirmed that the proposed Project area was within areas used by Tsawwassen First Nation for fishing, wildlife and bird harvesting areas and near plant harvesting areas. Tsawwassen First Nation also confirmed that no treaty-listed species would be impacted by the proposed Project but noted that *Tl'ektines* archaeology site DgRs-017 is within the proposed Project area.

In January 2010, Tsawwassen First Nation requested a three-day extension to provide comments on the dAIR. EAO granted the request.

EAO and Tsawwassen First Nation also met in February 2011 to meet with the new representative of Tsawwassen First Nation to discuss the EA process.

Comments on the Application were received by EAO from Tsawwassen First Nation in March 2011.

EAO and Tsawwassen First Nation met on September 4, 2012 to discuss their July 24, 2012 letter to EAO detailing Tsawwassen First Nation's concerns regarding spill risk, cumulative effects, economic benefits, *Tl'ektines*, as well as Tsawwassen First Nation's comments on the draft First Nations Consultation Report. EAO addressed Tsawwassen First Nation's concerns at that meeting where possible, and committed to follow-up with Tsawwassen First Nation on outstanding concerns.

Tsawwassen First Nation attended the October 2012 Working Group meeting, and provided comments on EAO's draft Assessment Report, draft Table of Conditions and draft Certified Project Description. Tsawwassen First Nation's concerns raised at the meeting and regarding the three documents include requests for additions to the Table of Conditions as well as more opportunity for Tsawwassen First Nation to be involved in proposed Project-related activities and decisions if an EA Certificate was granted. Tsawwassen First Nation's comments were largely focused on proposed Project activities that could potentially impact Tsawwassen First Nation's fisheries, compensation in the event of a spill, cumulative effects, completing an AIA before the EA concludes, ensuring the OPEP was included in the Table of Conditions, and concerns regarding emissions and standards used by the Proponent in the EA.

## **24 Tsleil-Waututh Nation**

### **24.1 Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation**

#### ***Regional Context:***

The Tsleil-Waututh Nation, formerly known as the Burrard Indian Band, has an approximate registered population of 525 members, with approximately 250 members living on reserve. The Tsleil-Waututh Nation has one reserve located on the south shore of Burrard Inlet and two reserves located at Indian Arm in Burrard Inlet. Tsleil-Waututh Nation is governed by a chief and four councillors under the *Indian Act* electoral system and is currently negotiating a comprehensive treaty settlement within the BC Treaty Commission treaty process.

The Tsleil-Waututh Nation claim includes an area that extends from a point midway in Charlotte Channel which runs between Horseshoe Bay and Bowen Island. The boundary then trends northeast to a landfall at Newman Creek, continuing north-northeast approximately 55 kilometres across the headwaters of the Capilano River, Furry Creek, Britannia Creek, the Stawamus River, and the Mamquam River to the head of Sentinel Glacier near Garibaldi Lake. The boundary then turns directly south for

approximately 11 kilometres to the headwaters of the Pitt River where it turns directly south for approximately 55 kilometres past the outlet of Pinecone Lake, over Mount Bonnycastle, and down the middle of Coquitlam Lake. The boundary continues down the centre of the Coquitlam River to its outfall in the Fraser River, and hence west to the Fraser's North Arm outlet at Iona Island. The boundary turns northeast in Georgia Strait, rounds Point Grey, then north to its origin midway between Horseshoe Bay and Bowen Island. During the EA, Tsleil-Waututh Nation refuted this description of their traditional territory, citing a larger boundary that includes the proposed Project area. Elected Chief Leonard George described the core territory of Tsleil-Waututh Nation as:

starting with the Headwaters of Mount Garibaldi, coming down the Indian River, Indian River Valley, taking in Belcarra and Port Moody Area. On the south side encompassing all of Burnaby and Gastown, Flase Creek to Jericho, and on the west side, all of Deep Cove – Deep Cove area, North Vancouver, Seymour, Capilano, to Point Atkinson<sup>184</sup>.

Tsleil-Waututh Nation's TUS stated that important seasonal villages were located on the shores of Coal Harbour, English Bay, False Creek, and the Fraser River, with the most important village site at Belcarra<sup>185</sup>. During the EA, Tsleil-Waututh Nation clarified that they had many seasonal villages and accessed resources on the South Arm of the Fraser River via kinship ties.<sup>186</sup>

Beyond Boundary Bay, the Northern Straits speakers would have had a much reduced interest in the north arm of the Fraser River use area and the Halkomelem speakers much more. The Fraser River would have been an important salmon fishing area to the Tsleil-Waututh Nation, as there is no sockeye salmon run in the tributaries of Burrard Inlet. To utilize this resource, Tsleil-Waututh Nation would have to move to the Fraser River in July and August, joining other Halkomelem groups accessing this resource. During the EA, Tsleil-Waututh Nation stated that they used the Fraser River to fish for eulachon, sturgeon, hunt for waterfowl, gather cranberries, and as a travel corridor<sup>187</sup>.

---

<sup>184</sup> Transcript of the evidence of Leonard George given on February 10, 1997, (page. 6, ll. 2-20), Mathias v. HMTQ T-956-93, as provided to EAO by Tsleil-Waututh Nation.

<sup>185</sup> TUS 2000:9-10 as cited in Clark, A. 2007. Musqueam Nation Statement of Intent Area Report on Strength of Claim Assessment Research. Prepared for Aboriginal Law Group, Ministry of Attorney General. (page 30).

<sup>186</sup> Tsleil-Waututh Nation. November 15, 2012. Tsleil-Waututh Nation rebuttal of EAO Document, (pages 5-6)

<sup>187</sup> Tsleil-Waututh Nation letter to EAO, dated November 15, 2012.

The Fraser River is not in Tsleil-Waututh's core territory<sup>188</sup>. During the EA, Tsleil-Waututh Nation informed EAO that Tsleil-Waututh Nation would have accessed the Fraser River via kinship ties. The Tsleil-Waututh TUS indicated that their core territory was limited to Burrard Inlet and Indian Arm<sup>189</sup>. During the EA, Tsleil-Waututh clarified this statement to mean all lands and waters draining into Burrard Inlet and Indian Arm. Tsleil-Waututh fished at Indian River at the head of Indian Arm in the summer months. According to information provided by Tsleil-Waututh Nation during the EA, Tsleil-Waututh Nation also fished for salmon in the Capilano and Fraser Rivers in the summer and on the Indian River in the fall, however, the late fall salmon fishery on the Indian River has probably always been the most important for Tsleil-Waututh Nation there<sup>190</sup>.

The Tsleil-Waututh Nation's Consultation Area includes BC's Lower Mainland down to the Canada-U.S. border. In February 2009, the Tsleil-Waututh Nation wrote to EAO indicating that the proposed Project fell within their Consultation Area as described in their Stewardship Policy. Through subsequent correspondence that spanned the following year, EAO consulted the Tsleil-Waututh Nation on EAO's preliminary strength of claim assessment, providing a summary of information that EAO reviewed to determine which First Nations should be consulted regarding the EA of the proposed Project. EAO then solicited further information and input from the Tsleil-Waututh Nation to assist EAO in understanding the nature of the aboriginal rights being claimed within the proposed Project site and the larger asserted traditional territory.

Based on the requests made by the Tsleil-Waututh Nation to EAO to be included in the section 11 Order for the proposed Project, and *Nlaka'pamux Nation Tribal Council vs. Griffin*, EAO amended the proposed Project's section 11 Order with a section 13 Order in March 2011. The section 11 Order was amended to include the Tsleil-Waututh Nation as one of the First Nations that EAO would consult directly with on any proposed Project impacts to their asserted rights. EAO did not direct the Proponent to consult with Tsleil-Waututh Nation.

Tsleil-Waututh Nation's *Traditional Use Study 1998-2000* prepared for the Ministry of Forests states that Tsleil-Waututh Nation would fish for sockeye in the lower Fraser during summer.

In a letter to EAO, Tsleil-Waututh Nation asserted that oral histories refer to use of the South Arm of the Fraser River and Richmond. Tsleil-Waututh Nation asserts that they

---

<sup>188</sup> Howes, K. 2003. Fraser Corridor Transportation Program Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 3).

<sup>189</sup> TUS 2000:10 as cited in Howes, K. 2003. Fraser Corridor Transportation Program Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 23).

<sup>190</sup> Tsleil-Waututh Nation. November 15, 2012. Tsleil-Waututh Nation rebuttal of EAO Document, (pages 5-6)

spoke the downriver dialect of Halkomelem and fished in the South Arm of the Fraser River along with the other downriver Halkomelem groups (Tsawwassen and Musqueam First Nations). Tsleil-Waututh Nation also asserts that they harvested berries around the No. 5 Road in Richmond.

***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment:***

Based on available information, including historical records and the Tsleil-Waututh Nation's correspondence, it appears that the most likely aboriginal rights to be claimed by Tsleil-Waututh Nation in the proposed Project area would be periodic or seasonal access to fisheries in the South Arm of the Fraser River and harvesting on Southern Lulu Island. The *prima facie* case for a claim to these aboriginal rights would be moderate based on the information provided to EAO by Tsleil-Waututh Nation during the EA. EAO believes that the *prima facie* case for a claim to aboriginal title in the proposed Project area by Tsleil-Waututh Nation is weak, given the overlapping claims with other First Nations and a lack of evidence indicating exclusive use and occupation of the Project area by Tsleil-Waututh Nation historically.

***Depth of Consultation:***

EAO considered the potential impacts of the proposed Project to Tsleil-Waututh Nation's asserted aboriginal rights. EAO considered available information, listed in section **Error! Reference source not found.** of this report, and engaged in discussions with other provincial ministries regarding the provincial government's knowledge of the Tsleil-Waututh Nation's historical use and occupancy of the proposed Project area and southern arm of the Fraser River, as well as the information provided by Tsleil-Waututh Nation.

As discussed above, EAO considers Tsleil-Waututh Nation to have a moderate *prima facie* claim for aboriginal rights to fish in the Fraser River. The proposed Project would have a small potential impact to the exercise of this right during normal operations. However, in the event of a spill, Tsleil-Waututh Nation's asserted aboriginal right to fish could be affected.

Taking into account the potential impact to Tsleil-Waututh Nation's asserted aboriginal rights in the event of a spill, EAO determined that the required duty to consult with the Tsleil-Waututh Nation is somewhat toward the lower end of the *Haida* spectrum.

EAO provided the Tsleil-Waututh Nation with opportunities for input and involvement in the EA and offered to meet individually with elected representatives of Tsleil-Waututh Nation for specific discussions regarding asserted aboriginal rights outside of the Working Group forum. Furthermore, EAO has kept Tsleil-Waututh Nation apprised of major EA milestones, including providing a copy of the Application for their information

and review and providing this Assessment Report to show that First Nations' concerns were considered.

## 24.2 Specific Consultation Activities Undertaken

### ***Consultation Activities Undertaken by EAO***

On February 3, 2010, Tsleil-Waututh Nation wrote to EAO requesting that they be added to the section 11 Order for the proposed Project because their consultative boundary overlapped with the proposed Project site. On February 16, 2010, EAO responded to Tsleil-Waututh Nation requesting more information on Tsleil-Waututh Nation's interests within the proposed Project area. EAO shared the *Tsleil-Waututh Nation Traditional Use Study 1998-2000* with the Tsleil-Waututh Nation, drawing attention to the stated traditional use area being outside the proposed Project area. EAO encouraged Tsleil-Waututh Nation to provide EAO with any information that documented Tsleil-Waututh Nation's use and occupancy of the proposed Project Area.

Tsleil-Waututh Nation contacted EAO in April 2010 to again express concerns with EAO's view regarding consultation with Tsleil-Waututh Nation. EAO repeated its request for Tsleil-Waututh Nation to provide information to EAO that would inform EAO's view on Tsleil-Waututh Nation's traditional use in the proposed Project area. In June 2010, EAO requested a meeting with Tsleil-Waututh Nation to further discuss these issues. EAO and Tsleil-Waututh Nation met in July 2010 to discuss the proposed Project area, the EA process and First Nations consultation, Tsleil-Waututh Nation's asserted aboriginal rights within the proposed Project area, and potential impacts from the proposed Project.

On July 15, after the above meeting, EAO advised Tsleil-Waututh Nation that it was unclear to EAO whether Tsleil-Waututh Nation was asserting aboriginal title within the proposed Project area in addition to aboriginal rights. EAO repeated that it was not able to locate any information which makes reference to Tsleil-Waututh Nation's exclusive use or occupancy of the proposed Project area at the time of sovereignty, and repeated EAO's request for Tsleil-Waututh Nation to provide EAO with information to support their claim. EAO acknowledged that Tsleil-Waututh Nation may have used the area seasonally. Based on the information provided, EAO reiterated the Province's duty to consult with Tsleil-Waututh Nation was towards the lower end of the *Haida* spectrum and EAO's decision not to add Tsleil-Waututh Nation to the section 11 Order for the proposed Project. EAO confirmed it would undertake the following:

- Provide Tsleil-Waututh Nation with all relevant materials for the proposed Project, including the Application, for information and consultation purposes;
- Arrange consultation meetings by mutual agreement with Tsleil-Waututh Nation to identify any specific asserted aboriginal interests which may be potentially

affected by the proposed Project, and measures to avoid or mitigate those effects;

- Provide EAO's draft First Nation Consultation and Assessment Reports for review and comment; and
- Provide Tsleil-Waututh Nation with the option to submit their own report directly to Ministers for the Ministers' consideration in making their decision on whether to issue an EA certificate for the proposed Project.

In August 2010, Tsleil-Waututh Nation provided EAO with a letter detailing that oral history provides accounts of Tsleil-Waututh Nation's use of the southern Lulu Island area for berry harvesting, as well as fishing in the South Arm of the Fraser River. EAO stated that EAO remains willing to meet with Tsleil-Waututh Nation to discuss Tsleil-Waututh Nation's concerns regarding the proposed Project, and potential impacts on Tsleil-Waututh Nation's asserted aboriginal rights. EAO provided clarification regarding the map Tsleil-Waututh Nation sent to EAO, stating that the proposed Project was in fact located on the south arm of the Fraser River, as the map that Tsleil-Waututh Nation provided EAO had the proposed Project area located at YVR, which was in error. EAO repeated its request for Tsleil-Waututh Nation to provide EAO with information to support their use and occupancy claims to the South Arm of the Fraser River.

EAO wrote again to Tsleil-Waututh Nation in August 2010, sharing MAG's August 2010 *Tsleil-Waututh Nation, Review of Anthropological and Historical Sources* report to demonstrate the information EAO was considering as a basis for understanding Tsleil-Waututh's asserted aboriginal interests within the proposed Project area. EAO requested that Tsleil-Waututh Nation review the report and provide EAO with any comments they may have.

In March 2011, Tsleil-Waututh Nation wrote to EAO repeating their request to be added to the section 11 Order for the proposed Project, this time basing their request on the *Nlaka'pamux Nation Tribal Council vs. Griffin* decision, which stated that First Nation participation in the EA process was to be set out in the section 11 Order. EAO responded to Tsleil-Waututh Nation's letter, notifying them that EAO had added Tsleil-Waututh Nation to the section 11 Order for the proposed Project given their assertion of aboriginal rights in the area via a section 13 Order and requested comments on the draft section 13 Order prior to finalizing it. EAO confirmed that it would provide Tsleil-Waututh Nation with the following opportunities to be involved in the EA of the proposed Project:

- Provide all relevant materials for the EA of the proposed Project;
- Arrange consultation meetings;

- Provide Tsleil-Waututh Nation with the opportunity to comment on the draft First Nations Consultation and Assessment Reports; and
- Provide Tsleil-Waututh Nation with the opportunity to prepare a separate submission to Ministers for consideration as part of their decision on whether to issue an EA certificate for the proposed Project.

