

# Chapter 6

## Assessment of Social and Economic Effects



## 6 ASSESSMENT OF SOCIAL AND ECONOMIC EFFECTS

### 6.1 Introduction

This chapter assesses the potential social and economic effects of Project construction and operations, and describes recommended mitigation measures to eliminate or reduce potential effects to an acceptable level. Potential residual effects are identified, following the implementation of mitigation measures, and their significance evaluated. The assessments of social and economic effects are the second and third pillars of assessment required by the EAO, respectively, and meet the federal requirements for the assessment of environmental effects and environmental changes. The assessment was prepared by Pierce Lefebvre Consulting.

General background to the biophysical environment and land use within the vicinity of the Project is provided in **Section 2.7**. This chapter provides details on specific social and economic baseline conditions relevant to the assessment.

Characterizing baseline conditions enables VCs to be identified and evaluated in the assessment of potential effects. General methodology used for the selection of VCs is described in **Section 4.4.1**, with a specific rationale regarding the selection of each VC provided in the assessment.

A discussion of potential cumulative impacts is included to meet the EAO's requirements. Potential cumulative environmental effects are addressed in **Chapter 22** to meet the federal requirements under the CEAA.

The assessment focuses on the City of Richmond, the Corporation of Delta and the South Arm of the Fraser River, but also considers Metro Vancouver, B.C. and Canada where broader social and economic effects are expected.

Existing information was reviewed to determine the social and economic baseline conditions. Additional issues relevant to the assessment were included as identified by stakeholders during consultations. The assessment highlights socio-economic indicators which may be affected by the Project.

To meet the EAO's summary of effects requirements **Section 6.7** provides an overall tabulated summary of all potential social and economic effects described in this chapter, recommended mitigation, and potential residual effects and their significance. A summary of all potential effects of the Project, recommended mitigation, potential residual effects and their significance, is provided in **Chapter 23**.

## 6.2 Approach and Methodology

The assessment was undertaken for a preliminary pipeline reference alignment and possible alignment alternatives for the 15 kilometre fuel delivery pipeline to YVR. Since the assessment was completed, VAFFC has refined these alignment options and identified a preferred route for consultation that includes the soon to be decommissioned CNR rail right-of-way between Williams Road and Bridgeport within the Shell Road corridor. The preferred pipeline route, as described in **Section 2.4.4.3**, is, therefore, fully encompassed within the alignments presented and assessed in this chapter.

### 6.2.1 Objectives and Scope

The objective of this assessment is to present a combined socio-community and socio-economic assessment in accordance with the AIR. The scope of this assessment includes providing a general understanding of how construction and operations of the Project may affect the local economy and surrounding communities, businesses, residents, property owners and other stakeholders. The scope also comprises an account of who may be affected by the Project and what measures might be taken to mitigate any potentially significant adverse effects.

### 6.2.2 Spatial and Temporal Boundaries

#### 6.2.2.1 *Spatial Boundaries*

To address effects for which a reasonably direct causal link to the Project could be demonstrated, potential effects were identified and evaluated with respect to a LSA encompassing the City 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 metropolitan setting of this Project engenders high value, high use of parks, recreation and place of worship facilities, because these community and regional assets are readily accessible to the large population of Metro Vancouver. Where the Project is expected to have broader social and economic implications for Metro Vancouver, a broader RSA is considered when assessing potential effects. Moreover, the socio-economic and socio-community assessment considers the broader significance of the Project to YVR, B.C. and Canada.

#### 6.2.2.2 *Temporal Boundaries*

With the exception of the cumulative impact assessment (see **Section 6.6**), which considers other past, present and future foreseeable projects and activities, the

temporal context for the assessment was limited to 18 to 24 months for Project construction and over a design life of at least 60 years for Project operation.

### **6.2.3 Methodology Framework**

The methodology framework used to identify and assess socio-economic and socio-community effects associated with the Project included the following steps:

1. Characterizing baseline socio-economic and socio-community conditions in the LSA and RSA
2. Identifying key values/indicators for assessing potential effects of the Project from a social and economic perspective (i.e., determining assessment VCs)
3. Identifying potential effects of the Project
4. Recommending mitigation measures to avoid or eliminate any adverse effects of the Project
5. Identifying any potential residual effects and evaluating their significance
6. Identifying any cumulative impacts

The assessment also considers the timing and reversibility of potential effects and the level of uncertainty associated with assessment findings.

In some cases, potential effects on VCs, such as noise and air quality, are also addressed in detailed assessments presented in other sections and chapters of the Application.

The establishment of the baseline setting and quantitative assessment findings with respect to the potential effects of the Project on VCs is primarily based on information presented in existing reports and documents. Additional information regarding potential socio-community and socio-economic effects will be identified during the course of ongoing consultation with the public and stakeholders and engagement with involved First Nations. All such information will, in turn, help to inform the Project's detailed design and implementation processes. In cases where specific information is not yet available or is not expected to become available, a more general qualitative assessment is provided.

#### **6.2.3.1 Data Collection and Review**

Information regarding quantitative values and indicators descriptive of social conditions in the Project area, including demographics, current and forecast population levels, employment and unemployment rates, labour supply/labour force context, traffic

volumes, and the numbers and types of dwellings, businesses and other types of establishments located in proximity to the Project facilities, were collected and reviewed based on published reports, Census Canada data and other existing sources.

Land use designations and municipal zoning in upland areas on and adjacent to Project sites were identified based on a review of the City of Richmond's Official Community Plan and Port land use plans. Information regarding land use, including the relative location of the Project facilities to designated parks, trails and recreational areas, as well as schools, hospitals and other institutions, was identified based on existing information and the results of site visits. Motor vehicle traffic patterns in the vicinity of Project facilities were reviewed based on publicly available data. Publicly available information pertaining to commercial and recreational river use including catch data for the Fraser River-based fisheries, and marine traffic on the South Arm of the Fraser River within the jurisdiction of the Port, was collected and reviewed.

Information relating to Project construction and operation parameters that will determine economic costs and benefits, including the potential person years of employment associated with each Project phase, was also collected and reviewed.

The relationship between the existing and proposed fuel delivery systems, and current and future operations at YVR, was examined.

#### **6.2.4 Selection of Valued Components**

VCs for this assessment were identified through the characterization of socio-economic and socio-community baseline conditions. Effects from the Project are reflected through socio-economic indicators, which was an important consideration in the determination of VCs. Community aspects of high social and/or economic importance were also an important consideration in the determination of VCs. VCs were identified based on the professional judgement of the study team and are identified in **Section 6.3.5**.

#### **6.2.5 Determination of Significance of Potential Residual Effects**

The overall nature and significance of any residual effects (i.e., adverse effects remaining following implementation of mitigation measures) are assessed using the attributes defined in **Table 6.2.1**.

**Table 6.2.1 Attributes Used to Assess the Significance of Potential Residual Effects**

<b>Criterion</b>	<b>Rating</b>	<b>Definition</b>
<b>General</b>	N/A	Not applicable
<b>Direction</b>	Positive	Improvement relative to baseline conditions
	Neutral	No measureable change relative to baseline conditions
	Negative	Adverse effect relative to baseline conditions
<b>Magnitude</b>	Negligible	Either minimal effects, or negative effects are offset by positive effects; may not be neutral for every segment
	Low	Not significant/noticeable in general context and/or low effect in relevant geographic area
	Moderate	Noticeable in general context and/or in relevant geographic area
	High	Significant or very significant effects in general context and/or in relevant geographic area
<b>Geographic Extent</b>	Site	Only areas within the Project footprint are affected
	Local	Areas within the City of Richmond will be affected
	Sub-regional	Areas within the southwest corner Metro Vancouver region will be affected
	Regional	Areas within the entire Metro Vancouver region will be affected
	Global	There will be a global effect associated with this residual effect

Criterion	Rating	Definition
<b>Duration</b>	Short-term	Restricted to the construction phase
	Medium-term	Within one to five years post-construction
	Long-term	Beyond five-year post-construction benchmark
<b>Frequency</b>	Once	Occurs only once
	Infrequent	Sporadic, with no predictability
	Intermittent	Occasionally, but predictable repetition
	Frequent	Occurs repeatedly
	Ongoing	Occurs continuously
<b>Reversibility</b>	Reversible	The valued component is expected to recover from the residual effect
	Irreversible	The effect is permanent
<b>Probability (i.e., the likelihood that an adverse effect will occur)</b>	Uncertain	
	Low	
	Moderate	
	High	

### 6.3 Baseline Conditions

This section describes the general social and economic context of the Project within the City of Richmond. It also describes the social and economic setting of the Corporation of Delta; YVR operations, of which the Project will be a significant component; key community features in close proximity to Project components; and shipping, fishing and shoreline activities on the lower Fraser River. Note that information regarding First Nation communities and traditional land use are provided in **Part C**.

## 6.3.1 Population and Communities

### 6.3.1.1 City of Richmond

Incorporated as a municipality in 1879, the City of Richmond has a current population of 190,357, which includes an estimate of census undercount (City of Richmond 2008). It is the fourth largest municipality in Metro Vancouver after Vancouver (approximate population 580,000), Surrey (395,000) and Burnaby (200,000).

Historically, long before the first European settlers came to the area as farmers in the 1860s, the islands of the Fraser Delta were occupied by Coast Salish First Nations (City of Richmond 2009). Soon after European settlement, the commercial fishing industry became an important local economic contributor supported by fish processing industries, marina operations, boat building and repair, retail sales, and other services. The village of Steveston in south Richmond gained international fame for the production and overseas shipments of large amounts of canned salmon. The growth of the fishing industry attracted Japanese fishermen and Chinese contract workers to Richmond, some of whom originally came to B.C. to build the Canadian Pacific Railway (City of Richmond 2009).

Richmond's growth has also been closely linked with the establishment and growth of YVR. The first aircraft flight in B.C. was made from the Minoru Racetrack in Richmond, and the first airport in the Vancouver area was located on Lulu Island. In 1931, the airport moved to its current location on Sea Island. The City's proximity to YVR has helped it attract a large number of manufacturing and high technology industries which contribute to the City's vibrant economy. The airport is also a significant contributor to Richmond's industrial tax base, contributing \$22 million per year in tax revenues to municipal governments of which \$11.8 million are in grants in-lieu of taxes (Vancouver Airport Authority 2006).

Other industries important to Richmond's economy include agriculture (172 farms, including cranberry and blueberry farms), wholesale and distribution, retail sales, Asian market retailing, and tourism and visitor services. Farms within the City of Richmond have total gross receipts of \$40.5 million (Statistics Canada 2006). Richmond also has a strong high technology sector with major employers that include MacDonald, Dettwiler and Associates Ltd. and Sierra Wireless Inc. (City of Richmond 2008). Richmond has 8.2% of Metro Vancouver's population and 7.9% of Metro Vancouver's labour force (based on 2006 Census Canada data, as reported in Metro Vancouver (2008a)). In 2006, 108,095 jobs with a fixed place of work were located in Richmond (excluding jobs like taxi drivers and contractors that are not associated with a fixed place of work). Of these jobs, some 49.5% were filled by Richmond's local labour force. Between 1996 and 2006 the number of jobs located in Richmond increased in several census tracts including those at YVR on Sea Island and along the South Arm of the Fraser River. The

360 companies and organizations based at YVR support 26,700 direct jobs. Approximately 6,000 airport employees live in the City of Richmond. Employment in other areas, such as Richmond's west shore waterfront, has declined. Changes in the number of jobs in Metro Vancouver, including Richmond, between 1996 and 2006 are shown in **Figure 6.3.1**.

Richmond has a slightly older population, with a higher percentage of university-educated people, than the Metro Vancouver average. Although median income is somewhat lower than the Metro Vancouver regional average, the unemployment rate is about the same (based on 2006 Census Canada data). Demographic statistics for Richmond, Delta and Metro Vancouver are shown in **Table 6.3.1**.

**Table 6.3.1 Selected Demographic Statistics for Richmond, Delta and Metro Vancouver**

	Richmond	Delta	Metro Vancouver
<b>Population (2006 Census Canada) - Not Adjusted for Census Undercount</b>			
1991	126,624	88,978	1,602,502
1996	148,867	95,411	1,831,665
2001	164,345	96,950	1,986,965
2006	174,475	96,740	2,116,581
<b>By Gender (2006)</b>			
% Male	48.0%	49.1%	48.8%
% Female	52.0%	50.9%	51.2%
<b>% by Age Group (2006):</b>			
Under 20 Years	22%	26%	23%
20 to 64 Years	65%	61%	64%
65+	13%	13%	13%
Total	100%	100%	100%
Median Age	40.7	41.0	39.1
<b>Income (2006 Census Canada)</b>			
Median Family Income (all Census Families)	\$61,627	\$84,553	\$64,332
Average Individual Income (All Returns 2005)	\$31,720	\$42,942	\$37,095
Labour Force (2006 Canada Census)	92,475	53,105	1,169,720

	Richmond	Delta	Metro Vancouver
Unemployment Rate (2006):	5.7%	4.7%	5.6%
% of Population (19 to 64) Receiving Employment Insurance and Basic Income Assistance Benefits (excluding maternity and disability benefits) - September 2008	1.3%	1.5%	1.9%
<b>Jobs with Fixed Place of Work Filled by Local labour Force</b>			
Total Jobs with a Fixed Place of Work- 2006	108,095	46,910	977,615
Total Jobs with a Fixed Place of Work - 1996	89,955	37,105	828,395
Jobs Filled by Local Labour Force - 2006	53,455	18,715	537,275
Jobs Filled by Local Labour Force - 1996	43,760	16,035	438,510
% Filled by Local Labour Force - 2006	49.5%	39.9%	55.0%
% Filled by Local Labour Force - 1996	48.6%	43.2%	52.9%
<b>% Educational Attainment for Population of 25 - 64 (2006 Canada Census)</b>			
No certificate; diploma or degree	9.0%	9.7%	10.1%
High school certificate or equivalent	24.7%	28.0%	24.0%
Apprenticeship or trades certificate or diploma	7.4%	10.9%	9.4%
College; CEGEP or other non-university certificate or diploma	17.6%	21.7%	18.7%
University certificate, diploma or degree	41.3%	29.7%	37.8%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Based on data collected from several sources including: 2006 Census Canada as reported in: Greater Vancouver Regional District (GVRD) (2007); Metro Vancouver (2008); and B.C. Stats (2009).

### **6.3.1.2 Corporation of Delta**

Delta has a population of 96,740 (GVRD 2007), including North Delta (approximate population 51,625), Ladner (21,115), Tsawwassen (20,935), and rural areas (3,065) according to 2006 Census Canada data (Corporation of Delta 2009b). Note that these population estimates have not been adjusted to account for census undercount.

According to the Corporation of Delta's website (2009a), archaeological evidence indicates that First Nations occupied seasonal settlements near the Alex Fraser Bridge over 8,000 years ago, and along the Strait of Georgia approximately 4,000 years ago. Early European settlers arrived in the 1860s, including the Ladner brothers who first settled in the area in 1868. In 1873, James Deas established a cannery at present-day Deas Island, and in 1879, Delta was given its name with the community of Ladner being designated at its administrative centre (Corporation of Delta 2009a).

Delta has a diversified economy with significant employment in the transportation, manufacturing, agriculture, retail sales, and tourism sectors. Major employers include Deltaport (TSI Terminal Systems Inc.), Westshore Terminals Inc., British Columbia Ferry Services Inc. (B.C. Ferries), Annacis Auto Terminal and the Boundary Bay Airport. Delta supports 180 farms with total gross receipts of \$190 million, in comparison to the City of Richmond's \$40.5 million produced by a similar number of farms (Statistics Canada, 2006 Census of Agriculture). Although the commercial fishing industry has declined in recent years, many fishing boats continue to moor in Delta.

Compared to the Metro Vancouver regional average, Delta residents tend to be slightly older, and earn higher incomes. Delta has 4.6% of Metro Vancouver's population and 4.8% of Metro Vancouver's employed labour force with a fixed place of work (Metro Vancouver 2008a).

## **6.3.2 Community Features**

Both Richmond and Delta contain a large number of parks, recreation areas and other community features. Community features located in close proximity to the Project facilities, including the preliminary pipeline reference alignment and possible routing alternatives, as well as the South Arm of the Fraser River, are described below.

### **6.3.2.1 Land-Based Community Features**

Land-based community features that are located adjacent or in close proximity to the marine terminal and/or proposed fuel receiving facility, preliminary pipeline reference alignment and possible routing alternatives include:

- **Riverport Recreation and Entertainment Complex:** Located at No. 6 Road and Steveston Highway in Richmond, approximately 1 kilometre east of the marine terminal location, this complex includes a 19-screen cinema complex, a large aquatic centre, a six-rink arena facility, a hotel, a 40-lane bowling centre, a children's indoor play centre, and various other amenities and restaurants.
- **Richmond Nature Park:** Located near No. 5 Road between Westminster Highway and Alderbridge Way, Richmond Nature Park offers a network of walking trails and nature areas as well as an interpretive centre and a playground. Richmond Nature Park reports 95,000 annual visits including estimates for casual and program attendees (Bauder K. 2009, pers. comm.).
- **Shell Road Trail:** Shell Road Trail is a bicycle and walking trail that runs north/south along the Shell Road corridor. Between Horseshoe Slough and Westminster Highway, both sides of the trail are occupied by tall trees and mature shrubs, making it a unique trail experience in urban Richmond. For most of the section along Shell Road between Westminster Highway and the Bridgeport Trail, the trail remains a dedicated bicycle/walking trail. While shrubs and trees occur along the east side of the trail through this area, it is located in close proximity to a roadway and motor vehicle traffic. The City of Richmond's Cycling Network Plan recognizes Shell Road as a major cycling route (City of Richmond 2010b). The City maintains only very limited data with respect to trail use. On February 25, 2005, on Shell Road Trail between Williams Road and Steveston Highway, the City recorded nine bicycles and 12 pedestrians between 07:00 and 09:00, and 22 bicycles and 22 pedestrians between 16:00 and 18:00 (Caravan J. 2009, pers. comm.). More extensive trail use data for this and other trails in Richmond are not available.
- **Bridgeport Trail:** Bridgeport Trail located between Shell Road and Great Canadian Way is a heavily used bicycle and walking trail lined with tall trees and/or green shrubs for most of its length. Bridgeport Trail is a popular community feature of urban Richmond.
- **Mylora Golf Courses:** "Mylora on Five" is an 18-hole executive golf course located on No. 5 Road north of the Williams Road right-of-way, and "Mylora on Sidaway" is an 18-hole executive course located on Sidaway Road also north of Williams Road (Mylora Golf Courses 2010).
- **River Rock Casino Resort:** Located at 8811 River Road along the North Arm of the Fraser River in Richmond, the River Rock Casino Resort includes a hotel, an entertainment centre, a marina, a conference centre and a parkade.

- **Other Community Gathering Places:** Various community gathering places are located in close proximity or adjacent to the preliminary pipeline reference alignment and possible routing alternatives. These include places of worship and church-sponsored schools on No. 5 Road; a day care/pre-school on No. 5 Road between Kingsbridge Drive and Blundell Road; and an elementary private school and church at the northeast corner of Blundell and No. 5 Road.

