Vancouver Airport Fuel Delivery Project
Lower Mainland, British Columbia

PROJECT DESCRIPTION

Submitted to:
The British Columbia Environmental Assessment Office
(Under Section 7 of the British Columbia Environmental Assessment Act)

JANUARY 2009

Prepared by: HATCH
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<th>Definition</th>
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<tbody>
<tr>
<td>ALR</td>
<td>Agricultural Land Reserve</td>
</tr>
<tr>
<td>BC</td>
<td>British Columbia</td>
</tr>
<tr>
<td>BCEAA</td>
<td><em>British Columbia Environmental Assessment Act</em></td>
</tr>
<tr>
<td>BCEAO</td>
<td>British Columbia Environmental Assessment Office</td>
</tr>
<tr>
<td>CEAA</td>
<td><em>Canadian Environmental Assessment Act</em></td>
</tr>
<tr>
<td>City</td>
<td>City of Richmond</td>
</tr>
<tr>
<td>DWT</td>
<td>Dead Weight Tonne(s)</td>
</tr>
<tr>
<td>DP</td>
<td>Development Permit</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Assessment</td>
</tr>
<tr>
<td>EAC</td>
<td>Environmental Assessment Certificate</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ERC</td>
<td>Environmental Review Committee</td>
</tr>
<tr>
<td>ESA</td>
<td>Environmentally Sensitive Area</td>
</tr>
<tr>
<td>FREMP</td>
<td>Fraser River Estuary Management Program</td>
</tr>
<tr>
<td>HADD</td>
<td>Harmful alteration, disruption and destruction</td>
</tr>
<tr>
<td>km</td>
<td>kilometre(s)</td>
</tr>
<tr>
<td>km²</td>
<td>square kilometre(s)</td>
</tr>
<tr>
<td>m</td>
<td>metre(s)</td>
</tr>
<tr>
<td>m³</td>
<td>cubic meter(s)</td>
</tr>
<tr>
<td>mm</td>
<td>millimetre(s)</td>
</tr>
<tr>
<td>NAD</td>
<td>North American Datum</td>
</tr>
<tr>
<td>No.</td>
<td>Number</td>
</tr>
<tr>
<td>PJ</td>
<td>Petajoules</td>
</tr>
<tr>
<td>Port</td>
<td>Port Metro Vancouver</td>
</tr>
<tr>
<td>RMA</td>
<td>Riparian Management Area</td>
</tr>
<tr>
<td>TMJ</td>
<td>Trans Mountain (Jet Fuel) Inc.</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>UTM</td>
<td>Universal Transverse Mercator Coordinate System</td>
</tr>
<tr>
<td>VAFFC</td>
<td>Vancouver Airport Fuel Facilities Corporation</td>
</tr>
<tr>
<td>VAA</td>
<td>Vancouver Airport Authority</td>
</tr>
<tr>
<td>YVR</td>
<td>Vancouver International Airport</td>
</tr>
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</table>
Executive Summary
Executive Summary

Vancouver International Airport (YVR) has experienced tremendous growth over the last two decades, driving an increase in the demand for aviation fuel. Over the same period of time, local aviation fuel refining capacity has declined to the point where international sources now supply the majority of fuel requirements at YVR. In the future, any increase in the demand for aviation fuel at YVR will, of necessity, be supplied from international sources. The existing aviation fuel delivery system is inadequate to meet future fuel requirements at YVR.

Vancouver Airport Fuel Facilities Corporation (VAFFC) proposes a new aviation fuel delivery system (“the Project”) that will meet the future demand for fuel at YVR and reflect the changes in the supply market logistics.

About Vancouver Airport Fuel Facilities Corporation

VAFFC is a not-for-profit company owned by a consortium of commercial airlines representing most of the domestic and international carriers that operate at YVR. VAFFC owns and operates fuel storage and distribution facilities at YVR that include fuel storage tanks, an underground pipeline hydrant system and related equipment used to transfer fuel from VAFFC’s storage tanks to the airplanes. These facilities are shared among the airlines, allowing them to avoid duplication and minimize costs. Similar fuel facility corporations operate at all of the major international airports across Canada.

Existing Fuel Delivery System

Aviation fuel is currently delivered to YVR through a pipeline owned by Trans Mountain (Jet Fuel) Inc. (TMJ) and by tanker trucks from fuel suppliers in the United States (US). The fuel delivery pipeline system was constructed in the late 1960s when four refineries operated in the Burnaby area. Today, only Chevron Canada Limited’s Burnaby refinery remains in operation, and it is the only source of aviation fuel in the Lower Mainland of British Columbia (BC).