In April 2011, Tsleil-Waututh Nation wrote to EAO expressing concern that EAO did not direct the Proponent to consult with Tsleil-Waututh Nation, instead, the section 13 Order stated that Tsleil-Waututh Nation would be solely consulted by EAO. EAO responded to Tsleil-Waututh Nation's letter and reiterated its request for comments on the *Tsleil-Waututh Nation, Review of Anthropological and Historical Sources*. EAO also reiterated its request for Tsleil-Waututh Nation to provide any information on their use and occupancy within the proposed Project area. In the absence of additional information to support Tsleil-Waututh's claimed uses in the proposed Project area, EAO opted not to revise the section 13 Order as requested by Tsleil-Waututh Nation because EAO's determination of its duty to consult with Tsleil-Waututh Nation for the EA of the proposed Project remained at the lower end of the *Haida* spectrum.

EAO met with Tsleil-Waututh Nation in July 2012 to discuss the EA process. Tsleil-Waututh Nation expressed concern regarding differences between their treaty process Statement of Intent map and their traditional areas. Tsleil-Waututh Nation state that their traditional areas extend outside their Statement of Intent map. The proposed Project area is not within Tsleil-Waututh's Statement of Intent Map, but is within their traditional areas map. Tsleil-Waututh Nation explained their stewardship policy, concerns related to capacity, and not being included in the working group for the proposed Project. In response to Tsleil-Waututh Nation concern regarding spills, EAO provided them with the Proponent's Aviation Fuel Spill Compensation Framework. Tsleil-Waututh Nation also expressed concern regarding the sources EAO referenced in this report, and discussed providing EAO with additional information.

Tsleil-Waututh Nation provided EAO with their comments on EAO's draft First Nation Consultation Report in November 2012. Tsleil-Waututh Nation also provided EAO with additional information detailing their traditional territory and resource use and repeated their concerns regarding the sources used by EAO in the Tsleil-Waututh Nation's section of this report.

## **25 Katzie, Kwikwetlem, and Qayqayt First Nations**

### **25.1 Katzie Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation**

#### ***Regional Context:***

Katzie First Nation has a registered population of approximately 505 members, with approximately 310 members living on reserve. Katzie First Nation has five reserves located in New Westminster District. Figure 14 illustrates Katzie's traditional territory.

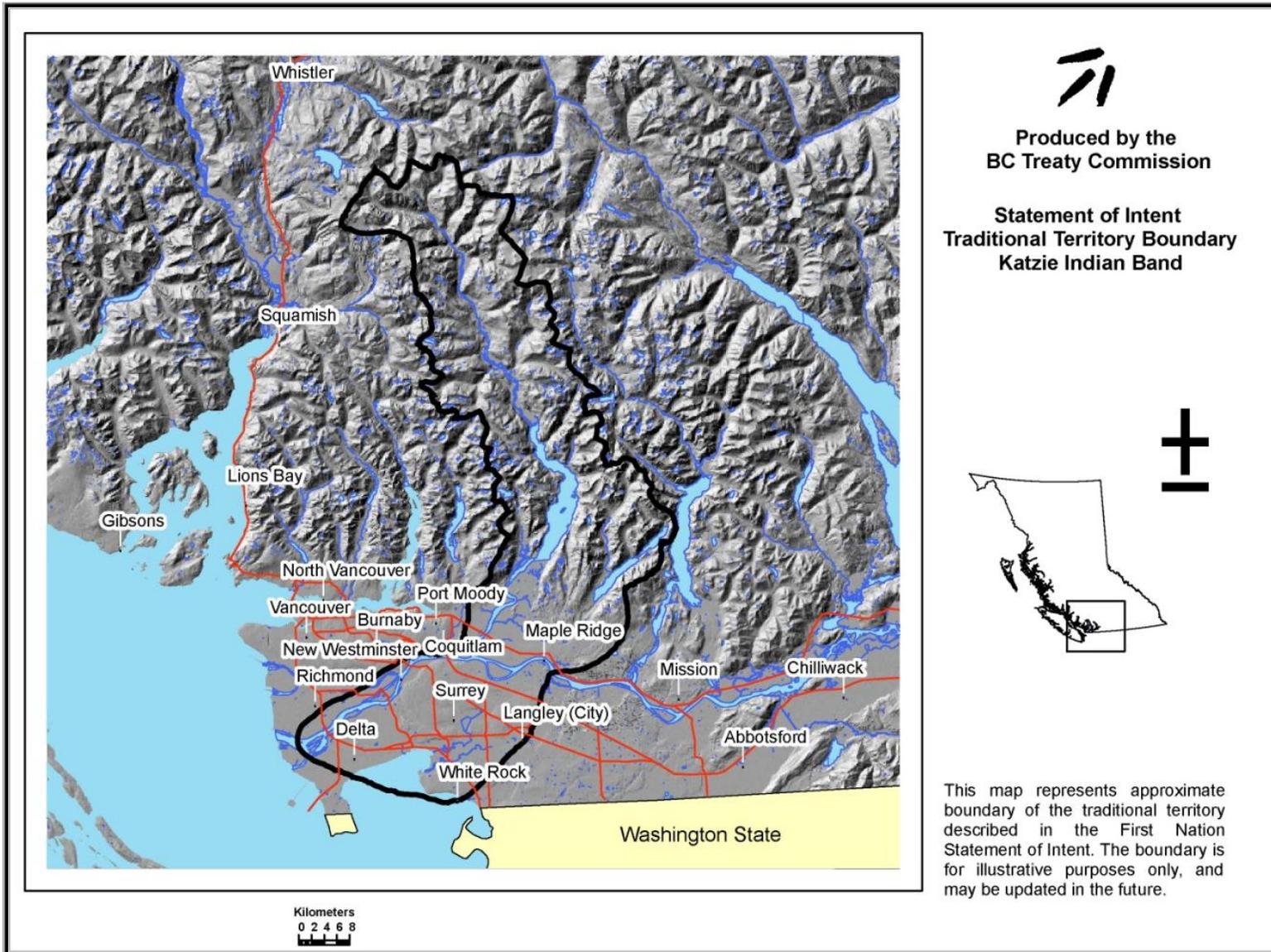


Figure 14. Katzie First Nation Statement of Intent Map

In the last half of the 1800s, Katzie First Nation's traditional territory included the area drained by the Pitt River, along with a segment of the north bank of the Fraser River from near the mouth of the Pitt River to Haney<sup>191</sup>. Katzie First Nation occupied a village on the Fraser River near Barnston for approximately half the year – during the important salmon season and the winter months<sup>192</sup>. The area between Barnston Island and the south bank of the Fraser River was an important fishing site for Katzie First Nation<sup>193</sup>. In late April to the end of May, Katzie First Nation would gather at their village to catch eulachon in Bishop's reach, the stream flowing between the north bank of the Fraser River and Barnston Island<sup>194</sup>. From mid-May to August, and from September to November, Katzie First Nation traditionally engaged in subsistence activities such as hunting, gathering and sturgeon fishing in and around Katzie Slough, Pitt River, Pitt Lake, Alouette River and Sturgeon Slough<sup>195</sup>. Although Katzie First Nation did not pick clams, people who visited Katzie First Nation brought them up to Katzie for trade.

### ***Strength of Claim:***

Katzie First Nation were more active in the Coquitlam River and New Westminster area, and no ethnographic or historical documents provided accounts or information stating any use or occupation by Katzie First Nation of the proposed Project area or the waters of the South Arm of the Fraser River near the proposed Project area. Several Katzie First Nation settlements and the main Katzie First Nation winter village were located near Barnston Island, upriver of the proposed Project site<sup>196</sup>. Katzie First Nation had a eulachon fishery located in the Fraser River between Barnston Island and the north bank, upriver of the proposed Project area, harvested cranberries and blueberries near Highway 7 and the Pitt River Bridge, and may have used that area for hunting and wapato harvesting<sup>197</sup>. Katzie First Nation continues to participate in the Aboriginal fishery between the Port Mann Bridge and Mission, upriver of the proposed Project site<sup>198</sup>. EAO considers Katzie First Nation's *prima facie* case for aboriginal rights or title in the proposed Project area to be weak.

---

<sup>191</sup> Howes, K. 2003. Fraser Corridor Transportation Program Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 15).

<sup>192</sup> Ibid.

<sup>193</sup> Ibid.

<sup>194</sup> Ibid, (page 16).

<sup>195</sup> Ibid.

<sup>196</sup> Howes, K. 2003. Fraser Corridor Transportation Program Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 2).

<sup>197</sup> Ibid.

<sup>198</sup> Ibid.

### ***Depth of Consultation:***

Katzie First Nation did not provide EAO with information on traditional uses of the land in the proposed Project vicinity or potential impacts from the proposed Project. EAO used other available information, listed in section 12.1 of this report, to understand any potential aboriginal rights and the *prima facie* case for any asserted aboriginal rights.

Although EAO determined that Katzie First Nation has a weak *prima facie* claim to aboriginal rights or title in the proposed Project area. Out of an abundance of caution, EAO considered the potential for impacts from the proposed Project on Katzie First Nation's potential aboriginal rights to fish in the Fraser River.

EAO provided Katzie First Nation with opportunities to inform EAO of any claims or assertions regarding use of the proposed Project area, and EAO notified Katzie First Nation of key milestones to keep them informed about the EA process.

## 25.2 Qayqayt Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation

### ***Regional Context:***

Qayqayt First Nation, also known as the New Westminster Indian Band, has a registered population of 11 members and does not have any reserves. A special reserve was set aside at New Westminster for "New Westminster District Nations or Groups" in 1879, but was cut-off by the Royal Commission in 1916.

According to some ethnographic reports, there is no record of Qayqayt First Nation's existence as an independent pre-contact/pre-sovereignty group, and Qayqayt First Nation may be descendants of Kwantlen, Musqueam, Tsawwassen, or other local First Nations<sup>199</sup>. Other ethnographic reports state that Qayqayt First Nation was once located in an area that extended from New Westminster through to Boundary Bay<sup>200</sup>, using the south-eastern portion of Lulu Island near Annacis Island, Annacis Island itself, and a short stretch of the bank of the Fraser River in Delta<sup>201</sup>.

---

<sup>199</sup> Howes, K. 2003. Fraser Corridor Program Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 5).

<sup>200</sup> Duff 1952:24 as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division, (page 15)

<sup>201</sup> Brent Galloway, as cited in Clark, A. 2008. Semiahmoo First Nation: Review of Ethnographic Sources regarding the Semiahmoo First Nation's Use and Occupancy Area. Prepared for MAG Aboriginal Research Division, (page 17).

Qayqayt First Nation appears to have been associated with the Kwantlen First Nation. Based on ethno-historical information discussed above, the Kwantlen were mainly settled at or near what is now the city of New Westminster and, post-contact, moved up-river after Fort Langley was established in 1827. A Kwantlen First Nation fishing camp called “qexa’yeyt” was located across the Fraser River from New Westminster on the south bank<sup>202</sup>.

***Asserted Aboriginal Rights and EAO’s Preliminary Strength of Claim Assessment:***

While Qayqayt First Nation was active in the New Westminster area, there are no ethnographic or historical documents that provide accounts or information stating any use or occupation of the proposed Project area or the waters of the South Arm of the Fraser River near the proposed Project area. EAO considers that Qayqayt First Nation’s *prima facie* case for both aboriginal rights and title in the proposed Project area to be weak.

***Depth of Consultation:***

Qayqayt First Nation did not provide EAO with information on traditional use of the land in the proposed Project vicinity or potential impacts from the proposed Project. EAO used other available information, listed in section 12.1 of this report, to understand any potential aboriginal rights and the *prima facie* case for any asserted aboriginal rights.

Although EAO determined that Qayqayt First Nation has a weak *prima facie* claim to aboriginal rights or title in the proposed Project area, out of an abundance of caution EAO considered the potential for impacts from the proposed Project on Qayqayt First Nation’s potential aboriginal rights to fish in the Fraser River.

EAO provided Qayqayt First Nation with opportunities to inform EAO of any claims or assertions regarding use of the proposed Project area, and EAO notified Qayqayt First Nation of key milestones to keep them informed about the EA process.

---

<sup>202</sup> Howes, K. 2003. Fraser Corridor Program – Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 10).

### 25.3 Kwikwetlem Regional Context, Asserted Aboriginal Rights, Strength of Claim and Depth of Consultation

#### ***Regional Context:***

Kwikwetlem First Nation has a registered population of 75 members, with approximately 40 members living on reserve. Kwikwetlem First Nation has three reserves located on the Coquitlam River in New Westminster, with a total area of approximately 85 hectares.

Ethnographic information concerning Kwikwetlem First Nation is limited. Kwikwetlem First Nation regard themselves as an independent group whose ancestors spoke a variant of the downriver dialect Mainland Halkomelem. The ethno-historical record discloses a number of divergent theories as to the origins of Kwikwetlem First Nation.

The main Kwikwetlem village was at the site of IR No. 2, located approximately two kilometres north of the Fraser River<sup>203</sup>. *Kwikwetlem*, a fishing camp, is located on the north bank of the Fraser River just west of Coquitlam, near the North Fraser Perimeter Road and the Port Mann Bridge<sup>204</sup>.

The Coquitlam River area seems to be generally accepted as Kwikwetlem territory<sup>205</sup>. The main Kwikwetlem First Nation village was on the Coquitlam River and Kwikwetlem First Nation's traditional territory included the Coquitlam drainage. Kwikwetlem First Nation may have had seasonal camps on Burrard Inlet, where the community harvested berries and shellfish. Kwikwetlem First Nation may have used Indian River, travelling to Indian Arm from villages on the Coquitlam River via Port Moody. Kwikwetlem First Nation participates in an Aboriginal fishery between the Patullo Bridge and Douglas Island at the mouth of the Pitt River<sup>206</sup>.

#### ***Asserted Aboriginal Rights and EAO's Preliminary Strength of Claim Assessment:***

While Kwikwetlem First Nation was active in the Coquitlam River and New Westminster areas, there are no ethnographic or historical documents that provide accounts or information stating any use or occupation by Kwikwetlem First Nation of the proposed Project area or the waters of the South Arm of the Fraser River near the proposed

---

<sup>203</sup> Howes, K. 2003. Fraser Corridor Transportation Program Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 21).

<sup>204</sup> Carlson 2002:138, as cited in Ibid.

<sup>205</sup> Howes, K. 2003. Fraser Corridor Transportation Program Soundness of Claim Report. Prepared for Ministry of Attorney General Aboriginal Research Division. (page 3).

<sup>206</sup> Ibid.

Project area. EAO considers Kwikwetlem First Nation's *prima facie* case for both aboriginal rights or title in the proposed Project area to be weak.

### ***Depth of Consultation:***

Kwikwetlem First Nation did not provide EAO with information on traditional uses of the land in the proposed Project vicinity or potential impacts from the proposed Project. EAO used other available information, listed in section 12.1 of this report, to understand any potential aboriginal rights and the *prima facie* case for any asserted aboriginal rights.

Although EAO determined that Kwikwetlem First Nation has a weak *prima facie* claim to aboriginal rights or title in the proposed Project area, out of an abundance of caution, EAO considered the potential for impacts from the proposed Project on Kwikwetlem First Nation's potential aboriginal rights to fish in the Fraser River.

EAO provided Kwikwetlem First Nation with opportunities to inform EAO of any claims or assertions regarding use of the proposed Project area, and EAO notified Kwikwetlem First Nation of key milestones to keep them informed about the EA process.