### ***6.3.2.2 Fraser River Estuary and Marine-Based Community Features***

The Fraser River estuary is one of the largest estuaries along the west coast of North America. The estuary is a globally significant ecosystem produced by the confluence of the Fraser River with the Strait of Georgia. It contains rich habitats for many species of fish and wildlife and its marshes “support millions of migrating salmon at a critical stage in their early development before they migrate out to sea, and act as a staging area for adult upstream spawning migration.” Also, “the estuary provides an important food source and resting-place for migratory birds on the Pacific Flyway.” (FREMP 2006).

Fraser River Estuary Management Program (FREMP) also recognizes the importance of the Fraser River estuary for recreation. In 2006, FREMP reported an increase of 38.7 kilometres in the total length of recreation corridors along the shorelines of the Fraser River estuary, which includes the South and North arms of the Fraser River, as well as Pitt River, Pitt Lake and the Fraser River as far upstream as Kanaka Creek (FREMP 2006). This increase includes a trail along the waterfront in the Imperial Landing area in Richmond, east of Steveston Village, a new trail adjacent to Deas Slough in Delta, as well as new corridors in Coquitlam, New Westminster, Surrey and Pitt Meadows.

**Table 6.3.2 Recreational Corridors along the Fraser River Estuary in Metro Vancouver**

Length of Recreational Corridors along the Shoreline of the Fraser River Estuary in Metro Vancouver		
Year	Total Length (km)	Increased Length (km)
1985	108	
2000	141.8	33.8
2005	146.7	4.9
<b>Total Increase</b>		<b>38.7</b>

Note: Recreation corridors include waterside paths, paths on dykes and walkable beaches. They exclude roads along the estuary, areas of recreational use where there is no access along the waterfront (like Westham Island) and conservation reserves where access is restricted.

Source: FREMP (2006).

Marine-based parks, recreation areas and community features in the Fraser River estuary that are in close proximity to the vessel transit route between Sand Heads and the marine terminal include:

**South Arm of Fraser River – Richmond’s South Shore:**

- **Garry Point Park and features along Richmond’s waterfront in Steveston Harbour:** This area includes the Gulf of Georgia Cannery National Historic Site, Steveston Historic Fishing Village, Imperial Landing Park, Britannia Heritage Shipyard, the No. 2 Road Fishing Pier, Gilbert Beach /Blair Point Park, and the No. 3 Road Fishing Pier and Waterfront Park. These features are discussed in more detail in **Table 6A-1** in **Appendix 6A**.
- **Finn Slough (also called Gilmour Slough):** This is a historic slough settlement of older buildings and houses on piles in a marsh habitat setting, approximately 1 kilometre in length. At the foot of No. 4 Road, Finn Slough separates Whitworth Island (also called Gilmour Island) from Lulu Island. Finn Slough was established in the early 1890s by a group of Finnish settlers who started clearing land and building fishing boats around that area. At that time, dykes were not sufficient to keep the river off the land and houses were built on pilings to protect them from high tides (Dorrington 2009). Every March for the past nine years, an art show featuring artists and art inspired by Finn Slough has been organized by the Finn Slough Heritage and Wetland Society.

- **Woodward's Landing and the Horseshoe Slough Trail:** Woodward's Landing Park (Scout Camp Park) is a 2.5 hectare (6.25 acre) park that is located one block east of No. 5 Road on the north side of the Dyke Road. Near the Park's entrance is Horseshoe Slough Trail which connects the waterfront to the Shell Road Trail (City of Richmond 2010a).

#### **South Arm of the Fraser River – Islands along Richmond's South Shore:**

- **Shady Island (Steveston Island):** Although it was originally created through placement of dredgate spoils, this island has become a popular natural area that supports a combination of forest, low sand dunes and salt marsh habitats, including habitat for nesting birds such as bald eagles and a variety of waterfowl species.
- **Don and Lion Islands Regional Legacy Site:** This site is part of the Fraser River Islands Reserve and includes two islands near the north shore of the Fraser River between No. 9 Road and Graybar Road in Richmond, slightly west of Annacis Island. Lion Island was once the site of a major cannery and both islands are part of Metro Vancouver's network of regional parks. Beach areas front Don Island during low tides.

#### **South Arm of the Fraser River – Delta's North Shore, including Adjacent Islands:**

- **Westham Island/Alaksen National Wildlife Area and George C. Reifel Refuge/National Migratory Bird Sanctuary:** Located in Delta, this area is at the westernmost point of the south shore of the South Arm and includes approximately 586 hectares (1,448 acres). Lands on Westham Island and the adjacent Reifel Island include cultivated farmland (70%), freshwater and tidal marsh wetlands (15%), woodland or grassland (5%) and built-up or barren shore flats (5%). (Environment Canada 2001). Westham Island also includes an Environment Canada research station. The area is a major Pacific Flyway site for migratory waterfowl and shorebirds and includes managed wetlands, natural marshes and low dikes. It was designated as a Ramsar Wetland site in 1982, one of approximately 1,855 such sites in the world<sup>1</sup>.

The George C. Reifel Refuge/National Migratory Bird Sanctuary located on Westham Island is managed by the B.C. Waterfowl Society which has approximately 2,000 members. The fall migration period, from October to early December, is the best time to view large flocks of waterfowl including snow geese. The Sanctuary reported 70,379 visitors in 2009 up from 66,489 visitors in 2008, including visits by

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<sup>1</sup> The Ramsar Convention, named after the town of Ramsar in Iran where it was adopted in 1971, is an international treaty for the conservation and sustainable utilization of wetlands.

members and single-day visitors (entrance fees are \$5 per adult and \$3 per child and individual annual membership fees that provide unlimited entry into the Sanctuary are \$25). (Raffan V. pers. comm. 2010).

- **The South Arm Marshes Wildlife Management Area:** The South Arm Marshes Wildlife Management Area, located along the south shore of the South Arm, includes seven main islands surrounded by both freshwater and intertidal marshes, including Ladner marsh and Ladner lagoon. The Wildlife Management Area includes the 3.7 kilometre long Woodward Island Wall, constructed between 1922 and 1928 and extended in the 1930s to stabilize the south bank by preventing the migration of the main navigation channel. The 937 hectare (2,315 acres) site primarily consists of marsh areas and is a popular area for various recreational activities including kayaking, canoeing, water skiing, recreational fishing and wildlife viewing. One of the main islands, Kirkland Island, is approximately 2.4 kilometres long and includes a government dock. Various projects to elevate dikes, mitigate flooding, and enhance wildlife habitat and intertidal environments have been undertaken on Kirkland Island and the adjoining Rose Island (B.C. Wildlife Watch 1996).
- **Deas Island Regional Park:** This is a 121 hectare (300 acre) regional park with a group camping facility, a public boat launch and access to Deas Slough, the Delta Deas Rowing Club Boathouse, approximately 5 kilometres of trails, and a wildlife viewing tower. Deas Island is a popular location for recreational uses such as cycling, walking, wildlife viewing and recreational fishing. The park also includes three historic buildings: Burrvilla, a stately Victorian home; Inverholme, a one-room schoolhouse that can be rented for social functions; and the Delta Agricultural Hall. All three buildings were relocated from elsewhere in Delta. Deas Island Regional Park records approximately 290,290 visits per year (2008 data) (Greenwood S. pers. comm. 2009).
- **Ladner Harbour Park:** This park includes a large picnic area, walking and bicycle trails, a playground and notable viewpoints of the working harbour. The Millennium Trail is accessible from the north end of the park. Ladner Reach, on the south side of Ladner Harbour Park is a popular area for recreational boating, including kayaking and canoeing. Across from Ladner Harbour Park and Ladner Reach is Ladner Harbour, which includes a public dock, as well as kayaking and other businesses, including the popular Sharkey's Seafood Bar and Grill.

#### **Tilbury Island and Annacis Island:**

- **Dow Delta Bar Fishing Park:** This small park is located at the eastern tip of Tilbury Island on the waterfront, east of Hudson Road in Delta.

- **Purfleet Point Park Reserve:** This is a quiet, natural park located at the western tip of Annacis Island, set amongst industrial developments common to the rest of the island.

### 6.3.3 Socio-Economic Significance of Vancouver International Airport

YVR is a very important economic infrastructure component for Metro Vancouver, the province and Canada. Located on Sea Island, YVR is Canada's second busiest airport (after Toronto), and the second largest international passenger gateway on the west coast of North America (Province of B.C. 2009).

An economic impact assessment conducted for YVR, based on 2005 passenger and air traffic data, estimated that ongoing airport operations generate 26,700 direct jobs, representing 23,800 person years of direct employment (Vancouver Airport Authority 2006). The data used in this study are very similar to the 2009 traffic data; passenger traffic peaked in 2008 at 17.9 million passengers but the recent world wide economic recession has affected the airline sector such that 2009 passenger data approximated 2005 YVR activity levels (Vancouver Airport Authority 2010b).

An estimated 360 employers and approximately 90% of the 26,700 direct airport-related jobs are located on Sea Island. The other 10% of direct YVR jobs are based in the cities of Richmond, Vancouver and surrounding municipalities.

In addition, YVR has substantial capital investment programs which generated 410 person years of construction employment in 2004 (Vancouver Airport Authority 2006) and over 1,000 person years annually between 2005 and 2010 (based on 5,200 person years of employment over approximately 5 years as per: Vancouver Airport Authority 2010a).

The provincial government recently acknowledged the importance of maintaining the international competitiveness of YVR, specifically with respect to aviation fuel costs, in announcing a recent initiative to eliminate aviation fuel taxes for international flights (BC Ministry of Finance 2010). The 2005 Economic Impact Study for YVR indicated that 30% of passengers at YVR are connecting through YVR to their final destinations (Vancouver Airport Authority 2006). Each new daily international service to YVR generates between 102 and 190 person-years of direct employment, between \$5 million and \$8.9 million in wages, and between \$8 million and \$15 million in provincial Gross Domestic Product annually (InterVistas Consulting Inc. 2006). **Table 6.3.3** summarizes some key socio-economic impact and operations statistics for YVR.

**Table 6.3.3 Socio-Economic Impacts of Vancouver International Airport**

YVR Operations & Impacts	2005		2005 - Billion \$		
	Total Jobs	Person Years	Wages	Gross Domestic Product	Economic Output
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%

Notes:

1. Direct employment related to ongoing airport operations such as handling passengers and cargo; auxiliary services such as food concessions, retailers and car rental agencies; and employment at agencies such as the Canada Border Services Agency.
2. Indirect employment is created by airlines, airport suppliers and industries such as tourism that rely on air services.
3. Induced employment is generated as direct- and indirect-related employees spend their wages on goods and services.
4. Gross Domestic Product represents YVR's value added contribution.
5. Economic Output is the gross value of the services provided and corresponds approximately to the gross revenues collected by airport businesses.

Source: Vancouver Airport Authority 2006; also, Vancouver Airport Authority 2010.

YVR is a dominant factor in the economic and industrial structure of Richmond. As noted on the City's website, "...the airport is a gateway to international trade and commerce. Many of Richmond's top employers have chosen to locate in this City because of its proximity to the Airport. Up to 60,000 passengers pass through the airport on a busy day, with up to 900 take offs and landings on peak days." (City of Richmond 2009). According to the most recent YVR economic impact study (conducted in 2005 and released in 2006), the airport generates \$1.7 billion in Gross Domestic Product and \$3.4 billion in total economic output each year (direct economic impact). In 2006, YVR reported that ongoing airport-related activity contributed \$680 million in tax revenue contributions to all levels of government, including \$504 million to the federal government, \$154 million to the provincial government and \$22 million to municipal governments, of which \$11.8 million was paid in grants in lieu of property taxes (Vancouver Airport Authority 2006).

YVR is managed and operated by the Vancouver Airport Authority, a community-based, not-for-profit organization that is governed by a Board of Directors. The Board of Directors includes representatives from the City of Vancouver, the City of Richmond, Metro Vancouver and other stakeholder groups. The airport is operated under the provisions of a long term ground lease with the federal government. The Vancouver Airport Authority has no shareholders and any excess of revenues over expenditures is re-invested in airport development and service improvements (Vancouver Airport Authority 2006).

The Vancouver Airport Authority has been operating the airport since 1992 when management responsibility was transferred from Transport Canada. Between 1994 and 2005, total direct employment at the airport almost doubled from 12,600 person years to 23,800 person years. This impressive growth occurred despite a decline in commercial air carrier employment following airline restructurings. YVR's gateway strategy is partially responsible for this growth as "approximately 30% of passengers at YVR are connecting through YVR to their final destination" and "each 1,000 origin-destination passengers generate 3,300 hours of employment at YVR while each 1,000 passengers connecting from Asia at YVR generate 4,900 hours of employment at the airport, because of additional employment from the connecting flight." (Vancouver Airport Authority 2006).

#### **6.3.4 Marine Use, River Channel and Port Metro Vancouver Activities**

Port activities, major fisheries that rely on the South Arm, and other marine and shoreline uses in the South and the Middle arms are reviewed below.

#### **6.3.4.1 Port Metro Vancouver Activities**

Port Metro Vancouver is the largest port in Canada and the fourth largest by tonnage in North America. The Port's jurisdiction encompasses nearly 600 kilometres of shoreline and extends from Point Roberts at the Canada/U.S. border through Burrard Inlet to Port Moody and Indian Arm, from the mouth of the Fraser River east to the Fraser Valley at Kanaka Creek, and north along Pitt River to Pitt Lake.

In 2009, the Port reported foreign vessel traffic at 2,791 arrivals, representing 101.9 million metric tonnes of gross registered tonnage (Port Metro Vancouver 2009). Cargo volumes increased steadily from approximately 40 million metric tonnes in 1985 to a 2007 peak of 127.8 million metric tonnes. While cargo volumes dropped in 2008 and 2009, they remain 2.6 times the level reported for 1985 (InterVISTAS Consulting Inc. 2009, Port Metro Vancouver 2009).

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 (Port Metro Vancouver 2008, 2009). In 2009, Port Metro Vancouver reported 255 tanker calls of which 100 tankers carried petroleum products (Muller S. pers. comm. 2010). Currently, aviation fuel shipments from offshore sources, which supply approximately 40% of YVR's aviation fuel needs, are delivered and off-loaded at Westridge Marine Terminal located in Burnaby, on Burrard Inlet.

The Chevron Canada Ltd. Burnaby refinery, which supplies approximately 40% of YVR's fuel requirements, has a refining capacity of 55,000 barrels of oil per day (8.7 million litres), only a fraction of which becomes aviation fuel (Chevron Canada Ltd. 2009). Raw petroleum hydrocarbon product (i.e., crude oil) is shipped to the refinery from northern B.C. and Alberta via a 1,200 kilometre long pipeline, except during maintenance shutdowns when product is also delivered to the refinery by marine vessels. According to Chevron Canada's website, vessels come in and out of the refinery's marine wharf on a daily basis, as approximately half of the fuel produced at the Burnaby refinery is shipped up and down the west coast via ships and barges (Chevron Canada Ltd. 2009).

The movement of petroleum products reported for Port Metro Vancouver (7.27 million metric tonnes in 2008; see **Table 6.3.4**) primarily includes shipments to and from Burrard Inlet. In the South Arm of the Fraser River, petroleum products shipments equivalent to approximately 150,000 metric tonnes per year, consist primarily of bunkering traffic (i.e., supply of fuel to ships moored in the river) (see **Table 2.3.1** in **Chapter 2**).

**Table 6.3.4 Cargo Statistics for Port Metro Vancouver**

<b>Port Metro Vancouver - Selected Statistics</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Number of Foreign Vessel Arrivals	3,165	3,004	2,791
Number of Deep Sea Foreign Vessel Arrivals by Port Location (all commodities)			
Fraser River	573	567	475
Burrard Inlet	2,071	1,983	1,822
Other	514	487	509
<b>Total Foreign Vessel Arrivals (see Note)</b>	<b>3,158</b>	<b>3,037</b>	<b>2,806</b>
<b>Cargo Tonnage for Port Metro Vancouver</b>	<b>Inbound &amp; Outbound Volumes (000 Metric Tonnes)</b>		
	<b>2007</b>	<b>2008</b>	<b>2009</b>
Foreign Cargo	82,824	82,250	78,811
Domestic Cargo	45,020	32,312	23,079
<b>Total Tonnage</b>	<b>127,844</b>	<b>114,562</b>	<b>101,890</b>
<b>Petroleum Products Traffic</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Aviation Fuel	1,072	838	814
Crude Petroleum, Gasoline, Diesel & Fuel Oils	4,493	5,252	6789
Kerosene, Distillate & Coke	803	1,044	762
Other	17	138	10
<b>Total Tonnage</b>	<b>6,385</b>	<b>7,271</b>	<b>8,375</b>

Note: The number of Deep Sea Foreign Vessel Arrivals by Port Location does not equal Foreign Vessel Arrivals because a vessel can visit more than one location.

Source: Port Metro Vancouver (2008, 2009), Muller S., pers. comm. (2010)

As indicated in **Table 6.3.4**, in 2009 the Port reported 475 deep sea foreign vessel arrivals for the Fraser River, with a three-year average of 538 vessel arrivals. This represents approximately 18% of total foreign vessel arrivals for the Port (Muller S. pers. comm. 2010). This data excludes all domestic trade (i.e., traffic between two Canadian ports) which account for most of the vessel traffic volumes in the South Arm and all of the traffic volumes in the North and Middle arms (based on 2007 Port Metro Vancouver data) (InterVISTAS Consulting Inc. 2009).

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 Project's marine terminal. Fraser Wharves has the capacity to berth the world's largest Pure Car Carrier vessels, with truck loading and storage capacity for 14,000 vehicles (Fraser Wharves Ltd. 2009).

Other large stevedoring and distribution facilities along the South Arm of the Fraser River, upstream of the Project's marine terminal, include facilities such as:

- Canadian Forest Products (Canfor) International Distribution Centre, a four hectare (10 acre) site located in Richmond with a large covered lumber re-load facility
- Coast 2000 Terminals Ltd., a third-party logistics service provider for the pulp and paper industry and various ocean carriers with a 12 hectare (30 acre) site located in Richmond
- Tilbury Terminal of Seaspan Coastal Intermodal, which operates a daily ferry service for freight from Tilbury Island in Delta to Nanaimo and Swartz Bay on Vancouver Island
- Fraser Surrey Docks Limited Partnership, a facility on the Fraser River that annually handles between 300 and 400 deep sea vessels up to Panamax-class size (Fraser Surrey Dock Limited Partnership 2010)

FREMP recognizes the importance of the Fraser River estuary as a major shipping route. In addition to providing terminal facilities for foreign and domestic cargo, FREMP recognizes that short sea shipping, or moving goods by barge, may play an increasingly greater role in the Metro Vancouver regional transportation system in the future. A 2002 FREMP report concluded that "compared to trucking, barging represented approximately one-tenth the costs of transport and one-twentieth the environmental costs" (FREMP 2006).

#### ***6.3.4.2 Fraser River-based Fisheries***

The Fraser River basin covers approximately 25% of B.C.'s land base and includes 13 main watersheds and a vast network of tributary rivers, lakes and streams (Fraser River Basin Council 2009). Seasonal returns to the lower Fraser River by migratory fish such as Pacific salmon, steelhead trout, white surgeon and eulachon are discussed briefly below in the context of the commercial fishery and in more detail in **Section 5.2**.