The existing pipeline system delivers about 80% of the fuel requirements at YVR, with about half being supplied from the Chevron refinery and the other half being supplied via marine deliveries from offshore sources to the Westridge Marine Terminal in the Port of Vancouver.

The existing delivery pipeline has difficulty meeting fuel demand at YVR during peak times. As a result, the airlines operating at YVR are increasingly reliant on tanker truck deliveries from the BP/ARCO Cherry Point refinery in Washington State. Currently, YVR receives between 25 and 30 tanker truck deliveries per day (approximately 20% of the total fuel requirement), increasing to over 35 deliveries per day during periods of peak fuel demand. Reliance on tanker trucks to augment the pipeline is not a viable option over the long-term.

Based on air passenger forecasts obtained from Vancouver Airport Authority (VAA), VAFFC expects the limitations of the fuel delivery system to become critical by 2011. Given the long lead time necessary to plan and develop a new fuel delivery system to accommodate the growth in traffic at YVR, VAFFC must prepare now to be ready to meet the imminent need.

Future Fuel Delivery System

VAFFC regularly reviews its future requirements as part of its ongoing system planning for fuel delivery. In 2001, VAFFC began to look at various alternatives for a new fuel delivery system capable of meeting YVR’s requirements over the long-term. VAFFC evaluated a wide range of potential delivery options including combinations of marine, rail, tanker truck and pipeline to bring fuel to YVR.
A common component of the top-ranked options was access to marine transport. The proposed Project evolved from this preliminary work.

**Project Overview**

In 2007, VAFFC purchased a waterfront property on the north shore of the South Arm of the Fraser River. This location is well-suited to serve as a marine terminal for aviation fuel deliveries. VAFFC is currently assessing the Project components as described below:

(i) Upgrade of the existing wharf facility

The property includes a pre-existing wharf facility, approximately 15 kilometres (km) upstream of the river mouth and in one of its widest sections. Minor upgrades to the facility are needed to increase the vessel berthing capacity from 30,000 dead weight tonnes (DWT) to 60,000 DWT. Upon completion of these upgrades, the marine terminal will be able to accommodate vessels ranging in size from small barges to Panamax class.

(ii) Construction of a fuel storage facility

Short underground pipeline will transfer fuel from the marine terminal to a fuel storage facility on adjacent land that VAFFC proposes to lease from Port Metro Vancouver (PMV). Storage capacity will be in the range of 80 million litres (500,000 barrels). VAFFC is currently evaluating the need for additional storage beyond 80 million litres.

(iii) Construction of a fuel delivery pipeline

Pipeline will be constructed to deliver fuel from the storage facility to the existing VAFFC fuel facilities at YVR. Potential pipeline routing options are being investigated along existing transportation and utility corridors in Richmond. Where major highway and waterway crossings are unavoidable (i.e., Highway 99 and the Moray Channel), the pipeline will be directionally drilled.

Depending on the progress and outcome of Project review and approval processes, construction is expected to commence late summer 2010 and take about 20 months to complete.

The estimated capital cost of the Project is CAD $70 million. Approximately 100 person years of direct employment will be provided during the design and construction phase of the Project. Another 14 person years of direct employment will be created during the operations phase. Additional economic spin-off benefits will accrue during the construction phase in the form of indirect employment, including indirect employment for off-site fabrication, materials, transportation, etc.

The Project will provide a safe and reliable fuel delivery system, access to a broad range of competitive offshore fuel supply sources, and the ability to meet YVR’s long-term needs for aviation fuel.

**Regulatory Approvals**

The Project will be reviewed for approval by several regulatory agencies and authorities, each with its own review process, including the following:

(a) **British Columbia Environmental Assessment Act (“BCEAA”)**

Based on current design, the Project does not exceed the “Reviewable Project” thresholds set out in the BCEAA Reviewable Projects Regulation. However, VAFFC applied to the British Columbia Environmental...
Assessment Office (BCEAO) in December 2008 requesting that the Project be designated as a reviewable project under section 7 of BCEAA.

(b) Canadian Environmental Assessment Act (“CEAA”)

The Project is not expected to require an environmental assessment (EA) under CEAA. The upgrade of the existing wharf facility may involve works in the Fraser River and minor and infrequent maintenance dredging may be required during terminal operations to optimize underkeel clearance of Panamax class vessels. If any of these activities are necessary, Fisheries and Oceans Canada and Transport Canada will be consulted to determine if an authorization under the Fisheries Act and/or an approval under the Navigable Waters Protection Act may be required, thereby triggering a CEA review.