## 25.4 Specific Consultation Activities Undertaken

### ***Consultation Activities Undertaken by EAO***

Following issuance of the section 11 Order, EAO contacted the Katzie, Kwikwetlem, and Qayqayt First Nations to determine their interest in participating in the EA, given that they have overlapping asserted aboriginal rights along the southern arm of the Fraser River. EAO provided all three First Nations with information regarding the proposed Project and its status in the EA process, and extended an invitation for them to participate in the EA. EAO committed to keeping the three First Nations notified of major milestones throughout the review process. EAO did not receive any submissions or indications of interest in the EA of the proposed Project from the Katzie, Kwikwetlem, or Qayqayt First Nations.

## **26 Issues Raised by First Nations**

The following key issues were raised by First Nations during the EA of the proposed Project:

- Potential impacts from a jet fuel spill, as well as prevention, accountability, compensation, response, bonding and insurance, notification procedures, and First Nation involvement;
- Potential impacts on asserted Aboriginal rights, including fishing, hunting and harvesting;

- Potential impacts on fish and fish habitat;
- Consideration of the Cohen Commission's conclusions in the EA for the proposed Project;
- Potential impacts on birds and bird habitat;
- Potential impacts from increased marine tanker traffic;
- Potential impacts on future use and/or acquisition of land and asserted Aboriginal title at *Tl'ektines*;
- Potential impacts on archaeology;
- Access; and
- Disposition of human remains.

The Proponent's responses to key issues raised by First Nations included references to information contained in the Application, proposed mitigation measures, and commitments and/or conditions that would be included in the EA Certificate, including the following:

### ***Jet Fuel Spills***

- Implementation of risk prevention measures:
  - implementation of an Oil Pollution Prevention Plan that follows best practice;
  - requirement for vessels to be double-hulled;
  - requirement for vessels to be vetted regularly in accordance with best practice;
  - use of pilots and tugs to assist the vessels;
  - design spill containment features at the terminal for unloading equipment to contain spills before release into the environment;
  - contracting with WCMRC to maintain the OPEP and related training;
- Implementation of spill response measures:
  - an Oil Pollution Emergency Plan that describes measures to contact and coordinate with First Nations that may be affected by spills;
  - requirement for two dedicated spill response vessels at the proposed marine terminal;
  - deployment of containment booms around vessels that are off-loading fuel;
  - deployment of exclusion booms in entrance to Ladner Reach during off-loading at the terminal;
  - spill response equipment on-site and in cache locations along the Fraser River; and
  - contracting WCMRC to provide spill response and related training;
- A commitment to design, construct, operate and maintain tanks and tank containment systems at the fuel receiving facility in accordance with current

seismic criteria and other standards governing aboveground storage of liquid petroleum hydrocarbons;

- Fuel concentrations in the air for each of the worst-case spill scenarios indicate that maximum concentrations of fuel in the atmosphere would be below WorkSafe BC's exposure limits (possible mitigation measures were identified for the unlikely case in which limits would be exceeded); and
- The Proponent will require that vessels using the proposed marine terminal meet the applicable standards, operating practices, and risk mitigation measures, and will carry insurance to respond to the consequences of a jet fuel spill associated with the operation of the marine terminal;

### ***Asserted Aboriginal Rights and Treaty Rights***

- Identifying and describe mitigation measures and management strategies to avoid, minimize or mitigate potential adverse socio-community and socio-economic effects on fisheries (see Appendix 5 for the Proponent's Aviation Fuel Framework);
- Chapters 5 and 6 of the Application identify and describe mitigation measures and environmental management strategies to avoid, minimize or mitigate potential adverse effects on fisheries, vegetation and wildlife resources, while the potential effects of the proposed Project on the asserted Aboriginal right to fish, hunt and harvest are outlined in chapter 11.

### ***Fish and Fish Habitat***

- The Application outlines mitigation measures and management strategies to avoid, minimize or mitigate potential adverse effects on fisheries, aquatics and surface water quality;
- Implementation of a Fisheries Compensation Framework (see Appendix 5);
- Implementation of Construction and Operations Environmental Management Plans;
- Adherence to environmental protection strategies presented in the Environmental Management Strategy for Dredging in the Fraser River Estuary (Fraser River Estuary Management Plan 2006) and the Fraser River Estuary Management Plan Dredge Management Guidelines (2005);
- The Application includes an assessment of potential effects of the proposed Project on fisheries and advises that the infrequent nature of tanker visits is not expected to significantly affect access or fishing in the Fraser River;

### ***Birds and Bird Habitat***

- Mitigation measures and environmental management strategies were identified in the Application to avoid, minimize or mitigate potential effects on wildlife, including birds;
- A commitment to cover piles to avoid a situation where birds could fall into the piles and become trapped;
- Requirement for the Proponent to consult a qualified, experienced environmental professional regarding the need for nest surveys, and to implement mitigation measures and a monitoring program to minimize disturbance at known and identified nest sites during construction of the proposed Project;

### ***Marine Tanker Traffic***

- The Proponent will notify First Nations at least 24 hours in advance of any vessels arriving at or departing the marine terminal;
- Patrol boats arranged by the Fraser River Pilots travel in advance of incoming vessels and alert fishers;
- Additive effects of vessel transits will be negligible with the implementation of the Construction and Operations Environmental Management Plans;
- The Proponent will work with the responsible agencies to coordinate vessel traffic in order to minimize potential effects on salmon fisheries and crabs.

### ***Asserted Aboriginal Title***

- Information regarding the mix of fee simple and Crown land that would be used for the proposed Project;
- The Proponent shared and discussed its study entitled “On the location of *Tl’ektines* relative to the present location of the VFPA Fraser Richmond properties on the south shore of Lulu Island study on the location of *Tl’ektines*” with First Nations, and the parties have agreed to continue to engage in further discussions;
- Acknowledgement of the historical use and occupation of the village of *Tl’ektines*, although the Proponent’s studies concluded that *Tl’ektines* is not located within the proposed Project site;
- The areas claimed by the Cowichan Nation Alliance First Nations as *Tl’ektines* are located in Richmond, BC. The marine terminal land is held in fee simple, and the other lands that the proposed Project intends to use are a combination of Crown and fee simple. Given the urbanization of Richmond and Delta, and private ownership of the marine terminal lands, it is unlikely that a claim by Cowichan Nation Alliance for restitution of the village site to Cowichan would succeed. It is more likely that such a claim would result in compensation or damages.

### ***Archaeology and Disposition of Human Remains***

- Archaeological work will be under the supervision of a qualified professional archaeologist under applicable legislation and agreements, including the *Heritage Conservation Act* and the Memorandum of Understanding between the Province of British Columbia and the Hul'qumi'num Treaty Group;
- Chapter 7 of the Application identifies and describes mitigation measures and environmental management strategies to avoid, minimize or mitigate potential adverse effects on archaeological resources during proposed Project construction and operations/maintenance;
- The Proponent will follow procedures for reporting human remains as specified by the B.C. Archaeology Branch, which include contacting local law enforcement, the Coroner's Office and applicable First Nations;
- First Nations participated in the fieldwork for the Proponent's Archaeological, Historical and Heritage Assessment and were consulted during the heritage resources impact assessment (or archaeological impact assessment) of those locations within the proposed Project footprint rated as having moderate or high archaeological resource potential; and
- Involvement of First Nations and a professional archaeologist certified by the BC Association of Professional Archaeologists in archaeological work.

A comprehensive list of all comments submitted by First Nations regarding the proposed Project and Proponent responses is presented in Appendix 2 (tracking table). The Table of Conditions for the proposed Project is included as Schedule B of the EA Certificate.

## **27 Conclusion as to whether the Crown's duties have been discharged**

Throughout the EA of the proposed Project, EAO has considered the potential impacts to treaty rights, proven and asserted aboriginal rights, and/or title (and the information available to support the strength of those assertions) by First Nations in the vicinity of the proposed Project. EAO has also considered the potential for the proposed Project to adversely impact such rights, based on it being implemented in accordance with the Project Description in the EA Certificate and the accommodation and mitigation measures and commitments made by the Proponent. EAO has consulted with First Nations and directed the Proponent to undertake certain actions to facilitate information sharing and issues resolution from the early stages of the EA of the proposed Project.

It is EAO's assessment that the Crown's duty to consult and, where appropriate, accommodate has been honourably upheld through a process of consultation and accommodation that included flexibility, accountability, inclusiveness, and

responsiveness to issues raised by First Nations. EAO further concludes that it, on behalf of the Province, acted in good faith at all times to consult with potentially affected or interested First Nations, and made available, where appropriate, opportunities for deep consultation which ensured that all concerns of First Nations potentially affected by the proposed Project were considered.

EAO made reasonable and appropriate efforts to engage First Nations listed on the Section 11 Order, and remained open at all times to engaging in government-to-government discussions outside of the Working Group forum, if requested. EAO also concludes it has been reasonable in its approaches to consulting with First Nations, accommodating issues by being flexible with timelines whenever possible and traveling to meet directly with First Nations in their communities.

EAO also concludes that the mitigation and accommodation measures and Proponent commitments described in the following documents adequately minimize or avoid potential impacts to asserted Aboriginal interests within the proposed Project area:

- The Issues Tracking Table for the Vancouver Airport Fuel Delivery Project's EA Certificate Application;
- The Proponent's First Nation Consultation Reports; and
- The Proponent's Application.

Based on:

- Information contained in the Application;
- Information contained in supplemental studies and reports;
- The Proponent's efforts at consultation with First Nations and its commitment to ongoing consultation;
- Comments on the proposed Project made by participating First Nations as members of EAO's Working Group, and the Proponent's responses to these comments;
- Issues raised by participating First Nations regarding potential impacts of the proposed Project and the Proponent's responses and best efforts to address these issues; and
- Commitments and mitigation measures identified in the Table of Conditions to be undertaken by the Proponent during the construction, operation, and decommissioning of the proposed Project.

EAO and VFPA are satisfied that:

- Consultation with First Nations and the distribution of information about the proposed Project have been adequately carried out by the Proponent and that efforts to consult with First Nations will continue on an ongoing basis; and
- Issues identified by First Nations which were within the scope of the EA, were adequately and reasonably addressed by the Proponent during the review of the Application.

The provincial Minister of Environment and the Minister of Energy and Mines will consider this First Nations Consultation Report and other accompanying materials in making their decision on the issuance of an EA Certificate to the Proponent under the Act.

## **PART D – ACCIDENTS AND MALFUNCTIONS**

Both EAO and VFPA consider potential environmental, social, economic, heritage and health effects of accidents or malfunctions during an EA.

Section 16 of the CEAA requires consideration of the environmental effects of reasonably foreseeable accidents or malfunctions. Environmental effects are defined by the CEAA as:

*“any change the project may cause in the environment, including any change to listed wildlife, its critical habitat or the residences of individuals of that species as defined by the species, and any effect such a change may have on health and socio-economic conditions, physical and cultural heritage, current use of lands by aboriginal persons or any structure, site or thing of historical, archaeological, paleontological or architectural significance.”*

To meet the requirements of EAO and VFPA, this section considers the potential environmental, social, economic, heritage and health impacts of accidents or malfunctions during construction and operation. Specifically, the following potential events were assessed:

- An aviation fuel spill from vessels during transit to the marine facility or at the marine facility during operations;
- An aviation fuel spill from the proposed pipeline;
- Accidental release of deleterious substances at the marine facility during construction or operation; and
- Accidental fire at the marine facility and fuel receiving facility.

Accidents or malfunctions associated with vehicle traffic were considered in the Motor Vehicle and Mobility section of this report, which included reference to the Proponent’s Traffic Management Plan that provides key measures to avoid, manage and mitigate vehicular accidents.

Accidents or malfunctions associated with vessel traffic were discussed in the navigation section of this Report.

This section of the Report assesses the information provided in the following chapters of the Application:

- Chapter 15 – Accidents or Malfunctions
- Chapter 16 – Spill Probability
- Chapter 17 – Spill Prevention

- Chapter 18 – Fire Prevention
- Chapter 19 – Fate and Effects Assessment

In addition, this section includes information from the Proponent's technical memo and draft Oil Pollution Emergency Plan<sup>207</sup>, the Proponent's Spill Risk Assessment in the South Arm of the Fraser River<sup>208</sup>, and the Proponent's Fraser River Delta Biofilm: Sensitivity to Jet A Fuel Spills Summary Report<sup>209 210</sup>.

## **28 Aviation Fuel Spills at the Marine Terminal and from Vessels**

A significant issue to be addressed during the EA for the proposed Project was the risk of an aviation fuel spill. Section 36(3) of the federal *Fisheries Act*, administered by Environment Canada, prohibits the discharge of deleterious substances to waters frequented by fish, or to a place where those substances might enter such waters.

Furthermore, paragraph 5.1(1) of the *Migratory Birds Convention Act* (1994), which Environment Canada is responsible for implementing, states:

*No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.*

Government agencies, First Nations, and the public identified a number of concerns regarding the risk<sup>211</sup> of an aviation fuel spill. Examples of hazards due to an aviation fuel spill from a vessel or the marine terminal can be found in Table 32. Please note that this table is not an exhaustive list.

---

<sup>207</sup> Submitted to EAO on January 4, 2012.

<sup>208</sup> Submitted June 4, 2012.

<sup>209</sup> Submitted to EAO on September 3, 2012.

<sup>210</sup> The Proponent's Spill Risk in the South Arm of the Fraser River, and the Proponent's Fraser River Delta Biofilm: Sensitivity to Jet A Fuel Spills Summary were requirements to re-start legislated timelines after the EA was suspended March 7, 2012.

<sup>211</sup> The assessment of risk includes the consideration of the quantification or level of risk as calculated by the product of the probability or likelihood of an event and the consequence of the event (risk = probability x consequence).

**Table 32. Spill sizes and examples of possible hazards.**

<b>Spill Threshold (bbl)</b>	<b>Example Hazards</b>
<b>1 to 49</b>	<ul style="list-style-type: none"> <li>• Improper connection of flanges resulting in fuel loss during unloading</li> <li>• Minor equipment failure (e.g., broken valve) resulting in fuel loss during unloading</li> <li>• Accidental unloading arm disconnection resulting in fuel loss during unloading</li> </ul>
<b>&gt; 49 to 999</b>	<ul style="list-style-type: none"> <li>• Major equipment failure (e.g., unloading arm rupture) resulting in fuel loss during unloading</li> <li>• Vehicle accident at berth face resulting in fuel loss during unloading</li> </ul>
<b>&gt; 1,000</b>	<ul style="list-style-type: none"> <li>• Major collision or allusion from a vessel in transit resulting in penetration of inner hull and cargo tanks and fuel loss</li> </ul>
<b>&gt;10,000</b>	<ul style="list-style-type: none"> <li>• Severe collision between two vessels travelling at speed with complicating factors (e.g., fire, explosion) resulting in fuel loss</li> </ul>

The Proponent undertook an assessment of the fate<sup>212</sup> and effects<sup>213</sup> of an aviation fuel spill from a vessel and from the marine terminal for the proposed Project (see Chapter 19 of the Proponent’s Application). Chapter 19 provided an assessment of the spill consequences for the worse-case scenario spill without the application of mitigation measures.

Given the probability and consequence of a spill will vary depending on its size and the application of appropriate mitigation measures, the Proponent provided an assessment of the potential risks of different spill sizes in a subsequent submission - Spill Risk Assessment in the South Arm of the Fraser River. VCs identified in Chapter 19 of the Application, which contained the Proponent’s worst-case unmitigated scenario, were also assessed for effects of smaller spill sizes. These include:

- Vegetation, including biofilm;
- Invertebrates;
- Fish;
- Marine Mammals;
- Birds – Geese and Swans;
- Birds – Wading Birds;

<sup>212</sup> For this assessment, fate was the expected behaviour of a worst-case aviation fuel spill, originating in the Fraser River, over time and under the influence of various environmental conditions, as determined by spill modelling;

<sup>213</sup> For this assessment, effects were the potential environmental consequences of a worst-case aviation fuel spill, originating in the Fraser River.