Other B.C. fish species that are commercially harvested in Georgia Strait, near the mouth of the Fraser River, include rockfish, sablefish, hake, herring, Dungeness crab, geoduck and prawn. Those fisheries are described in **Chapter 19**. The Fraser River

supports food, commercial and recreational fisheries, each of which relies, to varying degrees, on the annual return of salmon and other migratory species to the lower Fraser River. The food fishery recognizes the Aboriginal rights of the many First Nations who depend on the Fraser River watershed and, in combination with the fish harvested for cultural and ceremonial purposes, is of integral importance to individual quality of life and community well-being. Further discussion regarding First Nations fisheries and an assessment of the potential effects of Project construction and operation on Aboriginal rights is presented in **Part C**.

### **Fraser River-based Commercial Fisheries**

Since the late 1800s, the return of large annual runs of Pacific salmon to the Fraser River and its tributaries has supported a vibrant and high value coastal commercial fishery. Although the commercial fishery targets all five salmon species (i.e., Sockeye, Coho, Chinook, Pink and Chum), historically, its mainstay has been Sockeye salmon.

The timing of returning Sockeye runs to the Fraser River, generally between late May and November, and the number of returns is monitored in coastal test fisheries undertaken by Fisheries and Oceans Canada and used to predict Sockeye salmon abundance. In recent years, the productivity of key Sockeye runs has declined, likely due to a combination of factors including decreased ocean survival rates, habitat loss and degradation, over-fishing, and below average river discharge levels and higher water temperatures during upstream migration. In 1985, following the signing of the Pacific Salmon Treaty, the governments of Canada and the U.S. established the Pacific Salmon Commission to implement the treaty. The Commission's Fraser River Panel develops annual Sockeye salmon management plans for Panel Area waters that recommend the timing, location and duration of commercial fisheries openings. In some years, as in 2007, 2008 and 2009, the commercial Sockeye fishery remains closed in order to provide for the spawning escapement requirements of specific runs, as well as the food, social and ceremonial needs of the many First Nations within the Fraser River watershed, can be met. On August 6, 2010, the Pacific Salmon Commission announced that the Fraser River Sockeye commercial fishery would open for the first time since 2006, as a result of the largest salmon run since 1913. The 2010 salmon run was expected to be the peak of the four-year salmon return cycle and despite large numbers of salmon during this run, uncertainty remains about the long-term sustainability of the Fraser River Sockeye. Within Canadian Fraser River Panel Area waters, this includes allowing seine boats to fish in Johnstone Strait and part of Juan de Fuca Strait for 4 days; allowing the troll fleet the right to fish in the Georgia Strait (area H) starting August 8, 2010 until further notice, and allowing gillnetters a three hour fishery in the Fraser River on Tuesday August 10, 2010 (Pacific Salmon Commission 2010).

In 2008, the value of B.C.'s commercial salmon catch was \$21.5 million (**Table 6.3.5**), approximately 10% of the overall value of the wild fisheries commercial catch of \$225.2 million (Fisheries and Oceans Canada 2009a). The South Coast and Fraser River Districts accounted for 31% of this catch value while the North Coast and Taku/Stikine Districts accounted for the balance. Fisheries and Oceans Canada catch statistics for fish landed in the Fraser River District (see **Table 6.3.5**) primarily reflect the terminal portion of the fishery, namely the value of landings reported for the lower Fraser River estuary.

**Table 6.3.5 2008 Value of B.C. Commercial Salmon Fishery**

B.C. Coastal Districts	Total	%
Far North	\$1,182,380	5.5%
North Coast	\$13,639,793	63.6%
South Coast	\$6,194,890	28.9%
Fraser River	\$445,217	2.1%
<b>Total</b>	<b>\$21,462,280</b>	<b>100.0%</b>

Source: Fisheries and Oceans Canada (2009a).

The \$21.5 million value of B.C.'s commercial salmon fishery represents a multi-decade low and a significant decline from a peak of \$312 million in 1988. There are many possible reasons for this decline, some of which are summarized below, based on a 2006 report by the B.C. Seafood Alliance:

- In the late 1980s, the commercial fishing sector started to face declining values for salmon, particularly for Pink and Chum salmon, as other jurisdictions recorded high catches and production of farmed salmon increased in B.C. and worldwide. As noted in the B.C. Seafood Alliance report (2006), “a lesser financial contribution from pinks and chums meant a greater reliance on Sockeye – particularly Fraser River Sockeye” (BC Seafood Alliance 2006).
- In the last 20 years, salmon harvest levels have declined due to changes in ocean conditions (including increased water temperatures), the requirements to adhere to the federal *Species at Risk Act*, the need to conserve stocks of concern (particularly Sockeye stocks), and other factors. For example, the number of days fished as reported by vessel or license owners for salmon species in 1988 was 155,000 days compared to only 15,000 days in 2008 (Fisheries and Oceans Canada 2009a).
- In particular, returns of Fraser River Sockeye salmon, traditionally the most valuable species of the commercial catch, have been much lower, so that by 2005 the Fraser

River Sockeye season was one hundredth the scale that it was in 1994. In 2005, the Fraser River Sockeye season involved the commercial harvest of 128,000 fish (down from 10 million fish harvested in 1994), an estimated ex-vessel value of \$1.5 million (down from \$150 million in 1994), and a wholesale value of \$2.5 million (down from a wholesale value exceeding \$250 million in 1994) (B.C. Seafood Alliance 2006).

As a result of the closure of the Fraser River Sockeye fishery for the third consecutive year, in November 2009 the Government of Canada ordered a Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, “the Cohen Commission”, and named B.C. Supreme Court Justice Bruce Cohen as Chair of the judicial inquiry. The purpose of the Cohen Commission is to determine the reason for the recent decline in Fraser River Sockeye stocks and to project the long-term state of the stocks. As well, the Commission aims to develop recommendations for improving future sustainability of the Fraser River Sockeye fishery. Despite the record numbers of the 2010 salmon run (the largest since 1913), uncertainty remains about the long-term sustainability of the Fraser River Sockeye.

**Figure 6.3.2** shows the value and tonnage of the B.C. harvest of wild salmon between 1987 and 2008.

### **Fraser River-based Recreational Fishery**

While the commercial catch for salmon has been reduced to a fraction of what it was 20 years ago, the recreational fishery has become more important. Until 1981, B.C.’s recreational fishery was largely unregulated as no license was required and no catch statistics were recorded. Data on the recreational catch are based on random surveys of the sport fishery and as a result are not as complete as for the commercial catch. Allocation of Coho and Chinook salmon to the recreational fishery have increased significantly, and the catch of Pink salmon has also increased.

Sport fishing in the Metro Vancouver region is a very important recreational activity. A 2002 study of the B.C. Seafood and Recreational Fishing industry estimated that tidal recreational fishing in the Lower Mainland generates 1,110 person years of employment, or approximately one third of the 3,590 person years related to all tidal recreational fishing in B.C. (Gislason and Associates 2004).

The Fraser River tidal water area is very popular for sport fishing, particularly since this activity can be carried out from the shore and the various piers along the river, such as the No. 3 Road pier or the shores of Garry Point Park. It is customary to see numerous sports fishermen along the shores of the South Arm, particularly in summer and fall

during the peak period of salmon returns. For example, on Wednesday September 09, 2009 as part of a site visit to the Fraser River, the Robertson Environmental Services Ltd. field crew recorded 38 fishermen actively fishing along the South Arm. This included 23 fishermen along the shores of Deas Island, eight fishermen across the channel near the foot of No. 6 Road in Richmond, six fishermen along the shores of Steveston Harbour, and one fisherman in a small boat at the northwest corner of Reifel Island (Robertson, pers. comm. 2009).

“Fishing with Rod”, an online local angler magazine and website, provides an overview of the quality of the fishing in the South Arm along the Richmond south shore, as shown in **Figure 6.3.3**. Major recreational fish species include Bull trout (catch and release only), salmon, and White sturgeon (catch and release only). Other species, such as Peamouth chub (minnow family), Northern pikeminnow, Shiner perch, Staghorn sculpin and Starry flounder may be interesting to catch but are either too small or have poor eating quality to be major recreational fish species.

The provincial government sets specific fishing regulations and catch quotas for Fraser River tidal waters; in general, the daily limits for salmon range between two and four fish per day per angler, although for Coho salmon only hatchery fish may be retained in the tidal portion of the Fraser River (Fisheries and Oceans Canada 2009b). Also, given the low returns of Fraser River Sockeye between 2007 and 2009, no directed recreational or commercial fisheries were permitted in those years but in August 2010 the Fraser River Sockeye recreational fishery was re-opened for an indefinite time. As previously noted, the white sturgeon fishery is a catch and release fishery. Many guiding businesses specialize in sturgeon fishing in various areas of the Fraser River, particularly near Hope and the Fraser Canyon.

### **Fraser River-based First Nations Food Fishery**

Fishing for food, social and ceremonial purposes specifically recognizes the traditional rights of First Nations. As described on Fisheries and Oceans Canada’s website, First Nations fisheries may be regulated by the issuance of various types of communal licences crafted to fit particular circumstances. Such licences include:

- Single species – Used to authorize the harvest of a single species, typically salmon. Used to license all fisheries on the Fraser River and for the herring spawn-on-kelp fishery in the North Coast
- Multi-species – Uses separate schedules to authorize the harvesting of a number of different species such as salmon, herring and shellfish. Typically used in the North and South Coast areas

- Supplemental – Issued when food fishing occurs outside of the area described in the communal licence. The licence may be issued when an Aboriginal group is unable to achieve their required harvest under the existing communal licence
- Dry Rack – May be issued to individuals of a First Nation who have traditionally wind-dried fish, have appropriate fishing and drying sites and have erected structures along the Fraser River
- Ceremonial – Intended to allow fishing for ceremonial purposes only. This type of licence may be issued when fishing is restricted or prohibited due to management actions taken when local stocks cannot support an open fishery but may not be threatened by limited effort
- Interim – Generally issued to Aboriginal groups pending completion of Aboriginal Fisheries Strategy Agreement negotiations. After issuing the initial licence, any changes to that licence necessitated by subsequent negotiations is then addressed by way of amendments to the licence

Fisheries and Oceans Canada report that the Musqueam, Tsawwassen, and New Westminster First Nations fish with drift nets downstream of the Port Mann Bridge and into the Strait of Georgia. Discussions with the Hwlitsum First Nation indicate that they actively fish in this area and other Hul'qumi'num First Nations are in various stages of gaining access to the fishery (see **Part C** of the Application). Salmon fishery catch monitoring in this area is undertaken by Aboriginal Fishery Officers and fishery observers who conduct boat and vehicle patrols during the fishery openings to obtain catch and effort data. Participating fishers are interviewed multiple times throughout each fishery. The number of participants is recorded for each day of the fishery, and catch is recorded by species and reported to Fisheries and Oceans Canada.

There are no readily available data that show the First Nations' catch west of Annacis Island on the Lower Fraser River, but as a measure of the food fishery's significance, catches below Port Mann Bridge in 2009 totalled 4,891 Sockeye, 7,314 Chinook, 255 Coho, 39,176 Pink, 17,928 Chum and 2 Steelhead. (Fisheries and Oceans Canada. 2009c) These figures include those caught under "Economic Opportunity" licences. "Economic Opportunity Licenses" are also issued on the Lower Fraser under the Aboriginal Fisheries Strategy. Through agreements made between Fisheries and Oceans Canada and Aboriginal groups, Aboriginal communities were authorized to sell specified amounts of fish subject to conservation needs and to agreed-upon monitoring, enforcement and management regimes. The Sto:lo Nation, Musqueam and Tsawwassen First Nations have taken such licences. Commercial licenses are held, or have been held, in fishing areas near to or downstream from the Project by the

Musqueam, Tsawwassen, Kwikwetlem, Semiahmoo, Cowichan Tribes, Hwlitsum and Penelakut First Nations.

Further details on First Nations fisheries, and other interests, are presented in **Part C**.

#### ***6.3.4.3 Marine and Shoreline Use of the South Arm of the Fraser River***

The Fraser River estuary supports a wide variety of activities and uses. The South Arm of the Fraser River separates Lulu Island (Richmond) from the mainland and Delta, which includes the historical village of Ladner, Tsawwassen, North Delta and the rural areas surrounding these communities. The shores of the South Arm of the Fraser River have various environmentally significant areas which are protected, and include a mix of recreational, residential and industrial uses.

The navigation channel in the South Arm runs closer to the north shore of the river and the north shore of the South Arm is more extensively developed. A popular recreational pathway follows the north shoreline passing by historical buildings between Garry Point Park and No. 2 Road, referred to as Steveston Harbour. Steveston Harbour includes two main geographic sites:

1. The Paramount site extends from the south end of No. 2 Road to the Britannia Heritage Shipyard and is the main industrial area of the harbour
2. The Gulf site is located between No. 1 Road and Garry Point Park and consists of a combination of working docks, shops, restaurants, and gear storage

Steveston Harbour also includes the Sales Float area where members of the public are encouraged to purchase fresh seafood directly from vessel owners.

Steveston Harbour Authority is a non-profit society which leases Steveston Harbour and its facilities from the Fisheries and Oceans Canada Small Craft Harbours Branch. Steveston Harbour Authority reports that in excess of 500 commercial fishing vessels are moored there permanently. While primarily a commercial fishing harbour, there is also pleasure boats anchored in Steveston Harbour (Steveston Harbour Authority 2009).

To the east of Steveston Harbour along the north shore of the South Arm of the Fraser River are a number of boathouse communities and marinas. These include:

- **Finn Slough Settlement** (also called Gilmour Slough): At the end of No. 4 Road, Finn Slough separates Whitworth Island (also called Gilmour Island) from Lulu Island. Finn Slough is approximately 1 kilometre long and consists of a historic slough settlement with old buildings and homes on piles in a marsh habitat setting.

- **Shelter Island Marina & Boatyard Inc.:** Located on the north shore of the South Arm of the Fraser River, the marina and various related industrial and retail businesses are located at the end of Graybar Road and face the western tip of Annacis Island.
- **Other Floating Homes:** There are a number of floating homes on the north shore of the South Arm of the Fraser River including “Floatville”, a 6 home strata float home village located at 23260 Dyke Road in the Annacis Channel, across from Annacis Island.

To the south of the Fraser River navigation channel are a number of islands. Most of these islands and surrounding marshes are protected wildlife habitat and provide important areas for recreational activities such as wildlife viewing, kayaking, and canoeing. In particular, Westham Island and the adjoining Reifel Island include the Alaksen National Wildlife Area and the George C. Reifel Refuge/National Migratory Bird Sanctuary.

**Table 6A-1** in **Appendix 6A** details the socio-economic and socio-community features along the shore and islands of the South Arm of the Fraser River, between the trifurcation with the North Arm and the Strait of Georgia. These include the above mentioned Westham Island, the South Arm Marshes Wildlife Management Area and Deas Island Regional Park.

#### ***6.3.4.4 Marine and Shoreline Use of the Middle Arm of the Fraser River***

The Sea Island shoreline at the corner of the North Arm and Middle Arm of the Fraser River includes a marine fuelling facility (Chevron Richmond Marina) and a vacant building owned by Port Metro Vancouver (previously the offices of the North Fraser Harbour Commission). To the south of the Port Metro Vancouver facility along the Middle Arm of the Fraser River is a small boat moorage facility. The marine fuelling facility, the Port Metro Vancouver property and the moorage facility are accessible via Grauer Road and Airport Road on Sea Island. The area of Sea Island in the vicinity of the proposed fuel delivery pipeline is characterized by extensive civil works including a complex roadway interchange and ramps to the Arthur Laing Bridge, the Airport Connector Bridge, the Moray Channel Bridge, and the newly constructed Canada Line Rapid Transit Bridge.

Approximately 100 years ago, the northeast corner of Sea Island was the site of the historic settlement of Eburne which is described in more detail in **Chapter 7**. The Sea Island shoreline has archaeological significance to First Nations, which is also described in **Chapter 7**. The Moray Channel has been a significant fishing site for the Musqueam and Tsawwassen First Nations.

On Lulu Island, at the confluence of the Middle Arm with the North Arm is the River Rock Casino Resort, which includes a hotel, convention centre, a casino, a parkade and the Great Canadian Marina at 8811 River Road. The marina is located on the North Arm of the Fraser River. The east shoreline of the Middle Arm, slightly south of the River Rock Casino Resort, consists mainly of industrial properties.

South of the Airport Connector Bridge and the Moray Channel Bridge, on Lulu Island, there are a variety of uses including two marinas, Richmond Marina at 8191 River Road, and Skyline Marina at 8031 River Road.

#### ***6.3.4.5 Land Use Regime and Existing Land Use***

##### **Marine Terminal**

The marine terminal property is zoned “I1” Industrial under the City’s zoning bylaw, and is designated for Business and Industry use under the City’s Official Community Plan. The surface water drainage ditch along Williams Road on the outside of the property boundary to the north is a City designated Riparian Management Area with a 5-metre development buffer. A portion of the property waterside of the railway easement was originally designated as an Environmentally Sensitive Area by the City in 1999. Most of the site is devoid of vegetation, however, and significant modification to the site has greatly diminished the natural attributes of the site that led to its Environmentally Sensitive Area designation. The Environmentally Sensitive Area designation has subsequently been removed and is expected to be reflected in the next update of the Environmentally Sensitive Area map attachment to the City of Richmond Official Community Plan (Brownlee D. pers. comm. 2009).

Uses of properties adjacent to the marine terminal property are as described in the following section for the fuel receiving facility location, including industrial uses to the north and west, agricultural land to the northwest, and lands zoned for Athletics and Entertainment to the southwest. Residential/hotel uses nearest to the marine terminal include:

- six houses along Triangle Road/Williams Road from 500 to 700 metres west of the marine terminal;
- 16 houses along No. 6 Road approximately 1 kilometre west of the marine terminal;
- one four-storey hotel near No. 6 Road approximately 1 kilometre southwest of the marine terminal; and

- 139 units in three buildings in the Waterstone Pier condominium complex 500 to 700 metres downstream from the marine terminal along the waterfront.

### **Fuel Receiving Facility**

The proposed site for the fuel receiving facility has been heavily modified through landscaping materials mining, as well as through its function as a fill site for disposal of river sands and silts. This site is part of approximately 281 hectares of lands spreading to the northeast known as the Fraser Richmond Port lands. Under the Fraser River Port Authority Land Use Plan, the site is designated for industrial uses associated with Port operations (Vancouver Fraser Port Authority 2008). The Port has indicated that the proposed fuel receiving facility would comply with the existing Land Use Plan designation for the proposed site (Suszezwiw S. pers. comm. 2009).

Although the proposed location for the fuel receiving facility appears to be situated within a City-designated Environmentally Sensitive Area, City staff has indicated that significant modification to the site as noted above, has led to the Environmentally Sensitive Area designation being removed, which is expected to be reflected in the next update of the City of Richmond Official Community Plan (Brownlee D. pers. comm. 2009).