(c) Port Metro Vancouver (“the Port”) Environmental Assessment Process

The Port will conduct a review of the marine terminal upgrades and fuel storage facility to be developed and operated on Port-administered lands as part of its project development approval process. As the Lead Agency responsible, the Port will also be consulted for approval if operations maintenance dredging is necessary. If dredging is required, VAFFC will submit a Dredging Application to the Port as part of its approval process.

(d) Vancouver Airport Authority (“VAA”) Development Permit and Facility Permit Processes

VAA will conduct an engineering review and EA of pipeline and associated infrastructure located on airport-administered lands as part of its development permit (DP) and facility permit approval processes.

(e) Fraser River Estuary Management Program (“FREMP”)

In the event that development of the marine terminal will involve changes to the wharf facility on the “river side” of the dike, FREMP’s Track 2 Environmental Review Committee (ERC) Coordinated Project Review process may be triggered. Where the pipeline crosses the Moray Channel it will be directionally drilled to mitigate potential environmental impacts and avoid disruption of vehicle and vessel traffic. A FREMP review process is not expected to be triggered for this crossing.

If operations maintenance dredging is required, VAFFC’s Dredging Application to the Port will be forwarded through the FREMP ERC Coordinated Project Review process.

(f) BC Oil & Gas Commission

An application to the BC Oil and Gas Commission will be required for approval to construct and operate pipeline under the BC Pipeline Act.

(g) City of Richmond (“the City”) Development Permit Process

The City, under its DP process, will review the marine terminal development at the wharf facility as well as participate in the review of pipeline design and alignment through Richmond to YVR.

VAFFC plans to commence with public consultation in early 2009, beginning with Project Definition consultation during which the public will be able to learn more about the Project and regulatory review processes, and provide feedback.

This document is intended to satisfy the information requirements for a Project Description as set out in federal and provincial guideline documents (Canadian Environmental Assessment Agency, 2007; BCEAO, 2007).
SECTION 1

Information on VAFFC
1. **Information on VAFFC**

1.1 **Who is VAFFC?**

Vancouver Airport Fuel Facilities Corporation (VAFFC) is a not-for-profit consortium of commercial airlines that owns and operates shared aviation fuel facilities at Vancouver International Airport (YVR). Consortium members include almost all of the domestic and international airlines operating out of YVR (Appendix A). Similar fuel facility corporations operate at all of the major international airports across Canada (i.e., Calgary, Edmonton, Winnipeg, Ottawa, Toronto, Montreal and Halifax).

VAFFC has over 20 years of experience in aviation fuel handling activities at YVR. VAFFC contracts the management, construction and operation of its facilities to qualified organizations, and draws expertise from a network of experienced engineering and environmental consultants specializing in aviation fuel infrastructure (Figure 1.1).

![Figure 1.1 Aviation Fuel System Management at YVR](image)

The consortium structure provides efficient sharing of costs and risks between member airlines. Although membership may vary with the airlines use at YVR, the VAFFC structure remains stable over time. VAFFC has invested over CAD $40 million in fuelling infrastructure at YVR over the last 15 years, and capital financing of up to CAD $100 million is attainable with VAFFC’s financial structure.

1.2 **VAFFC Responsibilities**

VAFFC fuel facilities at YVR include a four-tank storage facility and tanker truck offloading rack system, an airside tanker truck loading compound, an extensive underground pipeline hydrant system to transfer fuel from VAFFC’s tanks to airside fuelling aprons, and a maintenance and administration facility (Figure 1.2). The VAFFC fuel storage tanks receive fuel supply from the Trans Mountain (Jet Fuel) Inc. (TMJ) fuel pipeline and storage delivery system at YVR, and from daily tanker truck deliveries.
VAFFC operates the only fuel facility system servicing YVR’s main terminal and therefore provides fuel delivery service to all airlines using that terminal. The cost of operating VAFFC’s fuel facility system is shared among member airlines. Non-member airlines receive fuel delivery service from VAFFC on a fee-for-service basis.

Each member airline purchases aviation fuel for its own use and arranges its delivery to the VAFFC fuel facilities at YVR, either through the existing delivery pipeline system or via tanker trucks. VAFFC manages the storage and handling of each airline’s fuel and ensures its delivery to the airline’s respective aircraft.