- Birds – Shorebirds; and
- Birds – Diving Ducks

This section of the Report will focus on the probability of a spill, in consideration of spill prevention measures, and the consequence of a spill, in consideration of spill response measures. The risk assessment used the matrix found in Figure 15, which considers the probability and consequence of a potential spills.

**Figure 15: Spill risk matrix**

Probabilities	Severe (A)	Major (B)	Moderate (C)	Minor (D)	Negligible (E)
Almost Certain (5)	Very High (5A)	Very High (5B)	High (5C)	Medium (5D)	Medium (5E)
Likely (4)	Very High (4A)	High (4B)	Medium (4C)	Medium (4D)	Low (4E)
May (3)	High (3A)	Medium (3B)	Medium (3C)	Low (3D)	Low (3E)
Unlikely (2)	Medium (2A)	Medium (2B)	Low (2C)	Low (2D)	Trivial (2E)
Rare (1)	Medium (1A)	Low (1B)	Low (1C)	Trivial (1D)	Trivial (1E)

## 28.1 Spill Probability

Chapter 16 of the Proponent’s Application provides an analysis of the probabilities for different size categories of spills occurring based on historical information and key details about the proposed Project, such as volume of fuel and frequency of vessel visits.

The Proponent developed a system to rate different probabilities in the Spill Risk in the South Arm of the Fraser Report (Table 33).

**Table 33 Criteria used for rating spill probability**

Probability Rating	Description	Criteria
1	Almost Certain to occur – event is expected to occur based on current practices	Could occur within the next year
2	Likely to occur – event is likely to occur based on current practices	Could occur within the next 10 years
3	May occur - event may occur at some time base on current practices	Could occur within the next 10 to 20 years
4	Unlikely to occur - event is unlikely to occur based on current practices	Could occur within the next 20 to 100 years
5	Rare occurrence - event is not expected to occur based on current practices	Not likely to occur within the next 100 years

Probabilities of different spill sizes, without preventative measures can be found in Table 34.

Based on historical worldwide data, the Proponent found that spills in the smallest size category have a one-in six year chance of occurring, and spills in the 50 to 999 barrel category once every 32 years, making them a reasonably foreseeable possibility within the lifetime of the Project.

Spills greater than 1,000 barrels and less than 10,000 barrels have a one-in-134 year chance of occurring when a vessel is “in port” (i.e., within the Fraser River). Spills larger than 10,000 barrels were highly unlikely events, and become increasingly unlikely as the size range increases (i.e., a one-in-481 year chance of occurring).

**Table 34 Chance of spills during proposed Project Operations Prior to Consideration of Proponent Spill Prevention Measures.**

Spill Threshold (bbl)	Chance based on Worldwide Historical Spill Statistics (Years/spill) <sup>214</sup>	Probability Rating (before proposed Project mitigation)
1 to 49	6.2	4 (likely)
> 49 to 999	32	2 (unlikely)
> 1000	134	1 (rare)
> 10,000	481	1 (rare)

#### 28.1.1 Spill Prevention Measures

The Proponent has identified the following spill prevention measures that would further reduce the potential for a spill. These include:

- *Double-hulled and double bottomed vessels* – all vessels visiting the marine terminal would be double-hulled and double-bottomed. The historical world-wide spill statistics reflect the experiences with single-hulled vessels. Double hulled vessels have been shown to be less susceptible to spills given they reduce the change of a breach of the vessel’s cargo compartment<sup>215</sup>.
- *River pilots and tugs* – all vessel transits in the river will be under the expert control of trained river pilots and tugs. The historical world-wide statistics include many spills under circumstances where pilot training was less rigorous and where tugs were not used. River pilots are specifically trained for the Fraser

<sup>214</sup> Chapter 16 of the Application contains more information on the chance return periods.

<sup>215</sup> <http://www.pwsrccac.org/docs/d0082071.801.431.091216.DblHullTnker.pdf>  
[http://www.amsa.gov.au/publications/comparison\\_of\\_single\\_and\\_double\\_hull\\_tankers.pdf](http://www.amsa.gov.au/publications/comparison_of_single_and_double_hull_tankers.pdf)  
<http://ww2.bpa.odu.edu/port/research/The%20effectiveness%20of%20double%20hulls%20in%20reducin%20vessel-accident%20oil%20spillage.pdf>

River environment. Vessels will be accompanied to the terminal by one or two escort and berthing tugs to be able to quickly correct vessel movement.

- *Tanker acceptance program* – All vessels calling at the terminal will be pre-screened and vetted through a well established tanker acceptance program. The historical worldwide statistics include many spills under circumstances where vessel vetting and acceptance was less stringent. The screening process will verify that all visiting vessels comply with Canadian and international regulations and guidelines and the terminal standards and practices before they enter Canadian waters.
- *Design considerations and automation at the marine terminal* – The marine terminal will feature articulated and hydraulically operated unloading arms with automated and manual shutdown capability, and leak free manifold connections. The historical worldwide statistics include spills under circumstances where vessel unloading was achieved using hoses without leak-free connections and automated emergency shutdown capability. Unloading arms are equipped with sensing equipment to react instantly to conditions outside the envelope of safe operations, a loss of connection or a leak. The sensors will trigger an immediate and automatic emergency shutdown of ship-board and land-based pump systems to cut off the flow of fuel.
- *Automated programming* – using automated programming unloading operations will be curtailed or discontinued if climatic conditions (eg. high winds) or river characteristics (ie. fast currents) exceed the pre-set operational limits.

In addition, the Proponent notes several other factors that reduce the probability of a spill from the proposed Project, as compared to the chance of spills based solely on the analysis of historical and worldwide statistics:

- There has been a continual downward trend in worldwide spill rates over the last three decades and this trend is expected to continue;
- The South Arm of the Fraser River is characterized by a soft, sandy river bottom which reduces the chance for a vessel puncture;
- All vessels calling at the marine terminal will be scheduled in advanced to ensure proper readiness at the marine terminal (including faster response to an incident); and
- The movement on the river of all vessels servicing the terminal, and all other commercial vessel traffic, will be managed through VFPA's traffic management program;

The results of these spill prevention measures and other factors and trends is reflected in the local spill incident data, which shows that a total of nine spills smaller than 49 bbl and one spill greater than 49 bbl from over 16,000 vessel visits in the Vancouver region since 2000. This is a rate of a spill of <49 bbl of 1 in 27 years, rather than the predicted

1 in 6 years based on worldwide statistics and a spill of >49bbl 1 in 267 years, rather than the predicted 1 in 32 years based on worldwide statistics.

### 28.1.2 Conclusions for Spill Probability

The probability ranking of a spill based on worldwide historical statistics and local spill incident data, in consideration of the spill prevention measures, factors and trends is provided in Table 35.

**Table 35. Spill threshold probability**

<b>Spill Threshold (bbl)</b>	<b>Chance based on worldwide Historical Statistics (Years/Spill)</b>	<b>Probability Rating (before Project mitigation)</b>	<b>Chance based on local spill incident data (Years/Spill)</b>	<b>Probability Rating (after Project mitigation)</b>
<b>1-49</b>	6.2	4 (Likely)	27	3 (May occur)
<b>&gt;49 to 999</b>	32	2 (Unlikely)	267	1 (Rare)
<b>&gt;1,000</b>	134	1 (Rare)	No data	1 (Rare)
<b>&gt;10,000</b>	481	1 (Rare)	No data	1 (Rare)

This data indicates that a small spill (1-49 bbl) may occur during the life of the proposed Project. However, larger spills (greater than 49 bbl) are unlikely and rare.

## 28.2 Consequences of a Spill

### 28.2.1 Approach

Chapter 19 of the Proponent’s Application provides a description of the consequences of a worst-case unmitigated aviation fuel spill from either the marine terminal or a vessel in transit. The objective of this modelling was to identify what is the worst that can occur so that potential exposure pathways and impacts can be identified. This scenario assumes that no passive or active mitigation measures are taken into account during the course of the spill to reduce the amount lost to the river environment. As a result, the identification of the adverse effects on VCs was considered conservative.

To identify the effects of a spill in the Fraser River, the following parameters were identified and considered during spill modelling in Chapter 19 of the Application:

- Spill sizes:
  - a severe 1,000 barrel operational spill at the marine terminal<sup>216</sup>, which is predicted as occurring less than once every 134 years without considering mitigation; and
  - a catastrophic loss of 40,000 barrels from a vessel during river transit, which is predicted as occurring less than once every 481 years without considering mitigation.
- Spill locations:
  - Sands Head – due to the change over in pilotage responsibility from BC Coast Pilots to Fraser River Pilots and the sensitive ecosystems of Roberts and Sturgeon Banks and the Strait of Georgia;
  - Steveston Bend – due to the higher complexity of navigation and the proximity to George C. Reifel Migratory Bird Sanctuary; and
  - George Massey Tunnel – due to the proximity of Ladner Reach which is at the upstream end of the complex channels and productive areas of the South Arm Marches.
- Dates and times, which were chosen based on specific combinations of major physical variable of river flow, tide, wind and air temperature (spills were simulated at representative times in 2002, which had a relatively large freshet peak flow);
- Spill rate and duration, which were based on the type of cargo product, typical dimensions of the affected tank and the location and size of the breach on a vessel's hull; and
- River and weather conditions (wind, water level and state of the tide, air temperature, and river flow).

The detailed simulations of 32 spill scenarios provide information regarding the outcome of spills on the specific dates selected. To determine all areas that could potentially be reached by such spills, and the associated likelihood of reach, stochastic (i.e., probabilistic) modelling of close to 1,500 independent spills was also undertaken. The following findings were made pertaining to the modelling of the spill scenarios discussed in Chapter 19 of the Application:

- Based on the literature available and the Proponents' studies, up to 10% of Jet A fuel can remain for periods of up to 7 days. Moderate weathering of the fuel (~50%) would be expected after several tidal flushes. In most scenarios, more than 95% of the spilled fuel dissipated (evaporated or dispersed) within 48 hours;
- Spills occurring during high river flows (e.g., from May to July), were more likely to flush out of the South Arm into the Strait of Georgia quickly;
- Spills occurring during low river flows (e.g., from October to April) were more likely to remain within the South Arm for several tidal cycles before flushing into

---

<sup>216</sup> Based on the physical features of the marine facility, the Proponent determined that it was reasonable to assume this value, for the sake of spill modeling, given it was feasible.

the Strait of Georgia;

- During low flow conditions (e.g., March) spills may move upstream as far as the trifurcation point by flooding tides;
- Spills within the South Arm from a vessel in transit may enter Ladner Slough within an hour after the spill event; however, it is more common for this entry time to be longer;
- For the worst-case river-spill scenarios (i.e., low river flow, flooding tide, spill at George Massey Tunnel), a high probability was assumed that South Arm and Ladner Slough shorelines (179 kilometres of shoreline, including 94 kilometres of marshes) may be contacted by the spill;
- A spill reaching the Strait of Georgia would end up dissipating without contacting shorelines. Probability analysis of many model runs indicated that tidal flat areas immediately adjacent to South Arm were most likely to be contacted;
- In model runs where spills contact the shore in the Strait of Georgia, the slick may contact the shoreline either to the north (Sturgeon Bank) or to the south (Roberts Bank) but in no model runs did a surface slick contact both Sturgeon and Roberts Banks simultaneously; and
- The probability of a surface slick reaching the Gulf Islands or Bowen Island was low (less than 5% and less than 10% respectively).

As a result of the modelling and input from the working group, four areas of concern were identified:

- Ladner Slough;
- Delta Front;
- South Arm; and
- Strait of Georgia.

Mitigation measures were not applied in this modelling in Chapter 19 and this analysis identified the VCs that may be potentially impacted by a severe spill at the marine terminal or a catastrophic loss of fuel from a vessel in transit.

Further analysis of the potential effects of different sizes of aviation fuel spills was carried out in the Proponent's Spill Risk in the South Arm of the Fraser River Report. In addition, the Report expanded on the information in Chapter 19 of the Application and considered the application of spill mitigation measures in the consequence analysis.

#### 28.2.2 Potential Biophysical impacts in the Event of a Spill (without Mitigation)

The potential effects of an aviation fuel spill can be classified into two categories:

1. Effects associated with coating and smothering an organism; and
2. Effects that involve disruption of metabolism due to the ingestion/uptake and the incorporation of hydrocarbons into lipid or other tissues.

The Proponent identified the consequences of a spill on several VCs using the following criteria (Table 36).

**Table 36 Consequence rating criteria for a potential fuel spill**

<b>Consequence Rating</b>	<b>Description</b>	<b>Criteria</b>
<b>A</b>	Severe Impact	Sub-regional to regional, long-term, and consequential in structural and functional changes at the population level to an extent which could potentially result in severe changes at the community and ecosystem levels; recovery expected over years to decades
<b>B</b>	Major Impact	Sub-regional to regional, medium-term to long-term, and consequential in structural and functional changes at the population level; recovery expected over months to years
<b>C</b>	Moderate Impact	Lethal and/or sub-lethal effects at the individual level; indistinguishable with natural variation*; minor/negligible effects at the population level; recovery expected over weeks to months
<b>D</b>	Minor Impact	Localized lethal and/or sub-lethal effects at the individual level; no effects at the population level
<b>E</b>	Negligible or no impact	Highly localized lethal and/or sub-lethal effects at the individual level; no effects at the population level

#### 28.2.2.1 *Vegetation (in the South Arm and Ladner Slough Areas of Concern)*

If some fuel is suspended on a marsh substrate, retention potential is considered high and weathering rates are likely to be reduced. Persistence is likely to be in the range of weeks to months. As a result, the damage/injury to vegetation is assessed as a major impact. Loss/mortality to vegetation as a result of fuel in sediment is assessed as a moderate impact.

For fuel on the water surface, oiling of plant foliage could result in plant loss/mortality. Loss/mortality to vegetation as a result of fuel on the water surface is assessed as a major impact.

Environment Canada noted that the Delta Front area of concern should have been included in the consequence analysis for vegetation. The Proponent responded that the effects to vegetation were not found to be significant for Delta Front in Chapter 19, and as a result, the Spill Risk Assessment on the South Arm of the Fraser report did not include this area. EAO and VFPA note that the potential consequences of a spill to Delta Front would likely be similar or less than those at the South Arm and Ladner

Slough areas of concern.

#### 28.2.2.2 *Biofilm (In Delta Front Area of Concern)*

As a result of comments received from Environment Canada, the Proponent completed additional studies to assist in understanding the potential toxicological effects, if an accidental spill of aviation fuel were to occur on the Roberts Bank intertidal biofilm. Biofilm has been documented as an important food source for migrating shorebirds (e.g. Western Sandpiper). The final report was submitted to EAO and VFPA on September 3, 2012 (posted to ePIC) and reviewed by Environment Canada.

The results of the studies found that the risks of the proposed Project to biofilm and the Western Sandpipers which feed on biofilm is low even in the unlikely event that an aviation fuel spill were to enter the areas where the biofilm occurs.

Environment Canada stated<sup>217</sup> that it “*appreciates the Proponent’s efforts to address outstanding questions and concerns regarding the environmental behaviour, fate and effects of Jet A fuel, and specifically, the potential effects of Jet A fuel on biofilm in the Fraser River Estuary. Based on the consideration of the information presented by the Proponent to date, EC agrees that the potential effects of a Jet A fuel spill on biofilm are unlikely to be high-magnitude and irreversible*”.

EC noted that, while the Proponent has stated that the risks to biofilm are low, there is a level of uncertainty given the limits to currently available knowledge on biofilm and on oil mineral aggregation fate, effects and toxicity related to Jet A fuel spills. To better understand this uncertainty, the Proponent would be required to design and undertake additional studies, in consultation with EC and VFPA, as a Condition to the EA Certificate if issued.