Lands immediately surrounding the location for the proposed fuel receiving facility are largely undeveloped and are zoned for industrial uses. Beyond the industrial lands are lands zoned for agriculture. A significant portion of the agricultural lands to the west are designated as City Environmentally Sensitive Areas. The nearest residential zoning is approximately 1 kilometre to the southwest, along the river foreshore, where a condominium development was constructed in a City comprehensive development zone (CD/134).

Also located approximately 1 kilometre to the southwest, is the Riverport Recreation and Entertainment Complex, which includes a six-rink arena facility, a hotel, a 19-screen cinema complex, a large aquatic centre, a 40-lane bowling centre, a children's indoor play centre, a pub, and several restaurants. **Table 6.3.6** describes the land use regime for the intended location for the fuel receiving facility, and for properties adjacent to that property.

**Table 6.3.6 Land Use Regime of Fuel Storage Site and Neighbouring Properties**

Fuel Storage Site - Port of Metro Vancouver Lands	2009 City of Richmond Zoning	Richmond Official Community Plan Designation	Preliminary Issues Identification
4.8 hectare site near the foreshore of the Fraser River South Arm, to be leased from Port Metro Vancouver, which will accommodate 6 large storage tanks, associated ancillary systems and an operations building.	Zoned Industrial (I1) under City of Richmond zoning bylaw	Designated "Business and Industry" under the City of Richmond Official Community Plan, and "Coastal Shipping, Port Services, and Industrial Use" under the Vancouver Fraser Port Authority Land Use Plan	Site was designated an Environmentally Sensitive Area by the City of Richmond Official Community Plan. Site has been heavily altered through peat excavation and dredge spoils. Indications from the City of Richmond are that the Environmentally Sensitive Area designation has been subsequently removed.
Description of Nearby Properties to Fuel Storage Site		2009 City of Richmond Zoning	Richmond Official Community Plan Designation
<b>North of Fuel Receiving Facility Site:</b> Continuation of the Port Metro Vancouver lands, followed by continuation of the Richmond Landfill lands which fan out to the north.		Zoned Industrial (I1) under City of Richmond zoning bylaw	Designated "Business and Industry" under the City of Richmond Official Community Plan, and "Coastal Shipping, Port Services, and Industrial Use" under the Vancouver Fraser Port Authority Land Use Plan
<b>West of Fuel Receiving Facility Site:</b> Approximately 140 meter wide industrial zoned property that is part of the large, privately operated Richmond Landfill. A portion of the landfill operation includes hazardous materials disposal and contaminated soils remediation services.		Zoned Industrial (I1) under City of Richmond zoning bylaw	Designated "Business and Industry" under the City of Richmond Official Community Plan
<b>West of the Richmond Landfill Site,</b> is a large block of densely forested lands designated Environmentally Sensitive Area by the City of Richmond Official Community Plan.		Zoned Agriculture (AG1) under City of Richmond zoning bylaw	Agriculture
<b>Southwest of the Fuel Receiving Facility Site</b> and the Marine Terminal site, are two parcels of industrial land, one being used for sand and topsoil sales, and the other used for parking of automobiles offloaded from the nearby wharfs.		Zoned Industrial (I2) under City of Richmond zoning bylaw	Designated "Business and Industry" under the City of Richmond Official Community Plan
<b>Further southwest</b> are several parcels owned by the City of Richmond, and currently used for parking automobiles offloaded from the nearby wharfs. Expected to ultimately be part of the Riverport recreation and entertainment complex.		Zoned Athletics and Entertainment (AE) under City of Richmond zoning bylaw	

Source: Pierce Lefebvre Consulting based on site visits; also, City of Richmond 2009a.

## **Pipelines**

The route for the fuel transfer pipeline lies partially on the marine terminal site, which is zoned I1 industrial under the City's zoning bylaw, partly under Williams Road and partly on the fuel receiving facility site, which is designated for industrial uses associated with Port operations.

The fuel delivery pipeline will traverse under existing transportation and/or utility corridors in Richmond for much of its approximate 15 kilometre length. The land use regime of the preliminary reference alignment and possible alternative alignments are described below:

### **Preliminary Reference Alignment<sup>2</sup>**

#### **Fuel Receiving Facility to No. 5 Road – 2.8 kilometres**

- This segment of the pipeline route runs along the Williams Road corridor adjacent to agricultural lands, industrial lands, and a property zoned for assembly (places of worship and private schools).
- Existing developments along this segment of the reference alignment include 10 houses on agricultural lands (with considerable set backs from Williams Road), two golf courses and a large temple.

#### **No. 5 Road to Westminster Highway – 3.3 kilometres**

- This segment of the pipeline route runs along No. 5 Road, adjacent to a mix of agricultural, community institutional and residential zoned lands.
- Existing developments include: a block of 21 single family residential dwellings fronting the west side of No. 5 Road from Williams Road to King Rd; a golf course; one series of townhouses; two apartment buildings; an additional 88 homes that front the west or east sides of No. 5 Road between King Road and Westminster Highway, and have associated agricultural lands behind; 10 churches/temples; one daycare/preschool; one private elementary school; some commercial/retail buildings; and several parcels of undeveloped agricultural land.

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<sup>2</sup> Since undertaking this assessment, VAFFC has identified the Shell Road corridor, specifically the soon to be decommissioned CNR railway corridor, as the preferred south-to-north routing for the preliminary reference alignment as opposed to No. 5 Road. The Shell Road corridor (including Shell Road, Shell Road trail and the adjacent CNR railway corridor) is included in this, and all, assessment(s) forming the Application, and was previously described as a possible routing alternative.

#### Westminster Highway to the Shell Road Corridor – 0.8 kilometres

- This segment of the pipeline route runs along Westminster Highway adjacent to agricultural lands to the south and a Conservation Area to the north.
- Existing developments include 19 homes and one church along the south side of Westminster Highway with associated agricultural lands behind, and the Richmond Nature Park with an interpretation centre, parking lot and playground on the north side of Westminster Highway.

#### Shell Road Corridor to Bridgeport Trail – 2.7 kilometres

- This segment of the pipeline route runs along the Shell Road corridor between two large green space areas, followed by developed industrial and commercial lands, and then a mix of industrial, commercial and low density residential lands. A Canadian National Rail right-of-way runs adjacent to the east side of Shell Road and for this analysis, is considered part of the Shell Road corridor.
- Existing developments in this segment include light industrial/office parks, industrial manufacturing facilities, an auto dealership, 42 single family houses, a townhouse development and a power line corridor.

#### Bridgeport Trail to Van Horne Way – 1.6 kilometres

- This segment of the pipeline route runs along Bridgeport Trail (a former railway corridor) through a mix of residential and industrial areas.
- Existing developments adjacent to this segment include 80 single family homes and several large industrial developments.

#### Van Horne Way to the Moray Channel Crossing – 0.75 kilometres

- This segment of the pipeline route runs through a largely industrial area that is in transition to a more urban environment. Much of the area has been recently heavily disturbed by construction of the Canada Line guideway and related infrastructure.

#### Moray Channel Crossing to the fuel facilities at YVR – 2.2 kilometres

- This segment of the pipeline route 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.

### Possible Routing Alternatives

Possible fuel delivery pipeline routing alternatives to the preliminary reference alignment include the following:

- When reaching No. 5 Road from the Williams Road corridor, the route crosses No. 5 Road and continues along the Williams Road corridor to the Shell Road corridor. The route then proceeds north along the Shell Road corridor to Westminster Highway, either along the Shell Road right-of-way, the Shell Road trail or potentially within a soon to be decommissioned CNR railway corridor. After crossing Westminster Highway, the pipeline route would continue north to Bridgeport<sup>3</sup>.
- When reaching the Francis Road corridor on No. 5 Road, the pipeline route turns west along the Francis Road corridor to reach the Shell Road corridor, and then proceeds north along the Shell Road corridor to Westminster Highway. After crossing Westminster Highway, the pipeline route continues north along the same route as the preliminary reference alignment described above.
- When reaching the Blundell Road intersection on No. 5 Road, the pipeline route turns west along Blundell Road to reach the Shell Road corridor, and then proceeds north along the Shell Road corridor to Westminster Highway. After crossing Westminster Highway, the pipeline route continues north along the same route as the preliminary reference alignment described above.
- When reaching the Granville Avenue intersection on No. 5 Road, the pipeline route turns west along Granville Avenue to the Shell Road corridor, and then proceeds north along the Shell Road corridor to Westminster Highway. After crossing Westminster Highway, the pipeline route continues north along the same route as the preliminary reference alignment described above.
- A possible routing alternative to the preliminary east/west reference alignment along the Williams Road corridor is the Francis Road corridor to reach either No. 5 Road or the Shell Road corridor to the west.

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<sup>3</sup> The route along the CNR railway corridor is identified as part of the preferred pipeline route alignment, which was refined after the effects assessments were completed.

### Summary Land Use Tables

**Table 6B-2 in Appendix 6B** provides a detailed description of land use for the preliminary pipeline reference alignment. **Table 6B-3** through **Table 6B-7** provides a detailed description of land use for the possible routing alternatives outlined above.

The City of Richmond zoning categories referred to in **Table 6B-2** through **Table 6B-7** are described in **Table 6B-1**.

### **6.3.5 Valued Components**

Economic development is a key socio-economic attribute potentially affected by the Project, which is in turn reflected through effects on socio-economic indicators such as:

- Employment
- Gross Domestic Product
- Government revenues
- Demographics
- Economic activity at YVR
- Port operations
- Commercial fishing activity (level of catch and value)

The following socio-economic attributes were identified as VCs for the assessment in addition to “Economic Development”, as they have an effect on community well-being and quality of life and could be affected by the Project:

- Land Use (conformity with existing land use & Official Community Plans)
- Property Value (value of properties adjacent to Project sites)
- Motor Vehicle Traffic and Mobility (changes in traffic volumes on city streets and highways)
- On-Street Parking (changes to roadside parking availability)
- Bicycle/Pedestrian Traffic and Mobility (changes to bicycle & pedestrian access)
- Schools, Recreation Areas, and Other Community Features (changes to access and enjoyment)

- Street and Trail Trees
- Marine Traffic (changes to Fraser River navigation)
- Noise and Other Health Related Issues (GHG and vapour emissions) (as determined in **Sections 5.5** and **Section 5.4**)
- Aesthetic Values and Visuals (visual effects associated with storage tanks, facilities, vessels and lighting)
- Railway Rights-of-Way (effects on railway operations from track crossings)
- Utilities (changes resulting from pipeline corridor utility crossings and/or utility displacement)
- First Nations (as determined in **Part C**)

The above VCs were assessed to determine the significance of any potential residual effects from Project construction or operations. The exception is First Nations which are described in detail in **Part C**.

## **6.4 Potential Effects and Recommended Mitigation Measures**

### **6.4.1 Project Construction**

#### **6.4.1.1 Potential Effects**

Detailed construction plans have not yet been developed. The magnitude of the construction effects will depend partly on the time required to complete the different phases of the Project. It is expected that construction of the Project will require approximately 18 to 24 months. See **Chapter 2** for a detailed description of proposed construction activities.

Construction at the marine terminal will require various upgrades to the existing wharf. Although it will not require the wharf to be longer, additional piles will be installed on the water side of the main wall. Most of the upgrades will consist of shore-side work including off-loading, receiving and transfer facilities.

Construction of the fuel receiving facility will include activities such as: ground improvements to achieve the necessary seismic stability, delivery of tank sections and equipment to the site, installing concrete pads for the equipment, assembling the fuel storage tanks, erecting steel framed building(s), connecting above ground sections of fuel pipeline and utilities infrastructure, and building facility access roads.

Where relevant and applicable, other elements of the construction schedule and constraints are reviewed as part of the effects assessment on individual socio-economic and socio-community values/indicators.

### **Economic Development**

The capital costs of the Project will range between approximately \$93 million and \$108 million.

Construction of the Project is expected to result in an estimated 762 person years of direct, indirect and induced employment in B.C. This is based on provincial employment multipliers, derived from the B.C. Stats input-output models applied to the capital costs of the Project (Horne 2008). **Table 6.4.1** provides estimates of the Project effects on employment, Gross Domestic Product, and federal and provincial taxes. The effects are approximate and conservative, as they are based on a lower overall cost of \$80 million in construction expenditures, and B.C. Stats multipliers derived from input-output model results from a different major infrastructure project with some similar characteristics to the Project.

**Table 6.4.1 Estimated Project Employment, Gross Domestic Product and Tax Impacts**

Economic Effects from Project	Estimated Effects from Construction				
	Employment (person years)	Gross Domestic Product at Factor Cost (\$ Million)	Federal Taxes (\$ Million)	Provincial Taxes (\$ Million)	
Direct (note 1)	320	\$21.5	\$2.9	\$3.5	
Indirect	330	\$23.4	\$2.0	\$1.4	
Induced	112	\$8.0	\$1.1	\$1.2	
<b>Total (2009)</b>	<b>762</b>	<b>\$52.8</b>	<b>\$6.0</b>	<b>\$6.0</b>	
Multipliers Based on Other Major Infrastructure Project	Multipliers per \$ Million of Construction Expenditures				
	Person years per \$ Million	\$ Million	\$ Million	\$ 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
<b>Total (2009)</b>	<b>9.53</b>	<b>\$0.66</b>	<b>\$0.08</b>	<b>\$0.07</b>	
<b>Total Capital Cost (2009)</b>	<b>\$80 million</b>				

Notes:

1. The 320 direct person years of employment estimate is higher than the 100 person years of direct employment reported by VAFFC in the initial Project Description, but that lower estimate excluded contractor employment associated with off-site fabrication, materials and transportation.
2. Induced effects are the employment, Gross Domestic Product and tax impacts generated through direct and indirect employee spending on goods and services.
3. The above taxes include personal income taxes on labour (direct, indirect and induced), commodity taxes at each of the three levels (GST- federal, PST- provincial, and taxes such as gas taxes, as well as provincial corporate income taxes (but not federal corporate income taxes). (Horne G. pers. comm. 2006) It is not known how the Input-Output results on provincial taxes will change as a result of the provincial sales tax being replaced by the HST, but the magnitude of any change is expected to be small.
4. The Input-Output model does not derive estimates of municipal property and school taxes

Source: Prepared by Pierce Lefebvre Consulting based on estimated construction costs and B.C. Stats economic impact multipliers estimated for a major infrastructure project with some similar characteristics as the Project (Hallin L. pers. comm. 2010).

While construction-related employment for the Project is considered relatively substantial in a local context, employment will be minor in the broader Metro Vancouver context. The estimated 762 person years of direct, indirect and induced employment resulting from the construction phase represent less than 1% of the Richmond labour force, and less than 0.07% of the Metro Vancouver labour force. As a result, it is expected that construction related jobs will be primarily filled by existing members of the local labour force. Any population or demographic effects are therefore likely to be negligible.

Construction of the Project, and in particular construction of the marine terminal upgrades, is not expected to affect the Fraser River-based fisheries. This is further discussed in the following sub-section on the effects of marine terminal construction on existing marine traffic.

### **Land Use Regime and Existing Land Use Context**

#### **Construction of Fuel Receiving Facility and Marine Terminal Upgrades**

As detailed in **Section 6.3**, the fuel receiving facility and the marine terminal property are intended to be located on lands that are zoned for industrial development. Also, lands that are adjacent to both of these components are zoned for either industrial or agricultural use. As described in **Section 6.3.4.5**, residential or hotel uses within approximately 1 kilometre of the marine terminal include 22 houses, one 4-storey hotel and 139 residential units in a condominium complex.

It is not expected that the Project will affect future zoning or land use patterns in this area.

#### **Effects of Pipeline Construction**

**Section 6.3** describes the land use regime, and existing land use context along the preliminary pipeline reference alignment and possible routing alternatives. As discussed in **Chapter 2** there is currently no finalized construction schedule detailing the extent of time construction will occur near any individual property. However, in general, construction of the pipeline is expected to take approximately 12 months.

**Section 6.3** also reports the number of existing single family residences along the preliminary pipeline reference alignment and possible routing alternatives. **Table 6.4.2** summarizes the approximate number of residential properties for each pipeline corridor option.

**Table 6.4.2 Approximate Number of Residences in Proximity to the Preliminary Pipeline Reference Alignment and Possible Routing Alternatives**

Pipeline Corridor Options	Brief Description	Approximate Number of Single-Family Residences (Excludes Multi-Family Developments)		
		South or West of Alignment	North or East of Alignment	Total
Preliminary Pipeline Reference Alignment	Williams Road corridor to No. 5 Road, north to Westminster Highway, west to Shell Road corridor, north to Bridgeport Trail and west to YVR (Note 1)	163	98	261
Routing Alternative	Williams Road corridor to Shell Road corridor	122	165	287
Routing Alternative	Francis Road corridor from No. 5 Road to Shell Road corridor (Note 1)	124	75	199
Routing Alternative	Blundell Road from No. 5 Road to Shell Road corridor (Note 1)	130	100	230
Routing Alternative	Granville Avenue from No. 5 Road to Shell Road corridor (Note 1)	157	108	265
<b>Alternatives from Fuel Receiving Facility to No. 5 Road and Francis Road:</b>				
	Williams Road corridor from Fuel Receiving Facility to No. 5 Road and north to Francis Road corridor (as is assumed for most of the above routing options)	27	5	32
	Francis Road corridor from Fuel Receiving Facility to No. 5 Road	1	1	2
	Difference in Number of Residential Properties Between Two Alternatives from Receiving Facility to No. 5 Road and Francis Road	- 26	- 4	- 30

Note 1: Using Francis Road from the fuel receiving facility to No. 5 Road, instead of using Williams Road to No. 5 Road, then north to Francis Road, is an alternate way of reaching Francis Road and No. 5 Road for the Preliminary Reference Alignment or any of the routing alternatives that use part of No. 5 Road. This would reduce the number of residences for those alternatives by 30 residences.

Source: Pierce Lefebvre Consulting based on various site visits and other sources. **Table 6B-2** through **Table 6B-7** in **Appendix 6B** provide more detail.

As shown in **Table 6.4.2**, between 199 and 287 single family residences (with significant setbacks in some cases) will be adjacent to the preliminary pipeline reference alignment or possible routing alternatives (excluding residences in multi-family buildings, unless otherwise specified). Also shown in **Table 6.4.2**:

- The lowest number of possible adjacent residences would be 199, under the option that includes a Francis Road corridor segment between No. 5 Road and the Shell Road corridor.
- The highest number of possible adjacent residences would be 287, under the pipeline routing option that uses the Williams Road corridor to the Shell Road corridor, the only option that does not use No. 5 Road at all.
- The preliminary pipeline reference alignment, the option that follows the No. 5 Road alignment from Williams Road to Westminster Highway and then along the Shell Road corridor, would be adjacent to approximately 261 residences.
- The option that includes a Blundell Road to Shell Road corridor segment would be adjacent to approximately 230 residences and the option with a Granville Avenue to Shell Road corridor segment, would be adjacent to approximately 265 residences.

For the options that use part of No. 5 Road, there are more single family residences on the south or west side of the pipeline alignment than on the north or east side. As a result, pipeline construction is likely to have fewer effects on individual single family residences if the location of the pipeline is on the north or east side of roadways, than if it is on the south or west side. The location of existing underground utilities and other factors are likely to restrict the location of the pipeline within an existing corridor.