On behalf of its member airlines, VAFFC is responsible for:

- Operating and maintaining the fuel facility system;
- Working with Vancouver Airport Authority’s (VAA’s) planning group to develop fuel demand forecasts;
- Directing new investment, maintaining insurance, and structuring debt;
- Planning, constructing and operating safe, reliable and cost-effective fuel infrastructure to meet near and long-term demand projections; and
- Obtaining regulatory approvals, permits and licenses as they relate to fuel system expansion and/or development.

VAFFC is currently in the process of expanding its fuel storage at YVR, which will improve on-airport fuel reserve capacity from 1.5 days to approximately 5 days during peak demand periods. New storage tanks are expected to be operational in 2010. VAFFC has also recently expanded its underground fuel hydrant system in step with VAA’s current expansion of the domestic passenger terminal building.
1.3 VAFFC Project Representatives

The day to day operation of VAFFC’s activities and facilities is administered by FSM Management Group Inc, who specialize in the planning and management of aviation fuel related projects and infrastructure across Canada.

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2. Project Justification

2.1 Introduction

Dependable supply and delivery of aviation fuel is essential to continued airline operations at YVR. Historically, passenger growth has been strongly correlated to fuel consumption at YVR (Figure 2.1). Aviation fuel forecasts are therefore an important component of airport planning as well as facility planning and design. In planning for the future, VAFFC relies on VAA passenger forecasts to model fuel demand growth.

Fuel demand at YVR varies from month to month and during different times of the day. Fuel facilities at YVR must be designed to accommodate peak demand to avoid disruption in service.

The recent VAA passenger forecasts (September, 2008) reflect the potential for increased growth in long range markets, resulting in longer flights with higher fuel demand, particularly for flights to the Far East. The 20-year forecast range, which includes adjustments for significant near-term events such as the opening of the new Vancouver Convention and Exhibition Centre in 2009 and the 2010 Winter Olympics, indicates that fuel consumption will increase faster than the historic fuel growth pattern. This trend may be partially offset by improved fuel efficiency as newer aircraft enter the fleet and older aircraft are retired. The trend may also be affected by periodic downturns in economic growth. The price of fuel, fewer flights, possible carbon taxes or surcharges, and other greenhouse gas/climate change initiatives, policies or regulations could also reduce future growth trends. On balance, however, VAFFC expects the average rate of growth in fuel demand at YVR to steadily continue over the long-term. Growth trends are discussed in more detail in Section 2.2.2.

The following sections describe the existing fuel delivery system and its limitations, the various alternatives assessed, and an overview of the proposed Project necessary to address the critical need for a fuel delivery system capable of meeting long-term fuel demand at YVR.

2.2 Existing Fuel Delivery System

2.2.1 How is Fuel Purchased and Delivered?

Fuel Purchase

Aviation fuel is purchased by the individual airline members of VAFFC, ideally from both domestic and international markets to optimize supply security and flexibility and obtain the most cost-effective pricing. The aviation fuel industry is very competitive and each market has its own pricing dynamics based on levels of supply and trading. However, there is limited supply access with the existing fuel delivery infrastructure and the few available domestic market sources have insufficient supply capacity to meet the requirements of YVR alone. International markets offer considerably greater purchasing flexibility and, therefore, security of long-term fuel supply at competitive prices.

Domestic purchasing options include the single remaining British Columbia (BC) Lower Mainland refinery located in Burnaby (Chevron Canada Limited), which produces aviation fuel, and the Shell and Petro-Canada processing terminals in Burnaby and Port Moody, respectively, which receive their fuel inventory via rail from production refineries in Edmonton. Domestic supply sources currently provide around 40% of YVR’s fuel requirements.
Passenger Growth and Fuel Consumption at YVR

Figure 2.1

Data is based on VAA's September 2006 passenger statistics.
The balance of YVR’s fuel requirements originates from the BP/ARCO Cherry Point refinery in Washington State on Puget Sound just south of the United States (US) – Canada border.

**Fuel Delivery**

YVR receives aviation fuel via two separate upstream delivery modes; the existing fuel delivery pipeline and tanker trucks. The pipeline system delivers about 80% of YVR’s fuel requirements with the remaining 20% delivered by tanker trucks (Figure 2.2). Individual airlines arrange the supply of their fuel through one of these delivery modes.

**Pipeline Delivery:**

The main fuel delivery pipeline connects Chevron’s refinery in Burnaby to TMJ’s fuel storage facilities at YVR. The pipeline was constructed in the late 1960s and is approximately 35 kilometres (km) in length. Additional spur lines connect the main pipeline to:

- Westridge Marine Terminal located on Burrard Inlet (approximately 1.3 km long);
- Shell Canada Products Ltd. Burnmount processing terminal (approximately 1.2 km long); and
- Petro-Canada Burrard Products processing terminal (approximately 3.5 km long) (Figure 2.3).