#### 28.2.2.3 *Invertebrates (In the South Arm and Ladner Slough Areas of Concern)*

Dissolved aviation fuel concentrations could be higher immediately below the water surface and in extremely shallow locations along the shoreline during multiple loading situations. Epifaunal<sup>218</sup> and infaunal<sup>219</sup> communities are both considered vulnerable and sensitive to spills due to their restricted movement. As a result, the potential consequences could be sub-regional and major to invertebrates in a number of

---

<sup>217</sup> Environment Canada’s response to the Proponent’s biofilm studies was submitted on November 13, 2012 and have been posted to EAO’s ePIC site at [www.eao.gov.bc.ca](http://www.eao.gov.bc.ca)

<sup>218</sup> Epifaunal animals live on the surface of a substrate, such as rocks or marine vegetation. Epifaunal animals may attach themselves to the substrate, or range freely over the substrate, e.g. mussels and sea stars.

<sup>219</sup> Infaunal animals live in the substrate of a body of water, e.g. clams and burrowing crabs.

categories of stressors, including: direct damage/injury, indirect damage/injury, direct loss/mortality, or indirect loss/mortality due to fuel on surface water.

Given that marshes have high fuel retention, the consequences on riverine/brackish water invertebrates are considered severe in a number of categories of stressors, including: direct damage/injury, indirect damage/injury, direct loss/mortality, or indirect loss/mortality due to fuel in sediment/root mass.

#### *28.2.2.4 Fish (in the South Arm and Ladner Slough Areas of Concern)*

Behavioural traits of juvenile salmon increase their vulnerability to exposure to toxic material. In particular, they tend to swim near the surface of the water and seek shelter in areas of shallow water and in areas of low currents (e.g., tidal channels, sloughs) where higher concentrations of a potential fuel spill may be present over comparatively longer periods of time.

Marshes and sloughs are important nursery areas for juvenile fish. Thus, these effects may be greater in areas where marsh habitat occurs. However, timing of the spill event would also be an important factor given impacts may vary depending on the time of year and life stage of fish.

Dissolved jet fuel may reach an extent to cause juvenile salmonid mortality or sub-lethal effects, however, this would be restricted to the water layer immediately below the fuel sheen or in small shallow pools where water movement is restricted to prevent dilution or in areas where wave action is large enough to enable the mixing of fuel and water. Overall, the potential consequences on fish are assessed as major in a number of categories of stressors, including: direct damage/injury, and direct loss/mortality due to fuel on water surface and in the water column.

#### *28.2.2.5 Mammals (in the Delta Front and Strait of Georgia Areas of Concern)*

The potential effects to marine mammals were assessed predominantly in the context of the Southern Resident Killer Whale subpopulation due to its endangered status and its reduced population, currently being negatively affected by reduced prey, noise and disturbance and bioaccumulation of contaminants.

Potential effects related to fuel on the surface of the water and in the atmosphere may have some measurable effect (moderate magnitude) from the direct contact, ingestion and/or inhalation, which would occur from contact with the fuel sheen on the surface of the water and with vapours at the air-water interface. There is uncertainty on the level of vapour concentrations that are harmful to killer whales.

The duration of potential effects was rated as long because if mortalities occurred within the Southern Resident Killer Whale subpopulation the effects could last months to years

or more than one generation to return to pre-mortality conditions.

Considering the potential long-term effects and low recovery ability, the consequence level is rated severe because a worst-case 40,000 bbl spill could affect Southern Resident Killer Whales at the population level, regardless of the extremely low likelihood for both to occur at the same place at the same time.

#### *28.2.2.6 Birds (in the Delta Front and Ladner Slough Areas of Concern)*

This assessment of worst-case 40,000 bbl spill scenarios conservatively focuses on spring because this is when the greatest number of birds occurs in the area. Representing the various avian groups were those with large numbers and species of management concern.

##### Ladner Slough Area of Concern

Snow Geese occur in the Ladner Slough area from early-March to mid-April, when their numbers may exceed 10,000<sup>220</sup>. The timing is particularly sensitive because it immediately precedes their northward migration. For these reasons, the consequences on geese and swans are deemed major as it relates to their displacement from this area.

Dabbling ducks occur in the Ladner Slough area in the low thousands in the winter. They have a history of using this area, and presumably exhibit site fidelity that might not easily be deterred by hazing. Because of the population size involved and high repeated exposure potential, the potential consequences on dabbling ducks are assessed as major in terms of indirect damage/injury, direct loss/mortality and displacement from the area during a spill event and for some time thereafter.

##### Delta Front Area of Concern

The potential consequences on geese and swans are primarily assessed on Snow geese<sup>221</sup> and Trumpeter swans due to the large wintering numbers, and on Brant due to their presence in March and April. The potential consequences would likely be sublethal, but the numbers could be substantial and affect breeding potential and functions for that breeding season. The potential consequences on geese and swans due to indirect damage/injury are assessed as major.

The potential consequences on wading birds are primarily assessed on Great blue

---

<sup>220</sup> Environment Canada notes that the Ladner Slough area does not receive the same amount of goose use as in the past.

<sup>221</sup> Between 10-15 thousand geese at Brunswick Point in fall/late winter-spring.

heron and American bittern, both species at risk. The Fraser Estuary populations of these species are important, and the sub-lethal and displacement effects might affect breeding potential in the ensuing months. The potential consequences on wading birds due to indirect damage/injury are assessed as major. The potential consequence due to displacement would likely be at a lower degree compared to those from indirect damage/injury. Spill modelling showed that only very limited fuel contacted Delta Front areas both south and north of the mouth of the Fraser River. With similar habitats in the neighbouring areas which would be unaffected by spilled fuel, the potential consequences due to displacement are assessed as moderate.

The potential consequences on shorebirds are assessed to be sub-lethal responses to fuel contamination and displacement because of contamination on the foreshore substrates where they feed. The consequences are assessed to be short-term, and there are uncertainties about whether effects would persist long enough to affect migration (starting in April) and the ensuing breeding season. The consequences on shorebirds are assessed as major in terms of indirect damage/injury. With similar habitats in the neighbouring areas which would be unaffected by spilled fuel, the potential consequences due to displacement are assessed as moderate.

EC expressed concern about the potential indirect impacts to shorebirds that rely on biofilm as a food source in the event of a spill. Additional studies completed by the Proponent found that the risks of the proposed Project to biofilm and the Western Sandpipers, which feed on biofilm, are low even in the unlikely event that an aviation fuel spill were to enter the areas where the biofilm occurs.

Due to some remaining uncertainty, as described above, the Proponent will be required to design and undertake additional studies in consultation with EC and VFPA.

The potential consequences on dabbling ducks are assessed as sub-lethal. However, the large number of individuals involved suggests that, if fuel contact were to occur, there may be substantial mortality and displacement from affected habitat some time after most of the fuel had disappeared. The potential consequence on dabbling ducks is assessed as major in terms of indirect damage/injury, direct loss/mortality and displacement.

Diving ducks and piscivorous<sup>222</sup> diving birds would be affected mostly by hypothermia and displacement; mortality would be proportionately higher compared to other birds, and the productivity of the survivors might be impaired for that breeding season. The consequences on diving ducks and piscivorous diving birds are assessed as major in

---

<sup>222</sup> Birds whose diets primarily consist of fish

terms of indirect damage/injury and indirect loss/mortality. With similar habitats in the neighbouring areas which would be unaffected by spilled fuel, the consequences due to displacement are assessed as moderate.

**Table 37. A summary of spill risk and consequence before mitigation for each VC**

VEC	Potential Effect	Stressor	Location	Significance Criteria before Mitigation							Consequence Rating before Mitigation
				Magnitude	Geographic Extent	Direction	Duration	Frequency	Reversibility	Ecological Context	
Vegetation	Damage / injury	Fuel in sediment	South Arm and Ladner Slough	Moderate to High	Subregional	Negative	Medium	Once	Reversible	High	B - Major
	Loss / mortality	Fuel on surface water	South Arm and Ladner Slough	Moderate to High	Subregional	Negative	Medium	Once	Reversible	High	B - Major
		Fuel in sediment	South Arm and Ladner Slough	Moderate	Subregional	Negative	Medium	Once	Reversible	High	C - Moderate
Invertebrates	Direct Damage / injury	Fuel on surface water	South Arm and Ladner Slough	High	Subregional	Negative	Medium	Once	Reversible	Moderate	B - Major
		Fuel in sediment	South Arm and Ladner Slough	High to Very High	Subregional	Negative	Medium to Long	Once	Reversible	Moderate	A - Severe
	Indirect Damage / injury	Fuel on surface water	South Arm and Ladner Slough	High	Subregional	Negative	Medium	Once	Reversible	Moderate	B - Major
		Fuel in sediment	South Arm and Ladner Slough	High to Very High	Subregional	Negative	Medium to Long	Once	Reversible	Moderate	A - Severe
	Direct Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	High	Subregional	Negative	Medium	Once	Reversible	Moderate	B - Major
		Fuel in sediment	South Arm and Ladner Slough	High to Very High	Subregional	Negative	Medium to Long	Once	Reversible	Moderate	A - Severe
	Indirect Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	High	Subregional	Negative	Medium	Once	Reversible	Moderate	B - Major
		Fuel in sediment	South Arm and Ladner Slough	High to Very High	Subregional	Negative	Medium to Long	Once	Reversible	Moderate	A - Severe
Fish	Direct Damage / injury	Fuel on surface water	South Arm and Ladner Slough	High	Subregional	Negative	Short to Medium	Once	Reversible	Moderate	B - Major
		Fuel in water column	South Arm and Ladner Slough	High	Subregional	Negative	Short to Medium	Once	Reversible	Moderate	B - Major
	Direct Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	High	Subregional	Negative	Short to Medium	Once	Reversible	Moderate	B - Major
		Fuel in water column	South Arm and Ladner Slough	High	Subregional	Negative	Short to Medium	Once	Reversible	Moderate	B - Major
Marine Mammals	Direct Loss/ Mortality	Fuel on surface water	Delta Front and Strait of Georgia	Moderate	Subregional	Negative	Long	Once	Reversible	Low	A - Severe

VEC	Potential Effect	Stressor	Location	Significance Criteria before Mitigation							Consequence Rating before Mitigation
				Magnitude	Geographic Extent	Direction	Duration	Frequency	Reversibility	Ecological Context	
Birds - Geese and Swans	Indirect Damage/Injury	Fuel	Delta Front	Moderate to High	Local to Subregional	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
	Displacement	Fuel	Ladner Slough	Moderate to High	Local	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
Birds - Wading Birds	Indirect Damage/Injury	Fuel	Delta Front	Moderate to High	Local to Subregional	Negative	Moderate to Long	Once	Reversible	Low to Moderate	B - Major
	Displacement	Fuel	Delta Front	Moderate	Local to Subregional	Negative	Short to Moderate	Once	Reversible	Moderate	C - Moderate
Birds - Shorebirds	Indirect Damage/Injury	Fuel	Delta Front	Moderate to High	Local	Negative	Long to Moderate	Once	Reversible	Low to Moderate	B - Major
	Displacement	Fuel	Delta Front	Moderate	Local	Negative	Short to Moderate	Once	Reversible	Moderate	C - Moderate
Birds - Diving Ducks	Indirect Damage/Injury	Fuel	Delta Front	Moderate to High	Local	Negative	Moderate to Long	Once	Reversible	Low to Moderate	B - Major
	Indirect Loss/Mortality	Fuel	Delta Front	Moderate to High	Local	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
	Displacement	Fuel	Delta Front	Moderate	Local	Negative	Moderate to Long	Once	Reversible	Low to Moderate	C - Moderate
Birds - Dabbling Ducks	Indirect Damage/Injury	Fuel	Ladner Slough	Moderate to High	Sub-regional	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
		Fuel	Delta Front	Moderate to High	Local	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
	Indirect Loss/Mortality	Fuel	Ladner Slough	Moderate to High	Subregional	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
		Fuel	Delta Front	Moderate to High	Local	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
	Displacement	Fuel	Ladner Slough	Moderate to High	Subregional	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
		Fuel	Delta Front	Moderate	Local	Negative	Moderate to Long	Once	Reversible	Moderate	C - Moderate
Birds - Piscivorous Diving Birds	Indirect Damage/Injury	Fuel	Delta Front	Moderate to High	Local	Negative	Moderate to Long	Once	Reversible	Moderate	B - Major
	Indirect Loss/Mortality	Fuel	Delta Front	Moderate to High	Local	Negative	Moderate to Long	Once	Reversible	Low to Moderate	B - Major

### 28.2.3 Key Strategies to Mitigate Biophysical Effects

To mitigate potential effects of an aviation fuel spill, the Proponent would be required to implement key strategies and meet specific conditions to mitigate potential effects. These include:

- The Proponent must maintain insurance coverage for liability of itself, its contractors, subcontractors, and operators during construction and operation of its facilities in accordance with the “Holder’s Insurance Policy Summary (27 November 2012)”. Without limiting the generality of the foregoing, the Proponent must maintain pollution liability insurance that meets or exceeds the prevailing industry standard coverage limits sufficient to insure its potential liability, according to the applicable law, to compensate for emergency spill response, clean-up and environmental remediation and for loss by aboriginal food, social and ceremonial fishers licensed under the *Fisheries Act* caused by a spill of aviation fuel from the Proponent’s construction sites or operational facilities;
- Key features at the marine terminal to respond to and clean up a spill (such as a boat launch for response vessels, booms and associated infrastructure and skimmers);
- Diversion booming to reduce the potential of spilled fuel entering into Ladner Slough /Delta Front marshes (Sturgeon Bank, Westham Island, Brunswick Point);
- Bird hazing to reduce the potential of birds coming into direct contact with spilled fuel; and
- Acoustic hazing to reduce the potential of marine mammals coming in contact with spilled fuel.

The specific mitigation measures are included in the OPEP, the Spill Risk in the South Arm of the Fraser Report and the Proponent’s Application. The OPEP was drafted in cooperation with the WCMRC, which is responsible for spill response in the Fraser River. WCMRC undertook field tests of the proposed spill response measures and the Proponent has accepted all the measures proposed by the WCMRC.

#### 28.2.3.1 *Marine Terminal Facilities*

The OPEP technical memo stated that considering the river currents, a credible response is only possible if resources (vessels, boom, skimmers, and temporary storage and trained spill responders) are deployed in the river before the tanker offloading activity commences. Without the pre-positioned resources, product spilled at the terminal could travel a considerable distance from the terminal before recovery operations could be commenced, thus potentially negatively affecting the environment.

As a result, a number of conditions for the EA Certificate have been recommended

including:

- Requirements for the incorporation of specific spill avoidance and spill response components into the design of the marine facility;
- Requirements to equip the fuel receiving facility and marine terminal with emergency spill response equipment;
- Requirements to maintain a real-time weather station to be used as an early warning system;
- Requirements to have two dedicated response vessels available at the marine terminal during vessel arrival, berthing and cargo transfer; and
- Requirements that all vessels berthed at the marine terminal will be surrounded by booming prior to unloading and for the duration of cargo transfer and that skimmers are ready for deployment.

The Proponent would also be required to conduct annual inspection, monitoring and maintenance to verify that that all equipment and systems are functioning as intended.

#### *28.2.3.2 Sensitive Locations - Steveston, Tilbury Island, Sea Reach, Canoe Passage and Gundersen Slough*

Of the list of sensitive locations, WCRMC identified that most could be protected by conventional booming tactics, namely deflection, exclusion (protection) or containment booming or a combination of the three types of booming. In extreme freshet conditions where currents exceed 3 to 4 knots, a combination of boom angle and a cascade of boom arrays may be necessary

As a result, the Proponent would be required to ensure that spill response equipment on-site and at cache locations on the Fraser River are available for response strategies at the following locations for immediate deployment in the event of a spill:

- Sea Reach (fixed deflection booming);
- North Steveston Harbour (exclusion booming);
- South Steveston Harbour (fixed deflection and containment booming);
- Tilbury Island (exclusion booming); and
- Canoe Passage (exclusion booming).