Analysis of the preliminary pipeline reference alignment and possible routing alternatives also show that starting from the proposed fuel receiving facility and running north to the Francis Road corridor, instead of using the Williams Road corridor, will lead to fewer single family residences being adjacent to the pipeline corridor. The Francis Road corridor from the fuel receiving station to No. 5 Road is adjacent to only two single family residences, whereas the Williams Road and No. 5 Road alternative is adjacent to approximately 32 single family residences, as well as some apartment buildings and multi-family units from King Road to Kingsbridge Drive (Francis Road right-of-way). The alignment with the fewest adjacent residences would use the Francis Road corridor from the proposed fuel receiving facility to the Shell Road corridor, resulting in the pipeline corridor being adjacent to 169 single family residences, or 30 fewer residences than would be the case if the Williams Road corridor were used.

**Section 6.3.4.5** and **Appendix 6B** provide an inventory of the types of businesses and business areas that are adjacent to the preliminary pipeline reference alignment and possible routing alternatives. Some of these are listed below:

- The Mylora Golf Course located on Williams Road
- Businesses (zoned Roadside Stand Class C) located along No. 5 Road, which include nursery or garden businesses, U-Pick facilities, farm markets, etc. These businesses typically have some parking facilities accessible only from a driveway on No. 5 Road
- Industrial businesses located along the Shell Road corridor between Westminster Highway and the Bridgeport Trail. These include various industrial complexes, sometimes with multi-unit buildings. These businesses typically have more than one entry to their sites, but not always

Effects to businesses along the pipeline route due to construction may include vehicle and pedestrian mobility restrictions, restricted access to driveways and on-site parking, effects to landscaping/sidewalks, etc., depending on the final alignment selected.

**Section 6.3.4.5** and **Appendix 6B** also list various places of worship and other sites zoned for assembly that are adjacent to some sections of the preliminary pipeline reference alignment and possible routing alternatives. These include various establishments along No. 5 Road that often have a driveway onto No. 5 Road with significant on-site parking. These sites typically have more than one access point or driveway, which should help to minimize effects from pipeline construction.

### **Property Acquisitions and Property Value**

Construction of the fuel receiving facility and marine terminal upgrades will not require additional purchase of properties. VAFFC owns the marine terminal property and proposes to lease the site for the fuel receiving facility from the Port.

Pipeline construction is not expected to require the acquisition of properties along the final selected alignment. Horizontal directional drilling will be required, however, in two or more locations, which will require larger temporary sites to accommodate this type of construction. For these sites, renting temporary work spaces on a few select properties may be required. Rental agreements are likely to require that business access is maintained throughout construction and will limit effects, such as site contamination once construction is complete (Lavers J. pers. comm. 2009).

Property values reflect long-term utility expectations which are not likely to be affected by short-term construction activities. Short-term liquidity of property can be affected by construction activities in circumstances of forced sale. While no detailed construction schedule is currently available, construction activity in most locations along the pipeline corridor is not expected to last sufficiently long to materially affect property values.

### **Motor Vehicle Traffic and Mobility**

The final alignment of the pipeline corridor and detailed construction plans/schedules are yet to be determined, but temporary effects to residences due to construction may include mobility restrictions, restricted access to driveways, effects on landscaping/sidewalks, etc.

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

There are various industrial sites neighbouring the marine terminal property and intended location for the proposed fuel receiving facility, including the Richmond Landfill which generates significant truck traffic.

Construction of the fuel receiving facility and the marine terminal upgrades will increase motor vehicle and truck traffic on Steveston Highway, No. 6 Road and Triangle Road, but should have limited or no effect on motor vehicle traffic to and from the Riverport Recreation and Entertainment Complex and the condominium complex located on Riverport Way. Construction will result in an increase in motor vehicle traffic on Dyke Road, Portside Road and other roads east of the marine terminal, but this increased traffic is unlikely to be noticeable when compared to other industrial traffic from Port activities in the area.

### **Pipeline Corridor**

The fuel delivery pipeline will be built in Richmond and will traverse existing transportation and utility corridors in undeveloped suburban/rural areas and urban settings. The effects on motor vehicle traffic and safety will ultimately depend on the final pipeline alignment selected, and the detailed construction plans. The following paragraphs comment generally on locations where construction may be most problematic in terms of motor vehicle traffic disruption.

As described in **Chapter 2**, pipeline construction is expected to take approximately 12 months to complete overall. In general, pipeline construction should be similar to routine utility construction projects where construction of open-cut road crossings is typically completed in one day, and each 100 metres of pipeline construction typically requires approximately one day (Lavers J. pers. comm. 2009). In areas where directional drilling

is required (i.e., beneath the Moray Channel and beneath Highway No. 99 at Williams Road, as well as for crossing some of the existing underground utilities) pipeline construction is expected to proceed more slowly. Most utility crossings are likely to take approximately 1 week; crossing Highway No. 99 is likely to take several weeks and crossing the Moray Channel will likely take a few months (Lavers J. pers. comm. 2009).

**Table 6.4.3** shows the volume of motor vehicle traffic at select major intersections along the preliminary pipeline reference alignment and possible routing alternatives. The intersections with the highest traffic volumes are along Westminster Highway and at the Shell Road and Alderbridge Way intersection. North-south traffic is significant along No. 5 Road between Williams Road and Westminster Highway, but the north-south traffic on No. 5 Road is about half the east-west traffic along Westminster Highway (City of Richmond 2009d).

**Table 6.4.3** also provides a ranking for each major traffic signal intersection in terms of traffic volumes in Richmond. While No. 5 Road is a major artery in Richmond, Westminster Highway and other east-west corridors such as Alderbridge Way, Cambie Road and Bridgeport Road are much busier corridors. North-South traffic on No. 5 Road between the Williams Road corridor and Westminster Highway averages approximately 16,600 vehicles per day (based on the three No. 5 Road intersections listed in **Table 6.4.3**) compared to an average of approximately 10,300 vehicles per day for Shell Road north of Westminster Highway (based on the data for the three intersections along Shell Road at Alderbridge Way, Cambie Road and Bridgeport Road).

**Table 6.4.3 Traffic Counts for Selected Richmond Intersections**

City of Richmond Traffic Counts	Monday to Friday Daily Averages, February 2006		Total	Traffic Signal Ranking By Volume
	Northbound and Southbound - No. 5 Road or Shell Road	From Intersecting Road (e.g. Williams Road, Blundell Road, etc.)		
No 5 Road & Williams Road	15,275	5,170	20,445	113
No. 5 Road & Blundell Road	18,626	9,521	28,147	79
No 5 Road & Westminster Highway	16,016	38,375	54,391	11
Westminster Highway and Shell Road	3,614	38,643	42,257	30
Shell Road & Alderbridge Way	10,187	42,051	52,238	15
Shell Road & Cambie Road	12,737	24,436	37,173	46
Shell Road & Bridgeport Road	8,093	28,218	36,311	28

Note: Traffic signal ranking by volume is based on February 2006 daily averages and provides ranking for 131 intersections.

Source: City of Richmond. 2009d.

Depending on the final pipeline alignment, two-lane roadways where traffic could be required to alternate under a single lane of traffic during active pipeline construction include:

- Williams Road from the proposed fuel receiving facility to Triangle Road;
- Blundell Road from No. 5 Road to the Shell Road corridor; and
- Granville Avenue from No. 5 Road to the Shell Road corridor.

On Williams Road from No. 5 Road to the Shell Road corridor, there are three lanes for motor vehicle traffic (including a centre turning lane), as well as curbside bicycle lanes in each direction. Bicycle lanes may also be temporarily affected during construction.

Bus lines operate on some of the key arteries along the preliminary pipeline reference alignment and possible routing alternatives, such as along No. 5 Road, along Williams Road between No. 5 Road and the Shell Road corridor, and along Westminster Highway. Bus routes may incur some delays along those roads during construction.

For the preliminary reference alignment, which uses the Williams Road right-of-way between Triangle Road and No. 5 Road, there are 7 properties that include single family houses and/or farm operations that currently have a single point of motor vehicle access from Williams Road.

### **On-Street Parking**

Construction of the marine terminal upgrades, fuel receiving facility and fuel transfer pipeline will occur primarily on property owned by VAFFC or leased from the Port, and should not have any implications for on-street or roadside parking.

During construction of the fuel delivery pipeline, there may be temporary negative effects to on-street parking where City streets are used as part of the pipeline corridor. Using roadside parking areas or lanes, either for construction work areas or traffic diversion alternatives, is preferred to keep as many traffic lanes open as possible. Potential pipeline routing alternatives where roadside parking is currently available include:

- No. 5 Road between Williams Road and Westminster Highway (day/time restricted parking available on both sides of the street);
- several portions of Shell Road between Williams Road and the Bridgeport Trail (particularly on the east side between Cambie Road and Caithcart Road, and the east side between Bridgeport Road and Bridgeport Trail); and

- Blundell Road (north side) and Granville Avenue (both sides) between No. 5 Road and Shell Road.

During business hours, the highest use on-street parking areas of those listed are on Shell Road near the Airport Executive Park (Cambie Road to Caithcart Road) and near the industrial/business parks north of Bridgeport Road. Some pipeline routing alternatives would require use of these parking areas during pipeline construction.

Businesses located along No. 5 Road and Shell Road where on-street parking could be temporarily affected, typically have significant areas of private, off-street parking for employees, clients and customers.

Potential socio-economic/socio-community effects of possible temporary loss of access to on-street parking are expected to be low for all pipeline routing options.

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

The preliminary pipeline reference alignment and possible routing alternatives involve the use of City and railway right-of-ways, some of which are currently used by pedestrians and cyclists. These include:

- **Shell Road Trail:** West of No. 5 Road, between Williams Road and Westminster Highway, tall trees and green shrubs line both sides of this trail making it a popular and important community feature of the City's parks and trails network. The portion of this trail located between Westminster Highway and the Bridgeport Trail is a dedicated cycling/pedestrian trail for most of the way, but it is paved and is adjacent to motor vehicle traffic. Using the Shell Road Trail for the pipeline corridor, particularly between Williams Road and Westminster Highway, would affect existing trail users during construction. There may be opportunities to reduce these effects by avoiding disruption to the bicycle/pedestrian trails, for example by constructing the pipeline primarily where the existing CNR railway corridor is located.
- **Bridgeport Trail:** Between Shell Road and Great Canadian Way, the Bridgeport Trail has tall trees and/or green shrubs for most of its length and is a popular and important community feature of urban Richmond. Using the Bridgeport Trail for the pipeline corridor would require the closure of sections of the trail thereby affecting existing trail users during construction.
- **Pedestrian and Bicycle Traffic Along Major City Streets:** There is little information available on pedestrian and bicycle traffic along the major City streets that the pipeline could follow, including No. 5 Road, Westminster Highway and the possible routing options along Williams Road, Francis Road, Blundell Road and

Granville Avenue. There are specific lanes for bicycle traffic on Williams Road, Blundell Road, and Westminster Highway. Pipeline construction may affect pedestrian and bicycle traffic on these streets.

### **Schools, Recreation Areas and Other Community Features**

The main effects due to Project construction on schools, recreation areas and other community features are likely to be temporary and relate to motor vehicle access, pedestrian and non-motorized traffic mobility, noise, and parking access including on-street parking, and effects to trees and vegetation.

Major community features that may need to be considered in construction plans include the schools and places of worship along No. 5 Road, the day care/pre-school on No. 5 Road between Kingsbridge Drive and Blundell Road, the elementary private school and church at the northeast corner of Blundell Road and No. 5 Road, the Mylora Golf Course on Williams Road, Shell Road Trail, Bridgeport Trail, and the Richmond Nature Park. All of these schools, recreation areas and community features are adjacent to and/or accessible from at least one of the possible pipeline alignments, and as a result may be temporarily affected during construction.

### **Street and Trail Trees**

**Section 5.3** of the Application reviews the potential biophysical effects of the Project on vegetation and wildlife. No attempt has been made to assess the value or significance of individual trees or groupings of trees with respect to species, age, health, or heritage value, in the review of potential effects due to construction on aesthetics of street/trail trees in Richmond.

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

Construction of the fuel delivery pipeline along the preliminary reference alignment or possible routing alternatives could potentially affect street/trail trees along the pipeline corridor. Typically, between 15 and 18 metres of temporary construction width is expected for installing the fuel delivery pipeline. This width is typically cleared and vegetation is cut and grubbed to create an adequate working surface. In special circumstances, trees of high historical value are protected and construction would circumvent them. Also, for limited lengths, a narrower construction width will likely be adopted to protect adjacent significant greenbelts (see **Section 6.4.1.2**).

Portions of the potential routing corridors that may be affected during the Project construction, depending on the final alignment and construction footprint include:

- trees and shrubs between the drainage ditches along Williams Road or the Francis Road right-of-way between the fuel receiving facility and No. 5 Road;
- some of the landscaping hedges along Kingsbridge Drive adjacent to the Francis Road right-of-way between No. 5 Road and Shell Road;
- trees lining the trails and pathways along the Shell Road corridor between Williams Road and Bridgeport Road;
- boulevard trees along the east side of Shell Road between Bridgeport Road and the Bridgeport Trail; and
- trees and shrubs along the Bridgeport Trail between Shell Road and Van Horne Way, particularly west of No. 4 Road where the Bridgeport Trail narrows.

From a socio-economic/socio-community perspective, trees that are removed for construction of the pipeline could likely be replaced if desired, but in areas such as the Shell Road Trail or Bridgeport Trail it may take some time for the new trees to provide the same screening and aesthetic value that currently exists. Socio-economic/socio-community effects resulting from removing street/trail trees during construction are expected to be low for all routing options.

### **Marine Traffic**

Marine terminal upgrades are expected to take approximately eight months, including four months for the in-water works. In general, marine terminal upgrades are expected to have a relatively small physical footprint. While floating equipment is likely to be required, any impingement on the safety setback zone/navigation channel will be coordinated with the Port, and marine traffic will always be able to move safely around the floating equipment. It is also expected that any potential effects on marine traffic would be mitigated through the authorization requirements from Transport Canada. Pile-driving will be required as part of the upgrades, but this is not expected to affect existing marine traffic.

### **Noise, GHG Emissions and Health Effects**

A separate noise assessment has been conducted for the Project and is presented in **Section 5.5** of the Application. Noise effects from the construction of the pipeline, the fuel receiving facility and the marine terminal upgrades, excluding pile-driving are predicted to be low. Noise effects associated with pile-driving are predicted to be high over the short-term, which may temporarily affect the residents of the three condominium complex buildings located on Riverport Way, and the single family houses

located between the marine terminal and No. 6 Road. As noted in **Section 6.3.4.5**, these include:

- six houses along Triangle Road/Williams Road from 500 to 700 metres west of the marine terminal;
- 16 houses along No. 6 Road approximately 1 kilometre west of the marine terminal;
- one four-storey hotel near No. 6 Road approximately 1 kilometre southwest of the marine terminal; and
- 139 units in three buildings the Waterstone Pier condominium complex 500 to 700 metres downstream from the marine terminal along the waterfront.

The noise assessment also predicts that the noise from pile-driving may affect activities at Deas Island Regional Park which is located between 1 and 1.5 kilometres across the South Arm of the Fraser and downstream from the marine terminal. This may affect the residents of Burr house as well as users of the group campsite and other park visitors.

Other potential health effects including air quality and vapour emissions are reviewed in **Section 5.4** of this Application. The Project is expected to reduce Greenhouse Gas emissions compared with the existing fuel delivery system.

### **Aesthetic Values/Visuals**

Construction of the pipelines will require that construction machinery be brought in to build the system; as a result there will likely be some minor visual effects during construction for short periods of time in specific locations. In particular, directional drilling is likely to require on-site heavy construction equipment and there may be temporary and minor visual effects for residences along the pipeline routing, depending on directional drilling entry and exit points.

The construction equipment to build the marine terminal and fuel storage facilities will be visible from the Fraser River shorelines, but should not be visually obtrusive given that the project site is surrounded by other industrial users.

### **Railway Rights-of-Way**

An inactive rail right-of-way bisects the marine terminal property, and continues northward adjacent to, and west of the Port lands. Design of the marine terminal and fuel transfer pipeline will consider and accommodate this right-of-way.

The fuel delivery pipeline will cross or traverse under the current CNR rail corridor parallel to Shell Road. The final pipeline alignment selected will determine where and how many crossings are required. The fuel delivery pipeline will cross under the Moray Channel north of the Canada Line crossing, and may cross under a rail right-of-way in the vicinity of Charles Road and No. 3 Road. Horizontal directional drilling will likely be used for crossings under active railway tracks. These crossings are expected to take approximately 1 week each to complete (Lavers J. pers. comm. 2009). The 2010 Richmond Trail Strategy suggests the potential for CNR to eventually abandon the rail right-of-way parallel to Shell Road (City of Richmond 2010b). Depending on the timing of this abandonment, horizontal directional drilling may not be required for crossings of this rail corridor, and it may also be possible to locate the pipeline alignment along this right-of-way, potentially from Williams Road north to the Bridgeport Trail.

### **Utilities**

Based on preliminary designs, the marine terminal and proposed fuel receiving facility are not expected to conflict with any utility lines in Richmond that could not be relatively easily repositioned.

Pipeline construction will necessitate crossing water and sewage lines in Richmond, as well as natural gas, power lines, control cables, telephone cables, etc. The location and number of crossings will depend on the final route selected.

It is also expected that the fuel delivery pipeline will be required to cross the existing aviation fuel delivery pipeline operated by Kinder Morgan. Sections of the existing fuel delivery pipeline corridor are located between Cambie Road and Bridgeport Road, and also cross Shell Road just north of Highway No. 99. Horizontal directional drilling is likely to be required to cross the existing fuel delivery pipeline corridor (Lavers J. pers. comm. 2009). More information on utility crossings/conflicts is expected to become available as the number of pipeline routing options is reduced. Any effects from utility crossings/conflicts are expected to be minor.

Regulations require a 300 millimetre separation between underground utilities, but a minimum of approximately 1 metre separation between underground utilities is typically desired for efficient operations (Lavers J. pers. comm. 2009).

### **First Nations**

**Part C** identifies specific effects of the Project on individual First Nations values including effects on food fisheries, gathering and traditional use of plants and wildlife, or other effects specific to First Nations and how they will be avoided or mitigated.

#### **6.4.1.2 Recommended Mitigation Measures**

Construction-related effects on the neighbourhoods and residents of Richmond that cannot be addressed through the routing of the fuel delivery pipeline are expected to be addressed in the Construction Environmental Management Plan (see **Chapter 9**).

#### **Land Use Regime and Existing Land Use Context**

To ensure that access is not severely restricted during business hours, access plates will likely be required to minimize the effects on road side businesses. There may also be seasonal differences for certain types of businesses that must be considered during construction planning. For example, effects may be mitigated by carrying out construction in winter, as many roadside businesses sell fresh produce or seasonal products.

#### **Motor Vehicle Traffic and Mobility**

Traffic management shall be addressed in a Traffic Management Plan (see **Chapter 9**), separate to the Construction Environmental Management Plan. Traffic management will consider motor vehicle, bicycle and pedestrian traffic and include 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.