The cumulative length of the main delivery pipeline and spur lines is approximately 41 km.

About half of the pipeline’s fuel shipments are supplied from Chevron’s refinery with a similar amount supplied from Westridge Marine Terminal, which receives fuel via marine vessels from offshore sources such as the BP/ARCO Cherry Point refinery.
Fuel is offloaded at the Westridge Marine Terminal and transferred into storage tanks before being delivered to the pipeline system. Occasionally, small amounts of fuel are supplied to YVR through the pipeline from the Shell and Petro-Canada processing terminals (Figure 2.4).

![Figure 2.4 Percentage and Origin of Fuel Supplied to the Existing Fuel Delivery Pipeline System](image)

**Figure 2.4  Percentage and Origin of Fuel Supplied to the Existing Fuel Delivery Pipeline System**

Fuel delivered to YVR through the pipeline system enters TMJ’s Sea Island storage facility and is transferred to the four VAFFC storage tanks in a coordinated manner. Fuel is then delivered to aircraft via the VAFFC underground hydrant pipeline system.

**Tanker Truck Delivery:**

Tanker truck deliveries to YVR began in the mid 1990s during a period of rapid economic growth. Most of these deliveries originate from the BP/ARCO Cherry Point refinery. Tanker trucks can travel over 150 km round trip by road to deliver fuel to the VAFFC fuel offloading racks at YVR. Currently, tanker truck movements account for between 25 and 30 tanker truck deliveries per day with over 35 deliveries per day during periods of peak demand.

### 2.2.2 Limitations of the Existing Fuel Delivery System

**Access to Markets**

The most critical limitation of the existing delivery system is the restriction on available fuel supply sources. Chevron and BP/ARCO Cherry Point are the two refineries providing over 95% of the fuel requirements at YVR. The Chevron refinery has reached its maximum aviation fuel supply capability and VAFFC understands that Chevron has no plans to increase production. Although fuel from the BP/ARCO refinery is delivered by marine vessel into the existing pipeline system, the Westridge Marine Terminal has limited capacity to receive more fuel because it is a multi-product facility and owned by others. With limited access and no additional storage available at the Westridge Marine Terminal, the current rate of vessel deliveries is essentially at a maximum.

A temporary shut-down of either refinery would effectively cut the supply of aviation fuel to YVR in half. YVR would be crippled within a few days of such an event.

The limitations of the existing fuel delivery system, coupled with diminished refining capacity in the Lower Mainland due to the closure of three of four refineries, has made access to competitive offshore sources of fuel supply increasingly important to the airlines.
Pipeline Reliability

The existing fuel delivery pipeline is constructed of high strength steel, allowing relatively high internal pressures as compared to regular grade steel. The drawbacks of this material are its thin cross-section and high brittleness, making it susceptible to puncture or fracture by accidental contact from excavating equipment. The condition of the pipeline is expected to have deteriorated over the 40 years it has been in service and maintenance is expected to be high.

The routing of the pipeline has seen significant encroachment over the years. In some locations, the pipeline is only a few feet from building foundations and in other areas completely exposed or very shallow. Risk of third party damage is considered to be high, and the right-of-way provides limited room for pipeline maintenance or repair activities.

Pipeline Capacity

The existing fuel delivery pipeline has difficulty meeting peak daily demand at YVR, which typically occurs in July and August. Problems with the throughput capacity of the pipeline date back to summer 1996 when, although operating at maximum capacity, the pipeline was unable to deliver enough fuel to meet peak daily fuel demand at YVR. Several airlines had to supplement fuel inventory by tanker truck deliveries from the US.

In 1997, certain pumping units on the pipeline system were upgraded to increase fuel pressure and delivery capacity. Since that time, however, no further upgrades have been made to enhance delivery capacity. In recent years, growth in passenger and airline traffic at YVR has increased to the point where the pipeline cannot deliver sufficient fuel to meet YVR's fuel requirements during peak demand periods. The daily tanker truck deliveries are required to keep pace with demand and ensure adequate on-airport fuel supplies.

Between 1990 and 2007, YVR experienced an average annual passenger increase of close to 4%. Based on this historic trend and the future forecast, fuel consumption is predicted to continue to increase by an average 3% to 5% per year over the next 20 years.

If the VAA high range passenger forecast is realized, the limitations of the existing pipeline system will become critical by 2011 (Figure 2.5). Fuel shortages could lead to flight cancellations or flights being redirected to competing gateways, such as Seattle, with a corresponding loss of economic benefit to the community and province.