The Proponent would also be required to install a new anchor point for deployment of deflection booming or permanent log booms at the eastern entrance to Steveston Harbour, before the start of operations.

#### *28.2.3.3 Sensitive Location - Ladner Slough*

Spill modelling showed that Ladner Slough, which is not on the shipping route, could be reached during some spill situations as a result of an unmitigated worst-case spill from a

vessel while in transit. The marsh-mudflat system of Ladner Slough is considered sensitive for a number of reasons: marsh ecology, invertebrate ecology and important juvenile fish nursing habitat. The area is considered to be an important biological habitat and is an active recreation area (fishing, boating, canoeing, etc.). Because spill entry time to the Slough is short, a booming strategy would have to be implemented very quickly after a spill event.

Previous studies suggested that deflection booms upstream of the entrance to Ladner Reach can be effective in directing floating objects, including spilled fuel, to bypass the entrance to Ladner Reach. On several occasions from March to July 2011 deflection booms were used by WCMRC in an effort to divert the surface flow away from Ladner Reach into the South Arm of the Fraser River on a typical ebb flow. WCMRC conducted a number of tests including a combination of diversion and containment booms within Ladner Slough, which are further described in the OPEP.

As a result, a number of conditions have been recommended for the EA Certificate including:

- The Proponent must ensure that spill response equipment at a cache location at Ladner Reach (primary and secondary fixed deflection and containment booming) are available for response strategies in the event of a spill; and
- The Proponent must require a response vessel be relocated to Ladner Reach and pre-deploy booming to be completed before vessel unloading starts.

#### *28.2.3.4 Bird Hazing on the Delta Front*

The assessment identifies a number of spill effects on the Delta Front potentially significant to birds. These effects could be mitigated by temporarily displacing birds from contaminated shore habitat. The Proponent has stated that bird hazing has been shown to be an effective spill response tool that can reduce impacts to avian wildlife.

One of the most effective hazing techniques is the use of helicopters to deter birds from using potentially contaminated shore habitat. Given that YVR is very close to potentially affected areas and that a number of commercial helicopter companies operate from the airport, rapid deployment of helicopters for hazing may be achieved. Canadian Coast Guard hovercrafts are also located at YVR and may be temporarily tasked for such an operation. This strategy would require pre-authorization from regulatory agencies and a list of guidelines for implementation should be prepared.

However, the potential to mitigate is substantial, and can be done on short notice.

#### 28.2.3.5 *Marine Mammal Hazing*

One of the risks identified as potentially significant is that on a small population of Southern Resident killer whales currently under duress. Because overlap between the Delta Front area of a worst-case spill and that of killer whale use is very small, acoustic hazing of killer whales may reduce the potential for whale-fuel interaction by temporarily displacing them from their preferred feeding areas. Acoustic hazing would require pre-authorization from regulatory agencies and a list of guidelines for implementation should be prepared.

#### 28.2.3.6 *Conclusion*

The implementation of the measures described above would reduce the potential consequences of a spill to VCs. BC Environmental Protection Department Environmental Emergency Program staff reviewed and provided comment on the Table of Conditions, stating that the conditions for the proposed Project, as they relate to spill response, were quite comprehensive. Table 38 provides the consequence ratings, before and after the consideration of mitigation measures, for each VC.

**Table 38. Consequence rating before and after application of mitigation measures for each VC.**

<b>VC</b>	<b>Potential Effect</b>	<b>Stressor</b>	<b>Location</b>	<b>Consequence Rating before Mitigation</b>	<b>Consequence Rating after Mitigation</b>
Vegetation	Damage / injury	Fuel in sediment	South Arm and Ladner Slough	B-Major	C - Moderate
	Loss / mortality	Fuel on surface water	South Arm and Ladner Slough	B-Major	C - Moderate
		Fuel in sediment	South Arm and Ladner Slough	C- Moderate	D - Minor
Invertebrates	Direct Damage / injury	Fuel on surface water	South Arm and Ladner Slough	B-Major	C - Moderate
		Fuel in sediment	South Arm and Ladner Slough	A - Severe	C - Moderate
	Indirect Damage / injury	Fuel on surface water	South Arm and Ladner Slough	B-Major	C - Moderate
		Fuel in sediment	South Arm and Ladner Slough	A - Severe	C - Moderate
	Direct Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	B-Major	C - Moderate
		Fuel in sediment	South Arm and Ladner Slough	A - Severe	C - Moderate
	Indirect Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	B-Major	C - Moderate
		Fuel in sediment	South Arm and Ladner Slough	A - Severe	C - Moderate

<b>VC</b>	<b>Potential Effect</b>	<b>Stressor</b>	<b>Location</b>	<b>Consequence Rating before Mitigation</b>	<b>Consequence Rating after Mitigation</b>
Fish	Direct Damage / injury	Fuel on surface water	South Arm and Ladner Slough	B-Major	C - Moderate
		Fuel in water column	South Arm and Ladner Slough	B-Major	C - Moderate
	Direct Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	B-Major	C - Moderate
		Fuel in water column	South Arm and Ladner Slough	B-Major	C - Moderate
Marine Mammals	Direct Loss/ Mortality	Fuel on surface water	Delta Front and Strait of Georgia	A - Severe	D - Minor
Birds - Geese and Swans	Indirect Damage/Injury	Fuel	Delta Front	B-Major	C - Moderate
	Displacement	Fuel	Ladner Slough	B-Major	C - Moderate
Birds - Wading Birds	Indirect Damage/Injury	Fuel	Delta Front	B-Major	C - Moderate
	Displacement	Fuel	Delta Front	C- Moderate	D - Minor
Birds - Shorebirds	Indirect Damage/Injury	Fuel	Delta Front	B-Major	C - Moderate
	Displacement	Fuel	Delta Front	C- Moderate	D - Minor
Birds - Diving Ducks	Indirect Damage/Injury	Fuel	Delta Front	B-Major	C - Moderate
	Indirect Loss/Mortality	Fuel	Delta Front	B-Major	C - Moderate
	Displacement	Fuel	Delta Front	C- Moderate	D - Minor
Birds - Dabbling Ducks	Indirect Damage/Injury	Fuel	Ladner Slough	B-Major	C - Moderate
		Fuel	Delta Front	B-Major	C - Moderate

<b>VC</b>	<b>Potential Effect</b>	<b>Stressor</b>	<b>Location</b>	<b>Consequence Rating before Mitigation</b>	<b>Consequence Rating after Mitigation</b>
	Indirect Loss/Mortality	Fuel	Ladner Slough	B-Major	C - Moderate
		Fuel	Delta Front	B-Major	C - Moderate
	Displacement	Fuel	Ladner Slough	B-Major	C - Moderate
		Fuel	Delta Front	C- Moderate	D - Minor
Birds - Piscivorous Diving Birds	Indirect Damage/Injury	Fuel	Delta Front	B-Major	C - Moderate
	Indirect Loss/Mortality	Fuel	Delta Front	B-Major	C - Moderate

#### 28.2.4 Risk of a Spill to Biophysical Resources

The risk of different sizes of spills to biophysical resources is found in Table 39. Of note, before mitigation there was a medium risk identified for invertebrates and marine mammals in the event of a >40,000bbl spill. Following mitigation, the risk to all VCs was found to be low or negligible.

**Table 39: Risk of different sizes of fuel spills to VCs.**

VC	Potential Effect	Stressor	Location	1-49 bbl Spill						> 49-999 bbl Spill						> 1,000 bbl Spill						40,000 bbl Spill (Representing > 10,000 bbl)					
				Before Mitigation			After Mitigation			Before Mitigation			After Mitigation			Before Mitigation			After Mitigation			Before Mitigation			After Mitigation		
				Spill Probability	Spill Consequence	Spill Risk	Spill Probability	Spill Consequence	Spill Risk	Spill Probability	Spill Consequence	Spill Risk	Spill Probability	Spill Consequence	Spill Risk	Spill Probability	Spill Consequence	Spill Risk	Spill Probability	Spill Consequence	Spill Risk	Spill Probability	Spill Consequence	Spill Risk	Spill Probability	Spill Consequence	Spill Risk
Vegetation	Damage / injury	Fuel in sediment	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
	Loss / mortality	Fuel on surface water	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
		Fuel in sediment	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	D - Minor	1D Trivial	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial
Invertebrates	Direct Damage / injury	Fuel on surface water	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
		Fuel in sediment	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	A - Severe	1A Medium	1 - Rare	C - Moderate	1C Low
	Indirect Damage / injury	Fuel on surface water	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
		Fuel in sediment	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	A - Severe	1A Medium	1 - Rare	C - Moderate	1C Low
	Direct Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
		Fuel in sediment	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	A - Severe	1A Medium	1 - Rare	C - Moderate	1C Low
	Indirect Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
		Fuel in sediment	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	A - Severe	1A Medium	1 - Rare	C - Moderate	1C Low
Fish	Direct Damage / injury	Fuel on surface water	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
		Fuel in water column	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
	Direct Loss/ Mortality	Fuel on surface water	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low
		Fuel in water column	South Arm and Ladner Slough	4 - Likely	E - Negligible	4E Low	3 - May Occur	E - Negligible	3E Low	2 - Unlikely	D - Minor	2D Low	1 - Rare	E - Negligible	1E Trivial	1 - Rare	C - Moderate	1C Low	1 - Rare	D - Minor	1D Trivial	1 - Rare	B - Major	1B Low	1 - Rare	C - Moderate	1C Low



## 28.2.5 Social, Economic, Heritage and Health Consequences of a Spill

In Chapter 19 of the Application, the Proponent also included an assessment of potential social, economic, heritage and health effects, in the event of a unmitigated worst-case vessel or marine terminal spill. The effects below were not found to be significant in the Proponent's analysis; however, EAO and VFPA have considered these in the EA.

### 28.2.5.1 *Socio-Economic Resources*

In Chapter 19 of the Application, the Proponent noted a range of socio-economic resources and activities could be adversely affected in the event of an unmitigated worst-case spill of aviation fuel in the Fraser River. The potential risks include:

- Commercial, recreational and food fisheries and plant gathering centred in the lower Fraser River and southern Strait of Georgia;
- Marinas;
- Recreational users and residents in the immediate vicinity of affected shoreline areas;
- Recreational boaters;
- The South Arm marine transportation sector, and
- Depending on the location and extent of the spill, float home communities and other amenities situated in places such as Finn Slough, Ladner Reach and Canoe Passage.

### 28.2.5.2 *Heritage Effects*

Chapter 19 of the Application identifies the effects of a spill of aviation fuel in the Fraser River on archaeological, heritage and historic sites. These effects would be contingent on numerous inter-related factors. The most significant factor would be the distance between the site and the spill origin, and the elapsed time between the spill and shore contact.

The risk of long-term effects to organic components (e.g., shell and wooden remains) of archaeological sites would be greater than would those associated with rock surfaces.

Contact with aviation fuel may also affect radiocarbon dating options. Additionally, clean-up activities, especially those resulting in landscape alterations, could affect the integrity of archaeological sites.

### 28.2.5.3 *Human Health*

The following summary is based Chapter 19 of the Proponent's Application and provides an overview of human health considerations associated with a spill of aviation fuel in the Fraser River:

- Aviation fuel is considered hazardous by WorkSafe BC and the OSHA Hazard Communication Standard. It can be harmful or fatal if swallowed, harmful if inhaled, and is an irritant to the respiratory system, skin and eyes. Over-exposure can result in nervous system distress (i.e., headache, dizziness, convulsions, loss of consciousness, coma or death), and/or nausea and vomiting;
- Most constituents of aviation fuel tend to volatilize quickly and have a low solubility in water;
- Inhalation and dermal exposure are the most likely pathways for human receptors in the event of a spill of aviation fuel in the Fraser River; and
- An MRL of 0.01 mg/m<sup>3</sup> exists for an intermediate-duration inhalation exposure to kerosene, the main constituent of aviation fuel. According to WorkSafe BC, the maximum permissible TWA exposure limit for kerosene/aviation fuels is 200 mg/m<sup>3</sup> (total hydrocarbon vapour). As shown in Table 19.4.2 of the Application, in all cases, the predicted maximum 8-hour average concentrations in air, based on worst-case spill scenario modelling, are well below this exposure limit.

In the event of a serious aviation fuel spill in the Fraser River, the Proponent stated that it is unlikely that either employees at the marine terminal, vessel crews or members of the general public would experience adverse health effects due to inhalation, ingestion, or skin or eye contact with the spilled fuel. While emergency responders would be at greatest risk, these individuals would be appropriately trained and equipped to minimize their exposure to aviation fuel and fuel vapours. Further, due to the inherently low concentrations of potentially hazardous constituents in aviation fuel (e.g., benzene, ethylbenzene), the volatility of these constituents, and the tendency for low exposure levels of these constituents to be rapidly metabolized and excreted, an acute inhalation exposure is unlikely to result in permanent adverse health effects.

The Proponent also noted that the International Agency for Research on Cancer concluded that aviation fuel is not classifiable as to its carcinogenicity to humans. In making its finding, the International Agency for Research on Cancer noted that there is also limited evidence for the carcinogenicity in experimental animals of straight-run or hydrotreated kerosene, the main constituent of aviation fuel.

#### 28.2.6 Key Mitigation Strategies

The recommended conditions for the EA Certificate includes requirements for implementing an Oil Pollution Emergency Plan in cooperation with authorities having jurisdiction that describes, among other things, the command structure, the containment, recovery and reporting procedures, the frequency of practice exercise, contact information and equipment to be maintained at the marine terminal and fuel receiving facility.

This plan would include measures of contacting potentially affected stakeholders, working with local Fisherman's Oil Spill Emergency Team and other local sources of emergency response and spill reporting.

Because of the inherently low concentrations of potentially hazardous constituents in aviation fuel, the volatility of these constituents, and the tendency for low exposure levels of these constituents to be rapidly metabolized and excreted, an acute exposure is unlikely to result in permanent adverse health effects. The risk to human health from a one-time accidental event is expected to be low in most instances.

The results of fuel concentrations in the air for each of the worst-case spill scenarios indicate that the maximum 8-hour concentrations of fuel in the atmosphere are well below WorkSafe BC's 8-hour average exposure limits of 200 mg/m<sup>3</sup> for total hydrocarbon vapour.

### 28.3 Key comments from Working Group members and the Public

Throughout the EA, questions were raised from Working Group members and the public regarding aviation fuel spills from vessels. Please see Appendix 2 and 3 for a complete list of the comments from the working group members and the public, respectively, and the Proponent's responses. Key issues included:

- Assumptions, methodologies and results of the spill modelling – this resulted in additional studies, reports and the development of the OPEP;
- Inclusion of working group members in spill response planning, notification, coordination and clean-up – this was noted by EAO and VFPA;
- Liability and regulatory oversight for spill response measures – this was discussed in the Aboriginal Fisheries Compensation Framework and in the draft Table of Conditions; and
- Clean-up 'end-points'<sup>223</sup> – this was noted by VFPA and EAO as was the role of the agencies under the *Marine Shipping Act* in the event of a spill.

The majority of the questions or comments raised by working group members have been resolved through the development of the draft OPEP, Biofilm studies, Spill Risk on the South Arm of the Fraser River information, the Aboriginal Fisheries Compensation Framework and the recommended Table of Conditions. Of note:

---

<sup>223</sup> This refers to how and when a spill is considered to be cleaned up. This determination is under the discretion of spill-response regulators.

- The Ministry of Environment stated that more work is necessary in characterizing current baseline environmental quality conditions.