In general, the following measures are expected to be implemented:

- In general and where warranted, access plates will be used to cover excavated trenches to maintain on-going access to a driveway or roadside business. In such instances, access will be maintained except for the one or two hours required to dig the trench and install the access plate.
- During non-working hours, all open excavations will be covered or securely enclosed by fencing and patrolled for safety reasons.

There may be certain special considerations for specific effects on motor vehicle traffic and mobility effects:

- Construction on or under major city streets with at least four lanes will seek to allow motor vehicle access to be maintained at a minimum of two lanes of traffic, one in each direction, with periodic stoppages to allow for heavy equipment movement. Construction within a two-lane roadway may require one lane to be completely closed to traffic with the second lane having alternating traffic directed by traffic control personnel. At the completion of each construction day, the Project will seek

to install road plates over disturbed pavement to enable access across open areas and maintain normal traffic flow, where appropriate.

- Should pipeline construction occur on Williams Road between Triangle Road and No. 5 Road, special provisions will be made for the access requirements to the seven adjacent properties with single point access.
- Should construction occur on Williams Road between No. 5 Road and the Shell Road corridor, the Project will attempt to maintain bidirectional traffic flow.

### **On-Street Parking**

To minimize effects of the Project to on street parking, parking for construction workers is recommended not to occur in areas along the fuel delivery pipeline route in areas where curbside parking is in high demand.

### **Bicycle and Pedestrian Traffic**

For pedestrians, it is likely that mobility restrictions may require detours with additional street crossings, and for bicycle traffic, detours to alternate street corridors may be recommended.

There may be opportunities to substantially reduce the Project effects to bicycle/pedestrian traffic and mobility on the Shell Road Trail by avoiding disruption to the bicycle/ pedestrian trails, for example by constructing the pipeline primarily where the existing CNR railway corridor is located. This option is being considered and will be finalized during detailed design.

### **Schools/Recreation Access and Other Community Features**

Major community features that may need to be considered in construction plans include the schools and places of worship along No. 5 Road, the day care/pre-school on No. 5 Road between Kingsbridge Drive and Blundell Road, the elementary private school and church at the northeast corner of Blundell Road and No. 5 Road, the Mylora Golf Course on Williams Road, Shell Road Trail, Bridgeport Trail, and the Richmond Nature Park.

### **Street and Trail Trees**

Environmental protection for Street and Trail trees will be incorporated in the Construction Environmental Management Plan to ensure best environmental construction practices to minimize effects to surrounding vegetation and tree stands of public value, particularly along the Bridgeport Trail between No. 4 Road and Van Horne Way. This protection is

expected to include methods to protect trees of high historical value, and a narrowed construction footprint, as appropriate, to minimize effects on greenbelt areas. At the completion of construction, greenbelts will be reseeded and visual screens of bushes may be planted in select locations (Chinook Engineering 2010).

### **Utility Crossings and/or Conflicts**

A communication strategy is recommended to be incorporated into the Construction Environmental Management Plan to give advance notice of utility works and any disruptions in services that may result. In addition, there are various existing utilities that may restrict the exact location of the pipeline within a given corridor. For example, along the east side of No. 5 Road, there is a water main that could prevent the pipeline from being located on that side of the corridor.

#### ***6.4.1.3 Summary of Construction Effects and Mitigation***

Construction of the Project is expected to:

- Create an estimated 320 person years of direct construction employment or approximately 160 person years per year for approximately two years; based on a conservative \$80 million construction cost and including the 100 direct person years estimated, and other direct jobs in transportation, off site fabrication, etc.
- Generate an additional 330 person years of indirect employment during construction from supplying goods and services to the Project and another 112 person years of induced employment from purchases of goods and services by direct and indirect employees
- Increase Gross Domestic Product by approximately \$52.8 million including direct, indirect and induced benefits
- Provide YVR with access to more dependable, diverse and competitive offshore fuel supply sources to meet YVR's long-term fuel requirements

The potential adverse effects from construction will be temporary and will be primarily associated with motor vehicle, bicycle and pedestrian mobility, particularly along the pipeline corridor where trench construction will be required, depending on the route alignment selected. Disruptions to motor vehicle traffic lanes, bicycle lanes/paths and pedestrian sidewalks/trails may be required. On-street parking may also be temporarily affected during pipeline construction, which may be problematic for some businesses and residents.

The final alignment of the pipeline corridor and detailed construction plans/schedules are yet to be determined. Temporary construction phase effects to residences and may include mobility restrictions, restricted access to driveways and effects on landscaping/sidewalks. Depending on the final fuel delivery pipeline alignment, between 169 and 287 single family residences (with significant setbacks in some cases) could be adjacent to the fuel delivery pipeline. These exclude residences in multi-family buildings. Effects to land use and businesses along the pipeline route due to construction, including vehicle and pedestrian mobility restrictions, restricted access to driveways and on-site parking, effects to landscaping/sidewalks, are expected to be fully mitigated through the use of access plates and a Traffic Management Plan.

Construction activity in most locations along the pipeline corridor, the marine terminal and the fuel receiving facility are not expected to last sufficiently long to materially affect property values.

The main effects due to the Project construction on schools, recreation areas and other community features are likely to be temporary and relate to motor vehicle access, pedestrian and non-motorized traffic mobility, noise, dust, parking access including on-street parking, and effects to trees and vegetation. No effects to schools/recreational access are expected; however, some major community features may need to be considered during creation of the construction plans and Traffic Management Plan.

Depending upon the finalized alignment, construction of the fuel delivery pipeline along the preliminary reference alignment or possible routing alternatives could potentially affect street/trail trees along the pipeline corridor. Environmental protection for street and trail trees will be incorporated into the Construction Environmental Management Program.

It is also expected that any potential effects on marine traffic as a result of floating equipment or pile driving necessary for construction would not have any impingement on the safety setback zone/navigation channel and would be mitigated through the authorization requirements from Transport Canada.

**Section 5.5** includes the potential operational noise effects, recommended mitigation measures and potential residual effects associated with Project operation. **Section 5.4** includes the potential operational air quality effects, recommended mitigation measures and potential residual effects associated with the Project's operation. **Chapter 8** discusses the potential human health effects, recommended mitigation measures and potential residual effects associated with the Project.

Construction of the pipelines will require that construction machinery be brought in to build the system; as a result there will likely be some minor visual effects during construction for short periods of time in specific locations.

Pipeline construction will require a crossing under Highway No. 99 and may require crossings under railway right-of-ways and utilities by means of horizontal directional drilling underground. There may be temporary and minor visual effects associated with drilling equipment for residences adjacent to the pipeline corridor, depending on the final route and the exact locations for the horizontal directional drilling entrance and exit points.

Construction-related effects on the neighbourhoods and residents of Richmond that cannot be addressed through the routing of the fuel delivery pipeline are expected to be addressed in the detailed Construction Environmental Management Program, as the Project moves into the detailed design phase. To ensure that any negative socio-economic or socio-community effects from construction are not significant, mitigation strategies required during construction of the Project include:

- **Land Use Regime and Existing Land Use Context Effects:** Access plates will likely be required to ensure access to road side businesses is not severely restricted during business hours. The Traffic Management Plan will consider the seasonal sensitivities of roadside businesses, as appropriate.
- **Motor Vehicle Effects:** The Traffic Management Plan will consider motor vehicle, bicycle and pedestrian traffic and include 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. As there may be seasonal sensitivities for certain types of businesses (for example road side businesses selling fresh produce or garden related products), motor vehicle access effects may be mitigated by avoiding pipeline construction in certain seasons. In addition, access plates will be used where appropriate to ensure motor vehicle access is not severely restricted during construction. Finally, the Project will seek to avoid affecting the local flow of traffic and will attempt to ensure unidirectional or bidirectional traffic flow, where appropriate. Site-specific mitigation measures should be implemented as per **Section 6.4.1.2**.
- **Utility Crossings and/or Conflicts:** The Traffic Management Plan will include a communication strategy to give advance notice of utility works and any disruptions in services that may result.
- **Effects on On-Street Parking:** To minimize effects of the Project to on street parking, parking for construction workers is recommended not to occur in areas

along the fuel delivery pipeline route in areas where curbside parking is in high demand.

- **Bicycle and Pedestrian Traffic Effects:** During construction, allowances will be made for additional street crossings for pedestrian and alternate detours for bicycles, as appropriate. There may be opportunities to substantially reduce the Project effects to bicycle/pedestrian traffic and mobility on the Shell Road Trail by avoiding disruption to the bicycle/ pedestrian trails, for example by constructing the pipeline primarily where the existing CN railway tracks are located.
- **Schools/Recreation Access and Other Community Features:** Major community features that may need to be considered in construction plans include the schools and places of worship along No. 5 Road, the day care/pre-school on No. 5 Road between Kingsbridge Drive and Blundell Road, the elementary private school and church at the northeast corner of Blundell Road and No. 5 Road, the Mylora Golf Course on Williams Road, Shell Road Trail, Bridgeport Trail, and the Richmond Nature Park.
- **Effects on Street and Trail Trees:** Environmental protection for Street and Trail trees will be incorporated in the Construction Environmental Management Program to ensure best environmental construction practices to minimize effects to surrounding vegetation and tree stands of public value, particularly along the Bridgeport Trail between No. 4 Road and Van Horne Way. At the completion of construction, greenbelts will be reseeded and visual screens of bushes may be planted in select locations (Chinook Engineering 2010).

## 6.4.2 Project Operations

### 6.4.2.1 Potential Effects

This section reviews the potential effects from on-going operations at the proposed marine terminal, fuel receiving facility and fuel transfer and delivery pipelines under normal and routine operations (i.e., potential effects as a result of an accident or malfunction are not considered, but are assessed in **Chapter 15** and **Chapter 19**).

### Economic Development

The primary economic development effect of the Project's operations is to aid YVR in remaining competitive as a world class airport, and by doing so assist with the general economic competitiveness of Metro Vancouver, B.C., and Canada. As noted in **Section 6.3.3**, the socio-economic influences of YVR are very significant to the

economies of Richmond, Metro Vancouver, B.C. and Canada. YVR is Canada's second busiest airport, generates 26,700 direct jobs representing 23,800 person years of employment, and has some 360 associated employers located on Sea Island (Vancouver Airport Authority 2006). The fuel delivery system is an integral part of YVR operations, and the YVR Master Plan recognizes the need for a new airport fuel delivery system (Vancouver Airport Authority 2007).

Also noted in **Section 6.3.3**, the provincial government recently acknowledged the importance of maintaining the international competitiveness of YVR, specifically with respect to aviation fuel costs, in announcing an initiative to eliminate aviation fuel taxes for international flights (B.C. Ministry of Finance 2010). The 2005 Economic Impact Study for YVR indicated that 30% of passengers at YVR are connecting through YVR to their final destinations (Vancouver Airport Authority 2006). Each new daily international service to YVR generates between 102 and 190 person-years of direct employment, between \$5 million and \$8.9 million in wages, and between \$8 million and \$15 million in provincial Gross Domestic Product annually (InterVistas Consulting Inc. 2006).

YVR is also a key element of Richmond's economy and it provides major economic development benefits to the City. Many top employers have chosen to locate in Richmond partly because of its proximity to YVR. The airport is also a significant contributor to Richmond's industrial tax base, contributing \$22 million per year in tax revenues to municipal governments of which \$11.8 million are in grants-in-lieu of taxes (Vancouver Airport Authority 2006). Moreover, the airport contributed approximately 15% of the capital costs of the recent Canada Line rapid transit project linking downtown Vancouver to YVR and Richmond, which further enhances Richmond's economic growth and sustainability potential.

During operations, the Project will generate approximately 14 full-time equivalent jobs. This excludes the person years for off-loading vessels at the proposed marine terminal, but also excludes any potential negative effects to jobs from reduced trucking deliveries. The increased employment from the Project operations is not likely to have a noticeable effect on the demographics of the local communities.

Marine traffic from Project operations is not expected to have any effects on Fraser River-based fisheries given the low number of Project associated vessels expected to transit the river each year, and existing levels of marine traffic on the river. This is discussed later in this section under the heading Marine Traffic.

## **Land Use Regime and Existing Land Use**

**Section 6.3.4.6** reviews the land use regime, existing land use and nearby properties for each Project component. The marine terminal property is zoned for industrial use and neighbouring properties are similarly zoned for industrial uses to the north and west. Neighbouring properties are zoned for agriculture to the northwest and for Athletics and Entertainment zoning to the southwest. Watermania, the aquatic centre and most eastern building of the Riverport complex, is approximately 0.5 kilometres downstream of the marine terminal. The proposed location for the fuel receiving facility is on Port administered land designated for industrial uses. The Port has indicated that this Project component complies with the existing Port Land Use Plan designation for the site. Lands immediately surrounding the proposed fuel receiving facility location are largely undeveloped and zoned for industrial uses, and beyond the industrial lands are lands zoned for agriculture (Agricultural Land Reserve).

The proposed fuel delivery pipeline route will traverse existing transportation and utility corridors in Richmond. Once in operation, the existence of an underground aviation fuel pipeline will not affect future uses of the privately or publicly owned properties that are adjacent to the pipeline (construction of structures would not be permitted directly above the pipeline right-of-way). There is no land use restriction associated with proximity to an aviation fuel pipeline. Also, the existence of an underground aviation fuel pipeline would not prevent other utilities from using that same corridor, although it would require that any new utility be installed with some minimum separation from the fuel delivery pipeline.

## **Property Value**

Throughout this assessment, the term “property value” refers 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. For example, an individual may derive less “enjoyment” value from his/her property as a result of the proposed pipeline, but the market may not place a value on his/her uneasiness from residing in a property that is now adjacent to the pipeline corridor. One of the main potential concerns of residents in the City of Richmond could be whether the existence of an aviation fuel pipeline will affect property values.

Two U.S. studies conducted in 2008 provide some insight into whether pipelines transporting hydrocarbon products affect property values:

- In 2008, the U.S. Pipeline Safety Trust conducted a survey of residents on perceptions related to pipeline safety, and found that the perception of the residents

was that the construction of a pipeline transporting fuels would affect their property values. The U.S. Pipeline Safety Trust was established in Bellingham (Washington) as a non-profit public charity. In the 2008 survey, 85% of survey respondents reported that they believe a fuel transmission pipeline on their property could result in a decrease in property value, even though in that same survey, excluding those who had no opinion on the topic, 63% of people believed that fuel pipelines are safer than other methods of transporting fuels such as tanker trucks, trains, barges and tankers (Pipeline Safety Trust 2008).

- A 2008 study on the effects of natural gas pipelines and residential property values in Clackamas and Washington Counties in Oregon found that the pipelines had no effect on property values (EcoNorthwest 2008).

In Metro Vancouver, there is little evidence that the existence of an aviation fuel pipeline would affect property values negatively, although no specific studies of the influence of fuel pipelines on property values in the Metro Vancouver context were available for this assessment. Although information on the location of the existing 41-kilometre long fuel delivery pipeline is available from Burnaby and Richmond municipalities, the pipeline corridor is not commonly known. For example, in Richmond, the existing pipeline crosses Shell Road in a residential area between Cambie Road and Bridgeport Road. It is doubtful that real estate values and sales of residences and other properties along the existing pipeline corridor would demonstrably differ from those of other major arteries in those communities.

It is possible that some short-term negative effects on property values along the proposed pipeline corridor could develop under certain circumstances during operations. For example, this could occur if there was a significant accident or malfunction in the Metro Vancouver area that has substantial negative effects on a property or neighbourhood, even if that accident involved a natural gas or oil pipeline that bears little resemblance to the operations and risks associated with an aviation fuel pipeline.

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.

### **Motor Vehicle Traffic, Mobility and On-Street Parking**

Once the Project is in operation, it is expected to eliminate the trucks that currently carry aviation fuel to YVR on a daily basis. Under the existing fuel delivery system, up to 35 tanker trucks travel roundtrip daily from the Cherry Point Refinery located in Bellingham

(Washington) to YVR. Trucks delivering fuel from the Cherry Point refinery travel across the Alex Fraser Bridge on Highway No. 91 to Richmond, along Highway No. 99 to Bridgeport Road, and across the Moray Channel to YVR. With the existing fuel delivery system unaltered, over 120 tanker trucks could be expected to travel daily from Washington State within 20 years. These are large tanker trucks, each carrying approximately 39,000 litres of aviation fuel per truckload.

Trucks carrying aviation fuel contribute to traffic congestion, although they represent a relatively small percentage of the total motor vehicle traffic along the route travelled.

Fuel truck deliveries contribute to the congestion of Richmond streets such as Bridgeport Road and Sea Island Way to and from YVR. Westbound traffic counts on Bridgeport Road just before entering the intersection at Garden City Way indicate 21,599 motor vehicle trips per day and eastbound daily traffic on Sea Island Way (fuel tanker trucks return from YVR via Highway No. 99) is measured at 15,826 motor vehicles per day (2006 traffic counts as per City of Richmond 2009d). The Sea Island Way and Garden City Road intersection in Richmond is ranked 9<sup>th</sup> in Richmond in terms of traffic volume, which makes reduction in traffic in that area particularly desirable.

Other benefits associated with elimination of truck traffic would include increased traffic safety and reduced road maintenance costs.

Once the Project is in operation, there will be no or negligible effect on on-street parking along the proposed pipeline corridor.

### **Bicycle and Pedestrian Traffic**

Once the pipeline is in operation, there are not expected to be any negative effects on pedestrian or bicycle traffic, as the pipeline corridor is expected to be returned to at least pre-construction conditions.

Long term maintenance of the pipeline may require periodic access by localized excavation. It would be expected that any repairs or upgrades would be carried out in much the same way as the pipeline construction activities.

The integration of the City of Richmond dyke trail system with the marine terminal facility will provide public passage across the marine terminal property, a significant benefit to bicycle and pedestrian traffic which does not currently exist on the property. This will facilitate continuation of the river dyke access trail along the waterfront in accordance with the Richmond 2010 Trails Strategy (City of Richmond 2010b).

## **Schools, Recreation Areas and Community Features**

The on-going operations/maintenance phase of the Project is not expected to have any effects on schools, recreation areas and community features.

## **Street and Trail Trees**

The on-going operations/maintenance phase of the Project is not expected to have any effects on street or trail trees.

## **Marine Traffic**

The Project will generate a relatively minor incremental volume of marine traffic in the Fraser River along the 21 kilometres from Sand Heads to the marine terminal.

Vessels that currently travel to Westridge Marine Terminal located in Burrard Inlet will be directed to the new marine terminal on the river. Initially, as described in **Section 2.4.4.4**, vessel traffic is expected to be as follows:

- One to two barges every two weeks with an off-loading time of 12 hours
- One larger tanker every month with an off-loading time of between 24 and 36 hours

The capacity of a standard barge is approximately 20 million to 35 million litres and 40 million to 50 million litres for a handysize product carrier. The marine terminal will also be able to handle partly-laden Panamax-class tankers with capacities of up to 60 million litres.

Once in operation, the marine terminal is expected to handle three to five vessels per month, or between 36 and 60 vessels per year including a mix of barges and deep sea tankers. The increased marine traffic on the Fraser River resulting from the Project will be relatively modest when compared to the number of large barges and vessels that travel on the Fraser River each day.