Economic Considerations

The capital cost of upgrading/replacing and operating the existing pipeline would be prohibitive compared with the costs associated with the development and operation of the proposed fuel delivery system. An upgraded/replaced pipeline would also require additional facilities for receiving and storing fuel at Westridge Marine Terminal, which is owned and operated by others (see Section 2.3).

To achieve the same market flexibility and supply security by upgrading the existing pipeline infrastructure, an investment of CAD $100 to $200 million would be required. Transporting fuel by road is uneconomical compared with bulk transportation modes such as marine vessel and pipeline. For example, it would take over 40 days for tanker trucks to deliver and offload 60 million litres of fuel from the BP/ARCO refinery to YVR at the rate of 35 deliveries per day. If the infrastructure were in place, this same volume of fuel could be placed on a single vessel shipment and delivered, offloaded and received at YVR in a matter of days, which would be considerably more economical.
Supply and Demand for Fuel at YVR

Data is based on VAA's September 2008 passenger statistics.
**Limited Expansion Opportunity**

Incremental fuel demand at YVR is currently managed through additional tanker truck deliveries. If an alternative fuel delivery system is not established by 2011/2012 and fuel demand increases as forecast, the number of tanker truck movements will more than double to between 50 and 60 deliveries per day with up to 70 deliveries per day during peak demand periods. However, a doubling of the current truck activity will only generate an additional 15% capacity, which is forecast to be exceeded within the next three to four years. By 2016, the average number of deliveries could increase to as many as 100 tanker truck deliveries per day.

The long-term deployment of tanker trucks to YVR is not a viable fuel delivery solution for several reasons:

1. Trucks are less reliable and prone to human error compared to bulk transport modes such as pipeline and marine vessel;
2. The deliveries result in increased highway traffic, and wear and tear on infrastructure; and
3. The deliveries are associated with increased environmental emissions compared to pipeline and marine bulk delivery modes.

A significant increase in the number of tanker truck deliveries would require additional receiving infrastructure at VAFFC’s fuel facilities and generate 24-hour tanker activity on local streets and highways. YVR has limited area available to expand the tanker truck offloading racks and an increase in tanker trucks would exacerbate already high traffic volumes along Lower Mainland highways and Sea Island roads.

Development of an alternative fuel delivery system is required to secure access to international fuel supply sources and address the critical needs of current and future fuel demand at YVR. Since marine transportation offers the most economic means to access a broad range of flexible and secure fuel supply sources, it represents a key component in VAFFC’s long-term planning of fuel delivery to YVR.

The following section provides an overview and evaluation of all modes of delivering fuel to YVR, including upgrading or replacing the existing pipeline.

### 2.3 Fuel Delivery System Alternatives

In 2001, VAFFC initiated an evaluation of alternate long-term fuel delivery system strategies to YVR, including upgrade/replacement of the existing pipeline and associated infrastructure. As a result, 14 fuel delivery options (Figure 2.6) were identified and assessed at a screening level with respect to potential economic, environmental, social and regulatory impacts associated with their construction and operation.

The 14 options include:

- Maintenance of the existing delivery system at the level of current fuel demand (i.e., existing delivery pipeline with up to 35 tanker truck deliveries per day);
- Maintenance of the existing delivery system at the forecast level of 2010 fuel demand (i.e., existing delivery pipeline with up to 65 tanker truck deliveries per day);
- Upgrade/replacement of the existing delivery pipeline and associated infrastructure; and
Various combinations of marine, road, rail and/or pipeline fuel delivery modes, such as:

- Offshore vessel mooring on Sturgeon Bank, off Sea Island, with a pipeline to YVR;
- Marine terminal on the north shore of the South Arm of the Fraser River, fuel storage facility and a pipeline to YVR;
- As above, with tanker truck deliveries instead of a pipeline;
- Railcar transportation from Alberta to a fuel storage facility in South Vancouver and a pipeline to YVR;
- Pipeline between the BP/ARCO Cherry Point refinery in Washington State and YVR;
- As above, with tanker trucks instead of a pipeline;
- Marine terminal at the Roberts Bank Port Facility, fuel storage facility and a pipeline to YVR;
- Offshore vessel mooring off Point Roberts in Washington State, fuel storage facility and a pipeline to YVR;
- Marine terminal or offshore mooring at/near Iona Jetty on Sturgeon Bank and a pipeline to YVR;
- Marine terminal or offshore mooring at/near North Arm Jetty and a pipeline to YVR; and
- Marine terminal on the south shore of the North Arm of the Fraser River and a pipeline to YVR.