The Proponent responded that definitive baseline data characterizing sediment and water quality conditions at site-specific locations within the Fraser River estuary may contribute to the understanding of the effects of pollutants of all types on sediment and water quality in the estuary, but the cost, effort and time involved with such a study far outweighs the probative value for the EA.

EAO agreed that baseline monitoring is not necessary for the purpose of assessing the risk of a spill and the spill prevention and response measures necessary to mitigate the risk to acceptably low levels. EAO and MOE both note that there may be data available from Metro Vancouver that would be available. EAO also notes that the governmental agencies who are involved in directing the spill response, clean up and remediation would have the authority to require whatever actions are necessary at that time. MOE noted a reduction in regional presence from EC, re-stated the benefits of a baseline monitoring program.

- Environment Canada has raised concerns regarding spill modelling, fate and effects assessment, effectiveness of proposed spill response measures and the risk of the proposed Project to the Fraser River estuary.

As a result, the Proponent requested that the EA timelines be suspended so that they could conduct additional studies and provide information needed to assess the fate and effect of a spill for the proposed Project.

EC has stated that the Proponent's completed studies and the recommended condition for some additional work in the EA Certificate, is satisfactory. EAO and VFPA consider this issue resolved.

- EAO received comments from the public during the EA that articulated concerns about the risk of a spill to the Fraser River Estuary as a result of the proposed Project. For a full list of the comments and the proponent's responses, please see Appendix 3.
- City of Richmond questioned whether there were spill response measures to protect red-coded FREMP habitat on the north side of the South Arm Islands around Finn Slough. City of Richmond was also of the view that the spill response measures would actually divert spills towards FREMP habitat.

The Proponent responded that any spilled product is likely to remain in the main

channel because of the faster current flows, which limit the potential for lateral surface migration. This is supported by the current flow and spill fate modelling predictions in the Application. The Proponent also noted that if some spilled produce was to migrate across the main channel and reach the shorelines referenced, the deflection /protection booming strategies identified in the draft OPEP for other shorelines would be implemented. With continued input from WCMRC and other stakeholder, the OEP would be updated and finalized before the start of operations. EAO and VFPA consider this issue resolved.

## 28.4 Conclusion

EAO and VFPA have considered the following:

- A small <49 bbl spill may occur during the life of the proposed Project, while a >49 bbl spill would be rare;
- Measures to reduce the probability of a spill (eg. Double-hulled vessels) will be recommended Conditions for the EA Certificate;
- Spill response measures have been described in the Application, OPEP and Spill Risk on the South Arm of the Fraser Report. These measures were recommended by WCMRC and will be recommended Conditions for the EA Certificate;
- The assessment of risk includes the consideration of the quantification or level of risk as calculated by the product of the probability or likelihood of an event and the consequence of the event (risk = probability x consequence). As a result, with the implementation of mitigation measures, EAO and VFPA found that the risk of a spill is low;
- Legislation and regulatory requirements relating to spill response and clean-up;
- The risk of a spill cannot be entirely eliminated and there remains some uncertainty regarding the effectiveness of some spill response measures in the Fraser River during extreme flow conditions;
- There remains some uncertainty regarding potential consequences of an aviation fuel spill on biofilm. The Proponent will be required to design and conduct additional studies, in consultation with EC.
- The proposed Project would introduce the shipping of aviation fuel into the South Arm of the Fraser River, resulting in a new hazard to that ecosystem;
- The risk of vessel spills to the Fraser River delta foreshore from aviation fuel and other bulk liquid hydrocarbon shipments already exists, regardless of the proposed Project;
- The proposed Project would replace the existing shipping of aviation fuel that currently goes past the river mouth and into Burrard Inlet; and
- If approved with the Conditions recommended in this report, the proposed Project would enhance spill response capability to the Fraser River for all users.

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate), EAO and VFPA are satisfied that the proposed Project is not likely to pose a significant risk to environmental, social, economic, health or heritage resources due to a potential spill of aviation fuel from a vessel or at the marine terminal.

## 29 Pipeline Operations Spill

### 29.1 Spill Probability

Fuel would be transferred to the newly constructed fuel receiving facility from the marine terminal via a transfer pipeline. Fuel will then be delivered to YVR via a delivery pipeline. The fuel receiving facility will include above ground tanks with a total capacity of approximately 80 million litres (approximately 500,000 barrels).

The pipeline system would be constructed in accordance with BMPs that govern a system of this scale, type and location, including the relevant Canadian Standards Association standards and the requirements of the B.C. Oil and Gas Commission.

The transfer pipeline would operate only during transfer of fuel from vessels at the marine terminal to the fuel receiving facility. The delivery pipeline will be in active operation only during delivery of fuel from the fuel receiving facility to the storage facilities at YVR, as required by fuel demand at YVR, and will remain inactive and at low residual pressure at all other times. The probability rating criteria can be found in Table 40.

The primary spill risk factors associated with the design, construction and operation of the pipeline system are as follows:

- External and internal corrosion;
- Operator error (such as misdirected flow);
- Third-party damage;

**Table 40: Probability rating criteria for a potential pipeline spill**

Probability Rating	Description	Criteria
1	Almost Certain to occur – event is expected to occur based on current practices	Could occur within the next year
2	Likely to occur – event is likely to occur based on current practices	Could occur within the next 10 years
3	May occur - event may occur at some time base on current practices	Could occur within the next 10 to 20 years
4	Unlikely to occur - event is unlikely to occur based on current practices	Could occur within the next 20 to 100 years
5	Rare occurrence - event is not expected to occur based on current practices	Not likely to occur within the next 100 years

Historical leak or spill frequencies from pipelines can be used to predict future frequencies. Pipeline failure statistics are recorded by industry organizers and regulators, and are often used as risk assessment benchmarks. Public statistical damage databases show the following trends in pipeline incidences:

- Failure frequencies have been reducing over the years although the rate of reduction is slowing;
- External damage incidents are the most prominent and are generally characterized by product leakage from holes and ruptures caused by human activity such as mechanized excavations; and
- Early constructed pipelines had a high failure frequency due to corrosion as compared to recently constructed pipelines and improvements in maintenance practices.

As a result, the probability of a pipeline spill due to external interference was ranked as moderate to high, the probability of operator error was ranked as moderate and the probability of corrosion was ranked as moderate to low.

## 29.2 Consequences of a pipeline spill

The accidental discharge of a deleterious substance that is toxic or deleterious to the surrounding environment, could potentially be associated with the proposed Project during construction.

**Table 41: Consequence rating for potential pipeline spills**

Consequence Rating	Description	Criteria
<b>A</b>	Severe Impact	Spill of more than 20 cubic metres enters a named water body, wildlife/fisheries and downstream water users impacts, large financial impact, regional to national public and media interest. Spill enters a waterway with a velocity of >3 Km/Hr.
<b>B</b>	Major Impact	Spill of less than 20 cubic metres enters a named water body and there is a potential for negative impact to downstream wildlife/fisheries and downstream water users. Local-to-regional public and media interest. Impacts other licensed water users. Public complains of health concerns. Flammable or explosive atmosphere. Spill will impact an environmentally sensitive area.
<b>C</b>	Moderate Impact	Any liquid spill within 100 metres of a named water body that has the potential for off-site impacts. Land based spill. Public complain of odours or potential health concerns or restricted use of recreational facilities. Potential public safety issue.
<b>D</b>	Minor Impact	Localized lethal and/or sub-lethal effects at the individual level; no effects at the population level
<b>E</b>	Negligible or no impact	No environmental impact, spill contained immediately.

Equipment failure or operator error during on-site fuel storage, refuelling activities, and other activities associated with over-water and upland works are possible sources of spills during construction.

During proposed Project operations, an accidental upland spill of deleterious material, including fuel, could potentially occur from fuel pipelines, the fuel receiving facility and/or during cargo transfer operations at the marine terminal. Over-water spills could also potentially occur during the process of fuel off-loading from a vessel berthed at the marine terminal.

Chapter 15 and 16 of the Application identifies the potential impacts and risk of an accidental spill of deleterious substances during pipeline construction and operation. Of note, these potential impacts include:

- Effects to human health due to exposure through a variety of potential pathways;
- Effects to ecological health both from over-water spills and upland spills; and
- Socio-economic and heritage effects including archaeological resource concerns, property values and lifestyle disruptions.

As a result, the consequence of a pipeline spill due to external interference was ranked as moderate to major, the probability of operator error was ranked as moderate and the probability of corrosion was ranked as moderate to minor.

#### 29.2.1 Mitigation Measures

The principal way to reduce pipeline system spill risk to an acceptable level is by using proactive measures during construction and operations to reduce the probability of an event occurring.

The pipeline system industry has developed BMPs which have been accepted and used throughout industry to mitigate and control risk to pipeline systems and are outlined in detail in Chapter 16 and 17 of the Application.

The Proponent will be required by the Oil and Gas Commission to have a System Integrity Management Program which will be implemented as a risk control measure during Project operations. This program will also incorporate BMPs as set out by the American Petroleum Institute.

The Proponent has stated that risk control measures to be implemented during design will include systems for corrosion control, preventative maintenance practices, and leak detection sensors and controls.

Of particular note, the Proponent has identified the following measures to mitigate risk due to external interferences, operator error and corrosion.

- The proposed Project will employ a comprehensive Third-Party Damage Prevention Program within its System Integrity Management Program. This Program will include third-parties participation in the “BC One-Call” program, patrolling surveys, right-of-way signage, mapping of pipeline location and right-of-way vegetation clearing programs.
- A detailed set of operational procedures will be developed and all operators will have prerequisite skill set and appropriate training to operate the pipeline system. Human error can be further mitigated using advanced control systems to maintain the systems within a design range of operating parameters.
- During operations, internal and external corrosion hazards will be managed through the Corrosion Protection Program, a component of the System Integrity Management Program

The Proponent notes in Chapter 16 that the probability of these hazards occurring at the fuel receiving facility is considerably lower because the facility would be located within a controlled area and the likelihood of third-party interference is greatly reduced. The fuel receiving facility would have secondary containment for all fuel handling areas, which would allow significant time for a response to a spill-related incident. This lowers the likelihood of adverse effects on the surrounding environment.

Statistically, the Proponent notes that fuel handling facility spill volumes average about one third the average volume of pipeline leaks/spills, and are lower in frequency than pipelines in part because of the requirement for secondary containment. Fuel facilities typically employ design techniques for corrosion control, preventative maintenance practices, and sophisticated monitoring equipment. These same design measures will also be employed for the fuel pipelines.

Chapter 15 and 16 of the Application also outline management and mitigation measures in the event of a pipeline spill including:

- Plans for management and mitigation of spills during construction will be included in the Construction Environmental Management Plan, which will provide prescriptive measures for fuel storage, equipment refuelling and protocols during over-water and upland construction works;
- Adherence with applicable laws (such as the Fisheries Act, Transportation of Dangerous Goods Act, Canadian Environmental Protection Act, Oil and Gas Activities Act and Environmental Management Act);
- Employment of BMPs for concrete handling, re-fuelling over-water, horizontal drilling, wastewater management and waste containment measures;
- A system integrity program that includes regular inspections and maintenance;
- The preparation of material to prevent, prepare and response to a spill, including:
  - Pipeline System Operations and Maintenance Manual;
  - Operations Environmental Management Plan (including a spill prevention, preparedness, and emergency response plan, a wastes managements plan

and training).

Finally, the Proponent is required by the OGC to provide additional analysis regarding spill risk during the OGC facility permitting and development of the system integrity management program.

### 29.3 Risk of a pipeline spill

In Chapter 16, the Proponent assesses the probability of a spill event, prior to the application of mitigation measures due to the following hazards (Table 42):

- External interferences – the Proponent stated that, prior to mitigation, the probability of a spill due to external interferences will probably occur within the next 10 years based on current practices;
- Operator error – the Proponent stated that, prior to mitigation, the probability of a spill could occur due to operator error within the next 10-20 years based on current practices; and
- Corrosion – the Proponent stated that, prior to mitigation, the probability of a spill due to corrosion could occur within the next 20 to 100 years based on current practices.

**Table 42. Probability, consequence, and risk of spills for hazards**

Hazard	Probability of spill event (pre-mitigation)	Consequences (pre-mitigation)	Risk (pre-mitigation)	Probability of a spill event (following mitigation)	Risk (following mitigation)
<b>External interference</b>	4 - Likely	B - Major	4B - High	2 - Unlikely	2B - Medium
<b>Corrosion</b>	2 - Unlikely	D - Minor	2D - Low	1 - Rare	1D - Trivial
<b>Operator error</b>	3 - May	C - moderate	3C - Medium	2 - Unlikely	2C - Low

The Proponent stated that the probability of these hazards occurring at the fuel receiving facility were considerably lower because the facility will be located within a controlled area and the likelihood of third-party interference is greatly reduced. Equipment and piping at the fuel receiving facility will not normally be accessible by any of the third-party groups that could inadvertently damage sections of the pipeline.

The OGC takes proactive measures to ensure the integrity of pipelines, which include a comprehensive application and review process, required Integrity Management Programs (IMP) and notification of any operational changes to a pipeline. Pipeline IMPs provide a systematic approach for assuring pipeline integrity throughout the entire pipeline lifecycle, which reduces the likelihood of an incident.

In addition, the fuel receiving facility would have secondary containment for all fuel handling areas, which would allow time for a response to a spill-related incident. This

lowers the likelihood of adverse effects on the surrounding environment. The pipeline would be in use only when the fuel is being transferred to YVR after a vessel unloading. The proposed pipeline would replace the existing longer pipe. The risk of pipeline spill would be reduced as a longer, older pipe with development encroaching on the right of way would be replaced with a newer, shorter pipe on a better marked and clearer right of way.

#### 29.3.1 Key Comments from Working Group members

The Ministry of Environment stated that additional modelling is required for the North Arm tidal and meso-tidal Arm Channels, as well as the Moray Channel, since a break or rupture in the aviation fuel pipeline crossing could significantly impact the environment in these areas. The Proponent responded that, the proposed pipeline will be built to current regulations and modern standards, codes, materials and best management practices. The new pipeline will also have modern leak detection and automated leak response features to limit the potential for loss of fuel from the pipe. The likelihood of incident in the vicinity of the river is lower than for other areas of the pipeline corridor. These factors combine to greatly reduce risk and spill probability in the Moray Channel.

EAO notes that this modelling was not required in the final Application Information Requirements for the EA. EAO also notes the Proponent's willingness to further spill probability and mitigation analysis through the OGC permitting process is an industry best practice. EAO considers this issue resolved.

#### 29.4 Conclusion

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding), EAO and VFPA are satisfied that the proposed Project is not likely to pose a significant risk to environmental, social, economic, health or heritage resources due to a potential pipeline spill.

### **30 Accidental fire**

Chapter 15 of the Application identifies the potential for a fire at the proposed Project site during construction.

Potential sources of fire during operations could include:

- Fire on vessels;
- Fire at the marine terminal;
- Fire in storage tanks at the proposed fuel receiving facility;
- Fire within the delivery pipeline.

The Proponent notes that due to the high percentage of hard, asphalt surfaces and the

low percentage of vegetation and other organic fuel sources, the likelihood is very low.

To addition to meeting all legal requirements, EAO has recommended the following EA Certificate Conditions to further reduce the probability and consequence of an accidental fire:

- The fuel receiving facility would be self-contained and fire protection services from municipalities were not expected to be needed;
- The Proponent must prepare and implement a Fire Safety Plan in co-operation with the City of Richmond Fire Rescue, the Corporation of Delta Fire, and Provincial Emergency Services;
- The Proponent must install and maintain firefighting systems at the fuel receiving facility sufficient to protect aviation fuel transfer areas and storage tanks, including:
  - a high-expansion foam fire protection system connected to a fixed foam storage and dispensing unit;
  - auxiliary firefighting equipment;
  - automated fire detection systems; and
  - a perimeter fire hydrant system to provide access to water for tank deluge and firefighting.
- The Proponent must install and maintain fire-fighting systems at the marine terminal sufficient to protect aviation fuel transfer areas;
- The Proponent must test all fire prevention and response systems in accordance with applicable codes, guidelines, and best practices and report the test results to the City of Richmond Fire Rescue, the Corporation of Delta Fire, and Provincial Emergency Services, upon request; and
- The Operations Environmental Management Plan must include an accidents and malfunctions sub-plan.