- Port Metro Vancouver reported 475 deep sea foreign vessel arrivals in the Fraser River for 2009, and a 3-year annual average of 538 vessel arrivals between 2007 and 2009 (excluding the significant daily domestic traffic of large vessels/barges) (Muller S. pers. comm. 2010).
- As described in **Section 6.3.4.1**, some of the large stevedoring and distribution facilities along the South Arm include Fraser Wharves, a facility near the marine terminal that handles Pure Car Carrier vessels regularly; Coast 2000 Terminal Ltd., another marine facility near the proposed marine terminal; Fraser Surrey Docks, a

facility that annually handles between 300 and 400 deep sea vessels up to Panamax-class size; and Seaspan Coastal Intermodals on Tilbury Island in Delta that operates a daily scheduled truck and trailer ferry service between the Lower Mainland and Vancouver Island.

- As noted in **Section 6.3.2.2**, FREMP recognizes the significance of the Fraser River estuary as a major shipping route and expects traffic in the South Arm to continue to increase, particularly since it compares favourably to trucking in terms of transportation costs and environmental costs (FREMP 2009).

In summary, the addition of approximately three to five more vessels each month (or even double that number if required in the future), is likely to have very limited or no measurable effect on other marine traffic in the South Arm of the Fraser River, and is not expected to be noticeable in the context of other daily traffic of large vessels and barges in the Fraser River's South Arm environment.

### **Noise, GHG and Health**

A separate noise effects assessment of the Project is presented in **Section 5.5**, which concludes that "low to moderate noise effects could occasionally occur at neighbouring residences due to low frequency noise from shipboard generators operating at night". Residences that may occasionally be moderately affected by noise are the single family houses located between the marine terminal and No. 6 Road and the condominium complex on Riverport Way. As described in **Section 6.3.4.5**, these include 6 houses along Triangle Road/Williams Road, 16 houses along No. 6 Road, and 139 condominium units.

**Section 5.4** provides an assessment of the air quality and net Greenhouse Gas effects associated with this fuel receiving system.

**Chapter 8** provides an assessment of the health effects and recommended mitigation measures required for the Project.

### **Aesthetic Values/Visuals**

Once in operation, the Project will have limited or no visual effects. There will occasionally be vessels moored at the marine terminal, which will be visible from the southern side of the Fraser River South Arm, as well as from various view points along the waterfront trail west and east of the marine terminal. The sight of the vessels and lighting requirements at the marine terminal will be similar to the vessels currently seen at other nearby locations on the river, such as at Fraser Wharves Ltd. property. Lighting

at the berth area and other active operational zones will be designed in accordance with the Illuminating Engineering Society of North America recommended illuminance and Part IV of the Canadian Labour Code.

The fuel storage tanks will be approximately 15 metres high. Given that the surrounding properties are primarily zoned for industrial uses, the immediate visual effects from fuel storage tanks should not be of concern to adjacent property users. The tanks will likely be visible from some of the condominiums on Riverport Way, as well as from vantage points across the South Arm, including recreation areas, but the tanks should not significantly obstruct views.

The fuel delivery pipeline will be located underground (with the exception of valve stations) and as a result there should be no visual effects associated with the fuel delivery pipeline once in operation.

### **Railways**

Once the Project is in operation there should be no effect on railway corridors. The rail right-of-way that bisects the marine terminal property continues north adjacent to, and west of, Port lands. There are currently no railway tracks on this right-of-way. The design of the marine terminal and fuel transfer pipeline will take this rail corridor into account. Once pipeline construction is completed, any rail crossings (i.e., near Shell Road and near the Moray Channel crossing) should not have any effects on rail operations.

### **Utilities**

Once pipeline construction is completed, the crossings of Richmond utilities, natural gas pipelines, and the existing fuel delivery pipeline should not conflict with the operations of those utilities.

### **First Nations**

This assessment recognizes that both First Nations and non-first nations communities depend on the same land and marine base, and as a result, some of the effects identified may be of relevance to First Nations (e.g., benefits from efficient airport operations, benefits from reduced truck traffic, etc.).

VAFFC has consulted with First Nations potentially affected by the Project, as directed by the EAO. First Nations were asked to provide VAFCC with information on their current and past uses of the Project area. Where this information was provided by a First Nation it

has been included in the Application. Where the First Nation did not provide the requested information, available secondary sources of information were used.

**Part C** includes a review of any specific effects of the Project on individual First Nations rights and interests including those on the food fisheries, hunting and gathering of plants and on other issues specific to First Nations.

#### ***6.4.2.2 Recommended Mitigation Measures***

During operations, the following mitigation measures are recommended to ensure the Project has minimal adverse effect on the surrounding community:

##### **Bicycle and Pedestrian Traffic**

When periodic maintenance involved with the pipeline right-of-way occurs, measures to alert the public and accommodate local vehicle, bicycle and pedestrian traffic is recommended.

##### **Aesthetic Values/Visuals**

Mitigation strategies, such as the use of hedges or plantings, may be available to reduce visual effects of the fuel storage tanks through on-site landscaping.

#### ***6.4.2.3 Summary of Operations Effects and Mitigation***

The major long term-benefit of the Project is to assist YVR in remaining competitive as a world class airport, and by doing so enhance the general economic competitiveness of Richmond, Greater Vancouver, B.C. and Canada. The fuel delivery system is an integral part of YVR operations, and the YVR Master Plan recognizes the need for a new airport fuel delivery system.

Other benefits from the Project include:

- reductions in motor vehicle traffic volumes, an increase in public safety, and reduced maintenance of city streets, as the project reduces truck traffic carrying aviation fuel; and
- improvements to bicycle and pedestrian mobility provided by public passage across the marine terminal property, thereby facilitating continuation of Richmond's river dyke access trail.

Construction and inspection activities along the pipeline corridor related to operations will be rare and short in duration. When periodic maintenance involved with the pipeline

right-of-way occurs, measures to alert the public and accommodate local vehicle, bicycle and pedestrian traffic is recommended.

Some minor long term adverse socio-economic/socio-community effects from on-going operations of the Project may result from short-term effects on property value as a result of fuel pipeline construction, slight changes to marine traffic at the marine terminal and visual impacts of certain Project elements and from noise generated at the marine terminal.

The fuel storage tanks, occasional vessel moored at the marine terminal, and lighting requirements of the fuel receiving facility and marine terminal will likely be visible from some of the condominiums on Riverport Way, as well as from vantage points across the Fraser River South Arm, including recreation areas. While these may be visible, the fuel storage tanks and other Project facilities are not expected to significantly obstruct views from nearby properties. Mitigation strategies may be available to reduce visual effects of the fuel storage tanks through on-site landscaping. The visual effects associated with lighting requirements at the marine terminal and fuel receiving facility, are expected to be mitigated by the above mitigation measures.

The noise assessment (see **Section 5.5**) concludes that low to moderate noise effects could occasionally occur as a result of low frequency noise from shipboard generators operating at night, and this could affect single family houses located between the marine terminal and No. 6 Road as well as the condominium complex on Riverport Way. The noise assessment provides mitigation strategies relating to potential noise effects.

## **6.5 Potential Residual Effects and their Significance**

The assessment indicates that the Project will have no significant negative long-term residual effects during construction and ongoing operations/maintenance provided the recommended mitigation measures are implemented.

During construction (see **Table 6.5.1**), all potential residual effects were rated “negative moderate” or better. The only potential effect rated “negative moderate” was on motor vehicle traffic and mobility during the construction phase and this effect rating only applied to three of the five routing alternatives: Williams Rd to No. 5 Rd to Westminster Highway to Shell Rd; Williams Rd to No. 5 Rd to Blundell Rd to Shell Rd; and Williams Rd to No. 5 Rd to Granville Ave to Shell Rd. All other potential residual effects were rated “not significant”, except bicycle and pedestrian traffic and mobility. This residual effect is dependant on the routing alignment, as shown in **Table 6.5.2**.

During ongoing operations (see **Table 6.5.3**), the Project is expected to have significant positive effects on YVR and economic activity in the region and the province.

Summary tables of potential residual effects from Project construction and operations are described in **Tables 6.5.1, 6.5.2, and 6.5.3**. A legend for these summary tables is shown in **Table 6.2.1**.

**Table 6.5.1 Residual Effects Matrix for Socio-Economic and Socio-Community VCs during Project Construction**

Valued Component	Potential Residual Effect (by Project Component)		Significance Criteria								Overall Significance Rating
			Magnitude	Geographic Extent	Direction	Duration	Frequency	Reversibility	Ecological Context (Ability to Recover)	Probability	
Economic Development	Project effects on jobs, Gross Domestic Product and economic activity	All Components	Low	Region	Positive	Short-term	Ongoing	Irreversible	N/A	High	Not Significant (positive)
Land Use	The Project will conform with existing land use and Official Community Plans, so there are <b>no expected residual effects</b>	All Components	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Property Acquisitions and Property Value	May affect liquidity during construction period, but no long-term effect	Fuel Delivery Pipeline	Low	Local	Negative	Short-term	Ongoing	Reversible	N/A	Low	Not Significant (adverse)
Motor Vehicle Traffic & Mobility	Traffic from construction vehicles	Marine Terminal	Low	Local	Negative	Short-term	Ongoing	Reversible	N/A	High	Not Significant (adverse)
	Traffic from construction vehicles	Fuel Receiving Facility									
	Changes in motor vehicle traffic flows and access – significance depends on pipeline routing option	Fuel Delivery Pipeline	Moderate / Low	Local	Negative	Short-term	Ongoing	Reversible	N/A	High	Depends on routing option as per <b>Table 6.5.2</b>
On-street Parking	Changes to roadside parking availability	Fuel Delivery Pipeline	Low	Local	Negative	Short-term	Ongoing	Reversible	N/A	High	Not Significant (adverse)
Bicycle/Pedestrian Traffic & Mobility	Changes to bicycle & pedestrian access - significance depends on pipeline routing option	Fuel Delivery Pipeline	Moderate / Low	Local	Negative	Short-term	Ongoing	Reversible	N/A	High	Depends on routing option as per <b>Table 6.5.2</b>
Schools/Recreation Access and Other Community Features	Changes to access and enjoyment - No expected residual effect	Marine Terminal	Low	Local	Negative	Short-Term	Ongoing	Reversible	N/A	High	Not Significant (adverse)
	Changes to access and enjoyment –effects depend on pipeline routing option as per <b>Table 6.5.2</b>	Fuel Delivery Pipeline	Low / No effect	Local	Negative	Short-term	Ongoing	Reversible	N/A	High	Depends on routing option as per <b>Table 6.5.2</b>
Street/Trail Trees	Changes to street or trail trees	Fuel Delivery Pipeline	Low	Local	Negative	Short-term	Once	Reversible	N/A	High	Not Significant (adverse)
Marine Traffic	Changes to Fraser River South Arm navigation	Marine Terminal	Low	Local	Negative	Short-term	Ongoing	Reversible	N/A	High	Not Significant (adverse)
Aesthetic Values/Visuals	Visuals associated with horizontal drilling & other construction equipment	Fuel Delivery Pipeline	Low	Local	Negative	Short-term	Ongoing	Reversible	N/A	High	Not Significant (adverse)

Valued Component	Potential Residual Effect (by Project Component)		Significance Criteria								Overall Significance Rating
			Magnitude	Geographic Extent	Direction	Duration	Frequency	Reversibility	Ecological Context (Ability to Recover)	Probability	
Railway Rights-of-Way	Railway Right-of-way and crossing of tracks near Shell Road and the Moray Channel	Fuel Delivery Pipeline	Low	Local	Negative	Short-term	Ongoing	Irreversible	N/A	High	Not Significant (adverse)
Utilities	Pipeline corridor utility crossings and/or utility displacement	Fuel Delivery Pipeline	Low	Local	Negative	Long-term	Ongoing	Irreversible	N/A	High	Not Significant (adverse)

**Table 6.5.2 Specific Residual Effects Significance Ratings by Pipeline Routing Alternative – Project Construction**

Socio-Economic / Socio-Community Values / Indicators	Specific Activities / Primary Concerns	Overall Significance (by Pipeline Routing Alternative)				
		Williams Rd to No. 5 Rd to Westminster Highway to Shell Rd	Williams Rd to No. 5 Rd to Francis Rd Right-of-way to Shell Rd	Williams Rd to No. 5 Rd to Blundell Rd to Shell Rd	Williams Rd to No. 5 Rd to Granville Ave to Shell Rd	Williams Rd to Shell Rd
Motor Vehicle Traffic and Mobility	Changes in motor vehicle traffic flows and access during construction	Significant (adverse)	Not Significant	Significant (adverse)	Significant (adverse)	Not Significant
Bicycle / Pedestrian Traffic and Mobility	Changes to bicycle and pedestrian access during construction	Not Significant	Significant (adverse) <sup>4</sup>	Not Significant	Not Significant	Significant (adverse) <sup>4</sup>
Schools / Recreation Areas and Other Community Features	Changes to access and enjoyment during construction	Not Significant	No expected residual effect	Not Significant	Not Significant	No expected residual effect

<sup>4</sup> There may be opportunities to substantially reduce the negative effects on bicycle/pedestrian traffic by avoiding disruption to the bicycle/pedestrian trails, for example by constructing the pipeline primarily where the existing CNR railway corridor is located.

**Table 6.5.3 Residual Effects Matrix for Socio-Economic and Socio-Community VCs during Project Operations**

Valued Component	Potential Residual Effect (by Project Component)		Significance Criteria								Overall Significance Rating
			Magnitude	Geographic Extent	Direction	Duration	Frequency	Reversibility	Ecological Context (Ability to Recover)	Probability	
Economic Development	Effects on jobs, Gross Domestic Product and economic activity – mainly from effects on YVR	Marine Terminal	Moderate	Region	Positive	Long-term	Ongoing	Irreversible	N/A	High	Significant (positive)
Fuel Receiving Facility											
Fuel Delivery Pipeline											
Land Use	<b>No expected residual effects</b>	All Components	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Property Acquisitions and Property Value	Property value adjacent to the proposed pipeline - Possible temporary low negative effect due to changes in public perceptions from time to time	Fuel Delivery Pipeline	Low	Local	Negative	Short-term	Infrequent	Reversible	N/A	Uncertain	Not Significant (adverse)
Motor Vehicle Traffic & Mobility	Changes in truck traffic volumes on city streets and highways	Fuel Delivery Pipeline	Low	Local	Positive	Long-term	Ongoing	Reversible	N/A	High	Not Significant (positive)
On-street Parking	<b>No expected residual effect</b>	All Components	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Bicycle/Pedestrian Traffic & Mobility	Changes to bicycle & pedestrian access including access along City dyke Right-of-Way	Marine Terminal	High	Local	Positive	Long-term	Ongoing	Reversible	N/A	High	Not Significant (positive)
	Changes to bicycle & pedestrian access from need to access pipeline for maintenance	Fuel Delivery Pipeline	Low	Local	Negative	Long-term	Infrequent	Reversible	N/A	Low	Not Significant (adverse)
Schools/Recreation Access and Other Community Features	<b>No expected residual effects</b>	All Components	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Street/Trail Trees	<b>No expected residual effects</b>	All Components	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Marine Traffic	Changes to Fraser River South Arm navigation	Marine Terminal	Low	Local	Negative	Long-term	Infrequent	Irreversible	N/A	High	Not Significant (adverse)

Valued Component	Potential Residual Effect (by Project Component)		Significance Criteria								Overall Significance Rating
			Magnitude	Geographic Extent	Direction	Duration	Frequency	Reversibility	Ecological Context (Ability to Recover)	Probability	
Aesthetic Values/Visuals	Visuals associated with storage tanks, facilities, vessels and lighting	Marine Terminal	Low	Local	Negative	Long-term	Ongoing	Irreversible	N/A	High	Not Significant (adverse)
	Visuals associated with storage tanks and facilities	Fuel Receiving Facility									
Railway Rights-of-Way	<b>No expected residual effects</b>	All Components	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Utilities	<b>No expected residual effects</b>	All Components	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

## 6.6 Potential Cumulative Impacts

To meet the provincial requirements for assessing cumulative impacts, the following section has been prepared, in addition to federal requirements addressed in **Chapter 22**.

The assessment identified “significant” potential residual effects relating to “Bicycle/Pedestrian Traffic and Mobility” (**Section 6.4**), resulting from the construction of the proposed pipeline under the preferred pipeline routing alignment, although the assessment recognizes that these negative effects may be substantially mitigated by using the CNR railway corridor. The furthest possible extent of adverse potential residual effects to “Bicycle/Pedestrian Traffic and Mobility” was captured in the delineation of the LSA boundary for the federal assessment of cumulative environmental effects (see **Chapter 22**). The boundary of this LSA extends 100 metres on either side of the proposed pipeline. Any past, present or future foreseeable projects or activities which had a spatial overlap with the LSA and a temporal overlap with the residual effects to the identified VCs were considered.

The “Application to Conduct Works to Upgrade the No. 4 Road Pump Station” project is in close proximity to the LSA boundary at the northern terminus of No. 4 Road at River Road. This project is situated near a bike route, but is set for completion in June 2011. There are several alternate bike routes in the vicinity, and none of the walking routes detailed in Richmond’s Walking Guide Book are located near this project. For this reason, cumulative impacts on “Bicycle/Pedestrian Traffic and Mobility” were assessed as being “negligible”.

Although potential significant residual effects were identified for “Economic Development”, they were not considered in the assessment of cumulative impacts because they were positive in nature, not adverse.

## 6.7 Conclusion

The assessment identified potential residual effects to “Motor Vehicle Traffic and Mobility”, and “Bicycle/Pedestrian Traffic and Mobility” during construction, but not during operations. The final routing of the fuel delivery pipeline will determine significance.

The potential effect was rated “significant adverse” for “Motor Vehicle Traffic and Mobility” during the construction phase for three of the five routing alternatives: Williams Rd to No. 5 Road to Westminster Highway to Shell Road; Williams Rd to No. 5 Road to Blundell Road to Shell Road; and Williams Road to No. 5 Road to Granville Ave to Shell Road. In all cases the effect would be temporary and reversible. If the pipeline route

follows the Shell Road / CNR railway corridor instead of portions of No. 5 Road, then disruption during construction to “Motor Vehicle Traffic and Mobility” will be avoided.

The potential effect was rated “significant adverse” for “Bicycle/Pedestrian Traffic and Mobility” during the construction phase for two of the five routing alternatives: Williams Road to No. 5 Road to Francis Road right-of-way to Shell Road; and Williams Road to Shell Road. The effects would be temporary and reversible, and constructing the pipeline where the existing CNR railway corridor is located would likely substantially reduce the negative effects on “Bicycle/Pedestrian Traffic and Mobility” during construction. Some low adverse effects, including detours and additional street crossings, would remain for “Bicycle/Pedestrian Traffic and Mobility” due to disruptions on Bridgeport Trail and other areas during construction.

During operations, economic development was also deemed to have “significant” residual effects, but of a positive nature. The fuel delivery system is a key part of YVR operations and the primary economic development effect of the Project’s operations would be to aid YVR in remaining competitive as a world class airport thereby enhancing the general economic competitiveness of Metro Vancouver, B.C., and Canada.

Potential cumulative impacts were identified for “Bicycle/Pedestrian Traffic and Mobility” and were assessed as being “negligible”.