The assessment included an objective and comparative multiple accounts evaluation to identify options that best satisfied a combination of environmental, social, economic and regulatory criteria (“accounts”). Impact assessment indicators, such as construction cost, operation cost, mode of transport, potential level of regulatory and public acceptance, and proximity to environmentally and socially sensitive areas, were considered with respect to each of the four accounts. Impact ratings were assigned to each indicator according to a numerical scale so that each option could be ranked.

The four accounts and various indicators were also assigned a combination of weighting conditions to test the sensitivity of each ranking.

A summary of the assessment, including the account ranking and pros and cons of each option, and significant considerations, is provided in Figure 2.7. The top four options for addressing long-term fuel delivery needs to YVR are highlighted for each account and overall ranking.
Overview of Fuel Delivery Options
## YVR Upstream Fuel Supply Options

<table>
<thead>
<tr>
<th>Key (See Map)</th>
<th>Option</th>
<th>Economic Evaluation</th>
<th>Environmental Evaluation</th>
<th>Socio-Economic Evaluation</th>
<th>Regulatory Evaluation</th>
<th>OVERALL EVALUATION</th>
<th>Pros</th>
<th>Cons</th>
<th>Costs</th>
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<tbody>
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<td>1</td>
<td>Maint. Existing Delivery System</td>
<td>9</td>
<td>5</td>
<td>13</td>
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<td>- No construction required</td>
<td>- Cannot meet fuel demand</td>
<td>- Cannot meet fuel demand</td>
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<td>Maint. Existing Delivery System</td>
<td>14</td>
<td>10</td>
<td>14</td>
<td>2</td>
<td>12</td>
<td>- Limited construction required</td>
<td>- Short-term solution</td>
<td>- Property &amp; contractual rights issues</td>
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<td>3</td>
<td>Upgrade Existing Delivery Pipeline</td>
<td>5</td>
<td>12</td>
<td>11</td>
<td>4</td>
<td>4</td>
<td>- Partially existing footprint</td>
<td>- Property &amp; contractual rights issues</td>
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<td>Sturgeon Bank</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>11</td>
<td>3</td>
<td>- Meets peak &amp; long-term demand</td>
<td>- Safety &amp; reliability of supply</td>
<td>- Property &amp; contractual rights issues</td>
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<td>South Arm</td>
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<td>7</td>
<td>9</td>
<td>6</td>
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<td>- As Option 4, plus</td>
<td>- High impact on land use</td>
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<td>South Arm</td>
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<td>9</td>
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<td>- As Option 5</td>
<td>- High impact on land use</td>
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<td>7</td>
<td>Alta Refinery</td>
<td>13</td>
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<td>6</td>
<td>5</td>
<td>1</td>
<td>- Majority of footprint exists</td>
<td>- Poor performance in fuel delivery</td>
<td>- Property &amp; contractual rights issues</td>
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<td>Cherry Point Refinery, USA</td>
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<td>10</td>
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<td>- Less expensive construction cost</td>
<td>- Long pipeline length</td>
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<td>Cherry Point Refinery, USA</td>
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<td>- Limited construction required</td>
<td>- Short-term solution</td>
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<td>Roberts Bank</td>
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<td>3</td>
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<td>- Meets peak &amp; long-term demand</td>
<td>- High impact on land use</td>
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<td>- Meets peak &amp; long-term demand</td>
<td>- No existing footprint</td>
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<td>As Option 12</td>
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<td>13</td>
<td>As Option 13</td>
<td>As Option 13</td>
<td>- As Option 13</td>
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### Summary of Major Considerations:
- Security & Reliability of Fuel Supply
- Environmental Impacts
- Economic Feasibility
- Regulatory Considerations
- Public Acceptance
- Technical Feasibility
- Economic Feasibility

Note: Each evaluation account & its respective sub-indicators have been weighted to reflect level of significance.

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**Figure 27**

Summary of Fuel Delivery Option Assessment

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The top-ranked options, listed in order of most to least preferable, were:

1. Option 5: Development of a marine terminal on the north shore of the South Arm of the Fraser River, a fuel storage facility and a pipeline to YVR;

2. Option 7: Use of railcar transportation from Alberta refineries and development of a fuel storage facility and a pipeline to YVR;

3. Option 4: Development of offshore vessel mooring on Sturgeon Bank, off Sea Island, and a pipeline to YVR; and

4. Option 3: Upgrade/replacement of the existing delivery pipeline and associated infrastructure (Figure 2.8).

The assessment was performed between 2001 and 2004, however some more recent factors have developed which further reduce the viability of some of the top-ranked options.