The City of Richmond stated that the mitigation measures did not provide adequate measures to satisfy Richmond Fire Rescue that the proposed Project would be safe or sustainable. COR further stated that for all Acts, Regulations, City of Richmond Bylaws, standards and codes compliance pertaining to fire planning and protection and emergency response, Richmond Fire Rescue must be recognized as the authority having jurisdiction. It is EAO's view that the provincial EA process cannot assign jurisdiction to one entity over another. As a result, the responsibility and authority for fire protection cannot be changed and will remain with the entity possessing jurisdiction.

The City of Richmond also proposed a number of conditions for the EA Certificate, including a staffed fire hall and a fire boat. EAO is of the view that these conditions are not required for the EA.

Members of the public expressed concern regarding potential hazards of the proposed Project and suggested that a system safety analysis be conducted to identify the worst

case hazard footprints and risk areas. VFPA noted that that a Hazard Assessment for the Fuel Receiving Facility will be required as part of the proposed Project permit. VFPA also stated that that they would be requesting Fire Safety Plans and Emergency Response Plans as part of the Project Permit.

Based on the above analysis and having regard to the recommended conditions (which, if approved, would become legally binding as a condition of a certificate) EAO and VFPA are satisfied that the proposed Project is not likely to pose a significant fire risk to environmental, social, economic, health or heritage resources due to a potential fire.

## **PART E – ENVIRONMENTAL MANAGEMENT PROGRAMS AND COMPLIANCE REPORTING**

### **31 Environmental Management Program**

The objective of an Environmental Management Program is to minimize potential for environmental effects and other adverse effects throughout the lifespan of the proposed Project. The Proponent's Environmental Management Program would need to support compliance with all applicable legislation, as well as terms and conditions of all permits, approvals, or authorizations issued in relation to the proposed Project, including an EA Certificate, if issued.

The Proponent would submit their Construction Environmental Management (CEM) Plan and Operations Environmental Management (OEM) Plan to appropriate regulatory agencies and authorities for review and comment prior to implementation and would update those plans as necessary during the course of proposed Project construction or operations.

In addition to developing and implementing the CEM and OEM Plans, the Proponent would be responsible for the following key elements to achieve the required environmental compliance:

- Retain a suitably qualified and experienced individual or organization to provide environmental management services for the proposed Project. The position would have a variety of responsibilities, including, and not limited to:
  - Assisting with development and implementation of the CEM and OEM plans;
  - Overseeing and participating in environmental inspection or audit functions;
  - Overseeing and managing any issues relating to environmental monitoring; and
  - Generally co-ordinating and overseeing compliance with all environmental requirements.
- Verify environmental inspection and compliance monitoring for the construction phase;
- Process regulatory permits, approvals, or authorizations in a timely manner;
- Identify aspects of the proposed Project that require environmental monitoring and developing an appropriate monitoring schedule and effective allocation of contractor staff resources;
- Developing a CEM plan, for implementation upon commencement of the proposed Project's construction; and
- Developing an OEM Plan, which will identify any ongoing monitoring and reporting requirements following completion of construction, which will be implemented at the commencement of the proposed Project's operations.

The Proponent's contractor would be given authority to issue stop-work orders and/or, suspend any construction or operations activities associated with the proposed Project that are not in compliance with legislation, regulations, terms and conditions, permits, approvals, and authorizations, or that could lead to adverse effects. The Proponent's contractor would comply with the terms and conditions detailed in permits, approvals, and authorizations relating to the proposed Project.

The Proponent's contractor will retain a suitably qualified environmental monitor to provide on-site monitoring services during all construction activities identified as having the potential for adverse environmental effects. The environmental monitor would:

- Be responsible for the contractor's environmental performance;
- Supervise day-to-day monitoring and reporting activities; and
- Provide technical input for adaptive management of the proposed Project, as appropriate.

The contractor will give written authorization to the environmental monitor, giving the environmental monitor the power to halt work if non-compliance or environmental harm is imminent or has occurred during construction.

For a full description of the contractor's responsibilities, please see section 9 of the Application.

### 31.1 Construction Environmental Management Plan

Environmental protection will be the primary focus for the CEM Plan. The CEM Plan will address:

- Applicable Proponent conditions;
- Regulatory requirements;
- Roles and responsibilities;
- Applicable BMPs;
- Monitoring and reporting requirements; and
- Contact information.

The CEM Plan will include a number of management plans, including those identified in Table 43. The Proponent will also have a separate Traffic Management Plan. Health and safety would be managed separately in the contractor's Construction Site Safety Manual, described further below.

**Table 43. Management plans included in the Proponent's CEM Plan**

<b>Management Plan</b>	<b>Purpose</b>
<b>Accidents or Malfunctions</b>	Provides measures to prevent, respond and mitigate impacts in the event of an accident or malfunction <sup>224</sup> .
<b>Air Quality and Dust Control</b>	Provides measures to prevent, control or mitigate fugitive dust and other airborne emissions associated with vehicle and equipment operation, demolition or decommissioning of existing structures, stockpiling of soils, and other construction activities would be included.
<b>Archaeological</b>	Provides requirements for the Proponent to develop strategies to identify additional assessment requirements for the proposed Project and applicable mitigation measures, monitoring/reporting <sup>225</sup> requirements and roles and responsibilities.
<b>Contaminated Sites</b>	Outlines additional investigations required prior to purchase or remaining land or disturbance of soils, as well as management strategies for specific contaminants that may be encountered during construction, or contamination that may occur as a result of construction activities.
<b>Directional Drilling Planning and Execution</b>	Describes BMPs to mitigate potential effects of directional drilling under Highway 99 and the Moray Channel at the entrance and exit locations, in accordance with the Planning Horizontal Directional Drilling for Pipeline Construction Guidelines (Canadian Association of Petroleum Producers 2004), and the federal <i>Fisheries Act and Navigable Waters Act</i> , as well as other applicable jurisdictional requirements.
<b>Environmental Education and Awareness Plan</b>	Clarifies the responsibilities of all parties involved in the construction of the proposed Project. Objectives, roles, responsibilities, delivery mechanisms, and information requirements to inform and engage proposed Project personnel about environmental issues, regulatory requirements, BMPs, and emergency and spill response procedures would be included, as well as provisions for an initial orientation session and periodic sessions subsequent. Measures and information described would be continually reviewed and modified to reflect current and planned construction activities.
<b>Environmental Monitoring Plan</b>	Identifies relevant BMPs for construction to be implemented by an independent environmental monitor and includes potential effects and mitigation and the monitoring activities required to fully evaluate construction performance and environmental protection.
<b>Surface Water Quality / Fisheries Protection and Sediment Control Plan</b>	Describe sediment control measures to be implemented prior to, during, and subsequent to construction, and would be consistent with the standards and best practices. A key objective of the plan would be to prevent or minimize erosion and the sedimentation of water courses in the vicinity of the proposed Project construction sites. Water quality monitoring, including parameters to be sampled, duration and frequency of sampling would also be described. Fisheries-specific protection practices would include protocols for in-water construction, protocols to mitigate potential acoustic effects, protocols for watercourse crossings, monitoring and reporting.
<b>Fuels, Chemicals and Materials</b>	Prior to construction, identifies strategies for the storage, handling and final disposal of fuels, chemical, and materials. Consistent with the MOE's <i>Environmental Management Act</i> and MOE's Field Guide to Fuel Handling, Transportation and Storage. Site-specific

<sup>224</sup> Including adherence to the Construction Site Safety manual, Traffic Management Plan, Spill Prevention and Emergency Response Plan (construction) and the Spill Prevention, Preparedness, and Emergency Response Plan (operations)

<sup>225</sup> Protocols and actions to be implemented in the event of an archaeological finding would be described, including involvement of First Nations.

<b>Storage and Handling Plan</b>	protocols, monitoring, education and awareness training and spill procedures will be included.
<b>Noise</b>	Provides noise management strategies to identify proposed Project activities that would result in elevated noise levels and site-specific measures to mitigate related adverse effect to residents and businesses.
<b>Spill Prevention and Emergency Response Plan</b>	Applies for any potential environmental emergency related to the loss of hydrocarbon-based or other hazardous or deleterious, materials related to construction. Information about a spill conveyed through the notification process to contractor personnel, the Proponent, regulatory agencies, would be clear, concise, accurate, and timely.
<b>Vegetation and Wildlife</b>	Includes management strategies to address vegetation and wildlife, including measures to minimize disturbance (such as work windows, set-backs, salvation of existing vegetation or wildlife, and protective fencing).
<b>Waste</b>	Includes strategies for managing solid and liquid wastes, and would address how all construction debris and non-hazardous waste would be managed to ensure compliance with the provincial <i>Environmental Management Act</i> . Also includes measures for managing hazardous wastes, including handling, storage, transportation and disposal of any hazardous waste materials generated during the proposed Project construction phase.

## 31.2 Construction Safety Manual

The objective to the Construction Site Safety Manual would be to maintain safe working conditions and promote safety awareness to all personnel working or attending onsite during construction. The Construction Site Safety Manual would include:

- Specific procedures and protocols to mitigate health and safety hazards on the work site with reference to WorkSafeBC regulations;
- Health and safety and emergency response procedures, including instructions on the use of personal safety devices, personal protective equipment, and spill response equipment;
- WHMIS training;
- Descriptions of measures to be taken to maintain air quality, visibility, and safe conditions during the use of private and public roadways and adjacent areas;
- Measures to maintain all work areas to promote environmental protection and worker safety;
- Descriptions of equipment operation, signage and site security measures to protect public safety and prevent vandalism;
- On-site communications strategies, including the Marine Communication Plan to communicate with the Harbour Master's office, Canadian Coast Guard and the Vancouver marine Communications and Traffic Services Centre;

The Construction Site Safety Manual would be integrated with other topics of the CEM Plan. Separate communications strategies would be developed to describe procedures to be followed to keep public and proposed Project area businesses informed about the

nature and location of upcoming construction activities as well as temporary road closures or delays.

### 31.3 Traffic Management Plan

Given the challenges associated with pipeline construction, particularly along busy transportation corridors, the Proponent will be required to develop a traffic management plan.

The Traffic Management Plan would include:

- An appropriate schedule for construction, in consideration of key times to minimize potential impacts to traffic and pedestrians;
- Tools to manage traffic, pedestrians, parking and noise;
- Safety measures;
- Communication for members of the public, government agencies and First Nations to be kept informed of construction progress.
- Incident management plan;
- Implementation Plan to identify responsibilities and procedures for development and implementation of the traffic management component plans in a coordinated manner as well as identify qualifications, duties and responsibilities for supervisory and management personnel responsible for implementing the Traffic Management Plan.

### 31.4 Operations Environmental Management Plan

The Proponent would also be required to develop an OEM Plan prior to the commencement of operations. The Proponent's OEM Plan would contain environmental protection plans or measures to address foreseeable operations requirements and procedures with environmental risk, and would be implemented following consultation with regulatory agencies, authorities and other relevant stakeholders. The Proponent's OEM Plan would describe activities involved in post-construction follow-up monitoring and fulfilling any agency or authority reporting requirements. The Proponent's OEM Plan would be used with the Proponent's Operations and Maintenance Manual to manage operations for the proposed Project.

The environmental protection plans or management strategies to be contained within the Proponent's OEM Plan would require input from industry experts and would be developed once detailed design and much of proposed Project construction had been completed. The Proponent's OEM Plan would address post-construction monitoring and reporting requirements for EAO and VFPA.

The Proponent expects to include the following environmental protection plans or management strategies in their OEM Plan:

- Accidents or Malfunctions Plan;
- Communications Plan;
- Solid, Liquid and Hazardous Wastes Plan;
- Training Program;
- Fire Safety Plan; and
- Spill Prevention, Preparedness and Emergency Response Plan.

In addition to the Proponent's OEM Plan, the Proponent would develop a comprehensive Marine Terminal Operations and Maintenance Manual and Pipeline Systems Operations and Maintenance Manual, in consultation with the appropriate regulatory agencies prior to commencement of operations.

### **32 Compliance Reporting**

The EA Act (Part 5, Section 34) details the steps the Minister of Environment may take if a Proponent fails to comply with the terms of their EA Certificate. The Minister of Environment has broad powers to order that construction or operation cease on the proposed Project, either partly or completely, at his or her discretion, until the proponent has complied with the EA Certificate's terms. The Minister of Environment may also suspend, cancel or amend a certificate for a variety of reasons. The Act (Section 41 and 43) defines offences and specifies maximum fines and imprisonment times for those offences.

Section 9.3 of the Application outlines the Proponent's plans for environmental inspections and compliance monitoring, including the role of an independent environmental monitor who will be responsible for the management and reporting of the Proponent's Contractor's environmental performance.

As part of the EA Certificate, the Proponent must submit reports to the Executive Director on the status of compliance with the Conditions of the EA Certificate, and the Conditions in Schedule B, at a specified time prior to significant surface disturbance during construction, and at a specified time prior to full scale operation of the proposed Project.

Such reports would also be made available to the members of the public, and be posted on EAO's website.

## **PART F – CONCLUSIONS**

### **34 Conclusions**

Based on:

- Information contained in the Application, Highway 99 Addendum and other supporting material;
- The Proponent's efforts at consultation with First Nations, the Tsawwassen First Nation, government agencies, including local governments, and the public;
- Comments on the proposed Project made by participating First Nations and the Tsawwassen First Nation and government agencies, including local governments, and the Proponent's responses to these comments;
- Comments on the proposed Project received during the public comment period, and the Proponent's responses to these comments;
- Issues raised by participating First Nations and the Tsawwassen First Nation regarding potential impacts of the proposed Project and the Proponent's responses and best efforts to address these issues; and
- Commitments, mitigation measures and proposed EA Certificate Conditions, to be undertaken by the Proponent during the construction, operation, and decommissioning of the proposed Project, if approved.

EAO and VFPA are satisfied that:

- The environmental assessment process has adequately identified and assessed the potential significant adverse environmental, economic, social, heritage and health effects of the proposed Project;
- Consultation with First Nations and the Tsawwassen First Nation, government agencies, and the public, and the distribution of information about the proposed Project have been adequately carried out by the Proponent;
- Issues identified by First Nations and the Tsawwassen First Nation, government agencies and the public, which were within the scope of the environmental assessment, were adequately and reasonably addressed by the Proponent during the review of the Application and supporting material;
- Practical means have been identified to prevent or reduce any potential negative environmental, social, economic, heritage or health impacts of the proposed Project such that no direct or indirect significant adverse effect is predicted or expected; and
- The potential for adverse effects on the First Nations and the Tsawwassen First Nation uses of the proposed Project area has been avoided or minimized to an acceptable level.

EAO is satisfied that the provincial Crown has fulfilled its obligations for consultation and accommodation to First Nations relating to the issuance of an EA Certificate for the proposed Project.

VFPA is satisfied that the duty to consult with First Nations has been fulfilled for this harmonized environmental assessment for the proposed Project.

The provincial Minister of Environment and the Minister of Energy, Mines and Natural Gas will consider this Assessment Report and other accompanying materials in making their decision on the issuance of an EA certificate to the Proponent under the Act.

The VFPA will consider this Assessment Report and other accompanying materials in making their decision and determining if carrying out of the proposed Project is likely to cause significant adverse environmental effects.