## **6.8 Summary of Potential Social and Economic Effects, Recommended Mitigation Measures and Potential Residual Effects**

The assessment presented in this chapter evaluated the potential social and economic effects of Project construction and operations on VCs. This section provides a summary of the overall assessment of socio-economic and socio-community effects, including potential effects, key recommended mitigation, residual effects and their significance.

This section has been prepared to meet the requirements of the EAO, in addition to the overall Project effects assessment summary tables provided in **Chapter 23**.

**Table 6.8.1 Social and Economic – Summary of Potential Effects, Recommended Mitigation and Significance of Residual Effects**

Valued Component	Project Component	Potential Effects	Recommended Mitigation	Significance of Residual Effects (Summary Statement)
<b>Construction Phase</b>				
Economic Development	All Components	Construction-related jobs are expected to be primarily filled by existing members of the local labour force and are expected to have negligible population or demographic effects; and  Construction of the Project, and in particular construction of the marine terminal upgrades, is not expected to affect the Fraser River-based fisheries.	N/A	Potential short-term, positive residual effects may arise as a result of labour requirements for the Project construction.  <b>Residual effects were deemed to be “not significant”.</b>
Land Use	Marine Terminal	It is not expected that the Project will affect future zoning or land use patterns in the area.	To ensure that access is not severely restricted during business hours, access plates will likely be required to minimize the effects on road side businesses. There may also be seasonal differences for certain types of businesses that will be considered in the Traffic Management Plan.	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	Effects to businesses along the pipeline route due to construction may include short-term temporary vehicle and pedestrian mobility restrictions, restricted access to driveways and on-site parking, effects to landscaping/sidewalks, etc., depending on the final alignment selected; and  There may also be effects to places of worship and other sites zoned for assembly that are adjacent to some sections of the preliminary pipeline references alignment and possible routing alternatives.		
Property Acquisitions and Property Value	Marine Terminal	Construction of the fuel receiving facility and marine terminal upgrades will not require additional purchase of properties.	N/A	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	Pipeline construction is not expected to require the acquisition of properties along the final selected alignment, other than the possible purchase or lease of existing transportation or utility right-of-way; and  Potential short-term, adverse residual effects on property values may occur as a result of construction activities along the pipeline route alignment.	N/A	<b>Residual effects were deemed to be “not significant”.</b>

Valued Component	Project Component	Potential Effects	Recommended Mitigation	Significance of Residual Effects (Summary Statement)
Motor Vehicle Traffic and Mobility	Marine Terminal	Construction of the fuel receiving facility and the marine terminal upgrades will increase motor vehicle and truck traffic on Steveston Highway, No. 6 Road and Triangle Road, but should have limited or no effect on motor vehicle traffic to and from the Riverport Recreation and Entertainment Complex and the condominium complex located on Riverport Way; and	<p>The Traffic Management Plan will consider motor vehicle, bicycle and pedestrian traffic and include 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. As there may be seasonal sensitivities for certain types of businesses (for example road side businesses selling fresh produce or garden related products), motor vehicle access effects may be mitigated by avoiding pipeline construction in certain seasons.</p> <p>In general:</p> <ul style="list-style-type: none"> <li>Where warranted, access plates will be used to cover excavated trenches to maintain on-going access to a driveway or roadside business. In such instances, access will be maintained except for the one or two hours required to dig the trench and install the access plate.</li> <li>During non-working hours, all open excavations will be covered for safety reasons.</li> <li>The Project will seek to avoid affecting the local flow of traffic and will attempt to ensure unidirectional or bidirectional traffic flow, where appropriate.</li> <li>Construction on or under major city streets with at least 4 lanes will seek to allow motor vehicle access to be maintained at a minimum of two lanes of traffic, one in each direction, with periodic stoppages to allow for heavy equipment movement. Construction within a two-lane roadway may require one lane to be completely closed to traffic with the second lane having alternating traffic directed by traffic control personnel. At the completion of each construction day, the Project will seek to install road plates over disturbed pavement to enable normal traffic flow.</li> </ul> <p>Depending on the pipeline route alignment, the following considerations for specific effects on motor vehicle traffic and mobility include:</p> <ul style="list-style-type: none"> <li>Should pipeline construction occur on Williams Road between Triangle Road and No. 5 Road, special</li> </ul>	Residual effects were deemed to be “not significant”.
	Fuel Receiving Facility	Construction will result in an increase in motor vehicle traffic on Dyke Road, Portside Road and other roads east of the marine terminal, but this increased traffic is unlikely to be noticeable when compared to other industrial traffic from Port activities in the area.		<ul style="list-style-type: none"> <li>Two-lane roadways where traffic could be required to alternate under a single lane of traffic during active pipeline construction may occur;</li> <li>Bicycle lanes, particularly those on Williams Road from No. 5 Road to the Shell Road Corridor, may also be temporarily affected during construction;</li> <li>Bus routes, including those along No. 5 Road, Williams Road and Westminster Highway, may incur some delays along those roads during construction; and</li> <li>For the preliminary reference alignment, which uses the Williams Road right-of-way between Triangle Road and No. 5 Road, there are 7 properties that include single family houses and/or farm operations that currently have a single point of motor vehicle access from Williams Road.</li> </ul>
	Pipeline Corridor			

Valued Component	Project Component	Potential Effects	Recommended Mitigation	Significance of Residual Effects (Summary Statement)
			<p>provisions will be made for the access requirements to the 7 adjacent properties with single point access.</p> <ul style="list-style-type: none"> <li>Should construction occur on Williams Road between No. 5 Road and the Shell Road corridor, the Project will attempt to ensure bidirectional traffic flow is maintained.</li> </ul>	
On-street Parking	Marine Terminal	Construction will occur primarily on private property, and should not have any implications for on-street or roadside parking.	To minimize effects of the Project to on street parking, parking for construction workers is recommended not to occur in areas along the fuel delivery pipeline route in areas where curbside parking is in high demand.	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	Temporary negative effects to on-street parking where City streets are used as part of the pipeline corridor may occur. Areas with the potential to be affected include: No. 5 Road between Williams Road and Westminster Highway, portions of Shell Road, portions of the Bridgeport Trail, and Blundell Road and Granville Avenue between No. 5 Road and Shell Road.		<b>Residual effects were deemed to be “not significant”.</b>
Bicycle/Pedestrian Traffic & Mobility	Marine Terminal	<b>No identified potential effects</b>	<p>For pedestrians, it is likely that mobility restrictions may require detours with additional street crossings, and for bicycle traffic, detours to alternate street corridors may be recommended.</p> <p>There may be opportunities to substantially reduce the Project effects to bicycle/pedestrian traffic and mobility on the Shell Road Trail by avoiding disruption to the bicycle/pedestrian trails, for example by constructing the pipeline primarily where the existing CN railway tracks are located.</p>	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility	<b>No identified potential effects</b>		
	Fuel Delivery Pipeline	The preliminary pipeline routing alignment and possible routing alternatives may use City and railway right-of-ways that are used by pedestrians and cyclists, including the Shell Road Trail, Bridgeport Trail and other pathways along major city streets.		<b>Residual effects were deemed to be “significant”</b> (the significance of the residual effect is expected to vary depending on the routing option).
Schools/Recreation Access and Other Community Features	Marine Terminal	The main effects due to Project construction on schools, recreation areas and other community features are likely to be temporary and relate to motor vehicle access, pedestrian and non-motorized traffic mobility, noise, dust, parking access including on-street parking, and effects to trees and vegetation.	Major community features may need to be considered in construction plans. Major community features that may need to be considered in construction plans include the schools and places of worship along No. 5 Road, the day care/pre-school on No. 5 Road between Kingsbridge Drive and Blundell Road, the elementary private school and church at the northeast corner of Blundell Road and No. 5 Road, the Mylora Golf Course on Williams Road, Shell Road Trail, Bridgeport Trail, and the Richmond Nature Park.	<b>Residual effects were deemed to be “not significant”.</b>
	Fuel Receiving Facility			<b>No adverse residual effects are expected.</b>
	Fuel Delivery Pipeline			<b>Residual effects were deemed to be “not significant”.</b>
Street/Trail Trees	Marine Terminal	Construction of the marine terminal, fuel receiving facility and fuel transfer pipeline will occur in highly disturbed areas without a significant inventory of trees.	Environmental protection for street and trail trees will be incorporated into the Construction Environmental Management Program to ensure best environmental	<b>No adverse residual effects are expected.</b>
	Fuel Receiving			

Valued Component	Project Component	Potential Effects	Recommended Mitigation	Significance of Residual Effects (Summary Statement)
	Facility			
	Fuel Delivery Pipeline	Construction of the fuel delivery pipeline along the preliminary reference alignment or possible routing alternatives could potentially affect street/trail trees along the pipeline corridor.	construction practices to minimize effects to surrounding vegetation and tree stands of public value, particularly along the Bridgeport Trail between No. 4 Road and Van Horne Way. This protection should include methods to protect trees of high historical value, and a narrowed construction footprint, as appropriate, to minimize effects on greenbelt areas.	<b>Residual effects were deemed to be “not significant”.</b>
Marine Traffic	Marine Terminal	Pile-driving will be required as part of the upgrades, but this is not expected to affect existing marine traffic; and  There is the potential for short-term adverse effects to navigation in the Fraser River South Arm as a result of the floating equipment and/or pile driving necessary for construction of the marine terminal.	It is expected that any potential effects on marine traffic as a result of floating equipment or pile-driving would not have any impingement on the safety setback zone/navigation channel and would be mitigated through the authorization requirements from Transport Canada.	<b>Residual effects were deemed to be “not significant”.</b>
Noise, Greenhouse Gas Emissions and Health Effects	All Components	<b>Table 23.4 (and Section 5.5)</b> includes the potential operational noise effects associated with Project construction.  <b>Table 23.3 (and Section 5.4)</b> includes the potential operational air quality effects associated with the Project’s construction.  <b>Table 23.8 (and Chapter 8)</b> discusses the potential human health effects associated with the Project construction.	<b>Table 23.4 (and Section 5.5)</b> includes the recommended mitigation measures for noise effects associated with Project construction.  <b>Table 23.3 (and Section 5.4)</b> includes the recommended mitigation measures for air quality effects associated with the Project’s construction.  <b>Table 23.8 (and Chapter 8)</b> discusses the recommended mitigation measures for health effects associated with the Project construction.	<b>Table 23.4 (and Section 5.5)</b> includes the potential residual effects associated with noise during the Project’s construction.  <b>Table 23.3 (and Section 5.4)</b> includes the potential residual effects associated with air quality during the Project’s construction.  <b>Table 23.8 (and Chapter 8)</b> includes the assessment of potential residual effects associated with human health effects during the Project’s construction.
Aesthetic Values/Visuals	Marine Terminal	The construction equipment to build the marine terminal and fuel storage facilities will be visible from the Fraser River shorelines, but should not be visually obtrusive given that the Project site is surrounded by other industrial users.	N/A	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	Potential short-term adverse effects may occur as a result of construction machinery required to complete the fuel delivery pipeline and the horizontal direction drilling underneath the Moray Channel.		<b>Residual effects were deemed to be “not significant”.</b>

Valued Component	Project Component	Potential Effects	Recommended Mitigation	Significance of Residual Effects (Summary Statement)
Railway Right-of-Way	Marine Terminal	Design of the marine terminal and fuel transfer pipeline will consider the existing inactive rail right-of-way on the property.	N/A	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	Potential short-term adverse effects may occur to railway right-of-way as a result of the crossings required to complete the fuel delivery pipeline.		<b>Residual effects were deemed to be “not significant”.</b>
Utilities	Marine Terminal	The marine terminal and proposed fuel receiving facility are not expected to conflict with any utility lines that could not be relatively easily repositioned.	The Traffic Management Plan will include a communication strategy to give advance notice of utility works and any disruptions in services.	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	Pipeline construction will necessitate crossing water and sewage lines in Richmond, as well as natural gas, power lines, control cables, telephone cables, and the existing aviation fuel delivery pipeline operated by Kinder Morgan etc. Any effects from utility crossings/conflicts are expected to be minor.		<b>Residual effects were deemed to be “not significant”.</b>
First Nations	All components	<b>Part C</b> identifies specific effects of the Project on individual First Nations values including effects on food fisheries, gathering and traditional use of plants and wildlife, or other effects specific to First Nations and an assessment of how they will be avoided or mitigated.	<b>Part C</b> identifies specific mitigation measures recommended to address First Nations effects and concerns.	<b>Part C</b> identifies any residual effects associated with First Nations interests, concerns and rights and title.
<b>Operations Phase</b>				
Economic Development	All components	<p>The primary economic development effect of the Project’s operations is to aid YVR in remaining competitive as a world class airport, and by doing so assist with the general economic competitiveness of Metro Vancouver, B.C., and Canada.</p> <p>During operations, the Project will generate approximately 14 full-time equivalent jobs. This excludes the person years for off-loading vessels at the proposed marine terminal, but also excludes any potential negative effects to jobs from reduced trucking deliveries.</p> <p>Marine traffic from Project operations is not expected to have any effects on Fraser River-based fisheries given the low number of Project associated vessels expected to transit the river each year, and existing levels of marine traffic on the river.</p>	N/A	<p>Potential long-term positive residual effects may occur as a result of the economic development effects of the Project.</p> <p><b>Residual effects were deemed to be “significant”, but positive.</b></p>

Valued Component	Project Component	Potential Effects	Recommended Mitigation	Significance of Residual Effects (Summary Statement)
Land Use	All Components	<p>The marine terminal property is zoned for industrial use and neighbouring properties are similarly zoned for industrial uses to the north and west. The Port has indicated that this Project component complies with the existing Port Land Use Plan designation for the site.</p> <p>The proposed fuel delivery pipeline route will traverse existing transportation and utility corridors in Richmond. As a result, all project components development are consistent and compatible with existing City of Richmond of Port of Metro Vancouver zoning, and no effects on land use are expected.</p>	N/A	<b>No adverse residual effects are expected.</b>
Property Acquisitions and Property Value	Marine Terminal	<b>No identified potential effects</b>	N/A	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	It is possible that some short-term negative effects on property values along the proposed pipeline corridor could develop under certain circumstances during operations. In the medium to long-term (beyond 3 years of such an incident) any potential negative perception associated with the fuel delivery pipeline would be expected to have dissipated.		<b>Residual effects were deemed to be “not significant”.</b>
Motor Vehicle Traffic and Mobility	Marine Terminal	<b>No identified potential effects</b>	N/A	<b>No adverse residual effects are expected.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	Once the Project is in operation, the fuel delivery pipeline is expected to eliminate approximately 60 one-way tanker truck trips per day, reduce traffic congestions, increase traffic safety and reduce road maintenance costs.		<b>Residual effects were deemed to be “not significant”.</b>
On-Street Parking	All Components	Once the Project is in operation, there will be no or negligible effect on on-street parking along the proposed pipeline corridor.	N/A	<b>No adverse residual effects are expected.</b>
Bicycle and Pedestrian Traffic	Marine Terminal	A benefit to bicycle and pedestrian traffic will occur as a result of the integration of the City of Richmond Dyke Trail system with the marine terminal facility.	N/A	<b>Residual effects were deemed to be “not significant”.</b>
	Fuel Receiving Facility	<b>No identified potential effects</b>		<b>No adverse residual effects are expected.</b>

Valued Component	Project Component	Potential Effects	Recommended Mitigation	Significance of Residual Effects (Summary Statement)
	Fuel Delivery Pipeline	Once the pipeline is in operation, there are not expected to be any negative effects on pedestrian or bicycle traffic, as the pipeline corridor is expected to be returned to at least pre-construction conditions. Long-term maintenance activities may require periodic access restriction as a result of excavations.		<b>Residual effects were deemed to be “not significant”.</b>
Schools, Recreation Areas and Community Features	All Components	The on-going operations/maintenance of the Project is not expected to have any effects on schools, recreation areas and community features.	N/A	<b>No adverse residual effects are expected.</b>
Street and Trail Trees	All Components	The on-going operations/maintenance of the Project is not expected to have any effects on street or trail trees.	N/A	<b>No adverse residual effects are expected.</b>
Marine Traffic	Marine Terminal	The addition of approximately 3 to 5 more vessels each month (or even double that number if required in the future), is likely to have very limited or no measurable effect on other marine traffic in the South Arm of the Fraser River, and is not expected to be noticeable in the context of other daily traffic of large vessels and barges in the Fraser River’s South Arm environment.	N/A	<b>Residual effects were deemed to be “not significant”.</b>
	Fuel Receiving Facility	<b>No identified potential effects</b>		<b>No adverse residual effects are expected.</b>
	Fuel Delivery Pipeline			
Noise, GHG & Health Effects	All Components	<p><b>Table 23.4 (and Section 5.5)</b> includes the potential operational noise effects associated with Project operation.</p> <p><b>Table 23.3 (and Section 5.4)</b> includes the potential operational air quality effects associated with the Project’s operation.</p> <p><b>Table 23.8 (and Chapter 8)</b> discusses the potential human health effects associated with the Project’s operation.</p>	<p><b>Table 23.4 (and Section 5.5)</b> includes the recommended mitigation measures for noise effects associated with Project operation.</p> <p><b>Table 23.3 (and Section 5.4)</b> includes the recommended mitigation measures for air quality effects associated with the Project’s operation.</p> <p><b>Table 23.8 (and Chapter 8)</b> discusses the recommended mitigation measures for health effects associated with the Project’s operation.</p>	<p><b>Table 23.4 (and Section 5.5)</b> includes the potential residual effects associated with noise during the Project’s operation</p> <p><b>Table 23.3 (and Section 5.4)</b> includes the potential residual effects associated with air quality during the Project’s operation.</p> <p><b>Table 23.8 (and Chapter 8)</b> includes the assessment of potential residual effects associated with human health effects during the Project’s operation</p>

Valued Component	Project Component	Potential Effects	Recommended Mitigation	Significance of Residual Effects (Summary Statement)
Aesthetic Values/Visuals	Marine Terminal	Once in operation, the Project will have limited or no visual effects except berthing at the marine terminal and the tanks at the fuel receiving facility.	N/A	<b>Residual effects were deemed to be “not significant”.</b>
	Fuel Receiving Facility			
	Fuel Delivery Pipeline	The fuel delivery pipeline will be located underground (with the exception of valve stations) and as a result there are no expected visual effects.		<b>No adverse residual effects are expected.</b>
Railways	All Components	Once pipeline construction is completed, any rail crossings (i.e., near Shell Road and near the Moray Channel crossing) should not have any effects on rail operations.	N/A	<b>No adverse residual effects are expected.</b>
Utilities	All Components	Once pipeline construction is completed, the crossings of Richmond utilities, natural gas pipelines, and the existing fuel delivery pipeline should not conflict with the operations of those utilities.	N/A	<b>No adverse residual effects are expected.</b>
First Nations	All Components	<b>Part C</b> includes a review of any specific effects of the Project on individual First Nations rights and values including those on the food fisheries, hunting and gathering of plants and on other issues specific to First Nations.	<b>Part C</b> includes a description of recommended mitigation measures used to address First Nations concerns, issues and rights and title.	<b>Part C</b> includes an assessment of any residual effects as a result of First Nations concerns, issues and rights and title.

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