The VAA 20-Year Master Plan (YVR: Your Airport 2027), which was developed between 2004 and 2006 and has recently been approved by the federal Minister of Transport, identifies only Options 5, 4, and 3 as short-listed for further detailed study. VAFFC had identified railcar transportation from Alberta (Option 7) as unviable due to unprecedented growth in the Alberta region and demand for refined petroleum products. Below is a discussion of additional factors leading ultimately to the selection of Option 5.

**Railcar transportation from Alberta**
Since conducting the assessment of alternatives, rail delivery of fuel from Alberta-based refineries has been eliminated as an option because Alberta has itself now become a net importer of aviation fuel and other refined products. Although it is an oil producing province, refining capacity is limited and the oil sand activity consumes much of what is refined. There have been shortages of gasoline and diesel experienced in Calgary as a result of oil sands consumption.

**Offshore Vessel Mooring on Sturgeon Bank**
The nearest feasible moorage for vessels on Sturgeon Bank is located at least 1 km to 2 km offshore of Sea Island in an area where high winds and waves during storm conditions could make vessel offloading challenging. In addition, the monobuoy mooring system associated with this option would limit the size of vessels that could be accommodated at such a site. Further, as described in its Master Plan, VAA is considering the potential for future runway expansions onto Sturgeon Bank. VAA has expressed a desire to retain flexibility in its future runway planning. These concerns led to the elimination of the Sturgeon Bank option.

**Upgrade/Replace the Existing Pipeline**
VAFFC has recently completed an assessment of the existing fuel delivery pipeline and infrastructure, and the viability of undertaking an upgrade or replacement of the pipeline.

Since VAFFC does not own the pipeline, the upgrade or replacement of this system is not within the control of VAFFC. In any case, since the delivery capacity of the pipeline is ultimately limited by its material strength and age, a partial upgrade and/or the addition of pumping stations would only provide marginal and short-term increased throughput capacity. Unfortunately, these upgrades would not address the pipeline’s long-term viability or improve its overall material strength and could, in fact, further reduce its useful life by placing additional stress on sections that had not been upgraded.
FUEL DELIVERY OPTIONS
(most to least favourable)

South Arm
marine terminal, storage facility & pipeline to YVR

Alberta Refinery
rail, storage facility & pipeline to YVR

Sturgeon Bank
offshore mooring & pipeline to YVR

Upgrade Existing Delivery Pipeline
pipeline upgrade/replacement

Cherry Point Refinery, USA
tanker trucks to YVR

Maintenance of Existing Delivery System
at current demand (up to 35 trucks)

Roberts Bank
marine terminal, storage facility & pipeline to YVR

Cherry Point Refinery, USA
pipeline to YVR

Iona Jetty
offshore mooring & pipeline to YVR

South Arm
marine terminal, storage facility & tanker trucks to YVR

North Arm
offshore mooring & pipeline to YVR

Maintenance of Existing Delivery System
at 2010 demand (up to 85 trucks)

Point Roberts
offshore mooring, storage facility & pipeline to YVR

North Arm
marine terminal & pipeline to YVR

Figure 28
Results of Fuel Delivery Options Assessment
While pipeline replacement and/or the construction of a parallel pipeline would permit increased flow rates and significantly enhance throughput capacity, any significant work would be complicated. Urban development and community infrastructure along the right-of-way has built up considerably in the 40 years since the pipeline was constructed and little vacant land remains, particularly through Burnaby and northwest Richmond.

Even if the pipeline was upgraded or replaced, it would not provide sufficient access to the offshore supply market which must be accessed by marine transport. The marine terminal and storage facilities at Westridge are owned by a third party and are not part of the TMJ fuel delivery system. As a result, the airlines at YVR would not have assured access to the Westridge Marine Terminal over the long term. Without that access, increased capacity of an upgraded or replacement pipeline system is not a certainty.

2.4 Overview of Proposed Fuel Delivery System

The Project evolved from further evaluation of the top-ranked options.

Conceptual Overview

In 2007, VAFFC acquired a waterfront property on the north shore of the South Arm of the Fraser River in Richmond, approximately 2 km east of Highway 99. An important component of the property is an existing wharf facility and water lot lease with the Port.

The wharf facility is appropriately positioned to serve as a marine terminal for aviation fuel deliveries. As outlined below, the Project will involve upgrades to the wharf facility, construction of a fuel storage facility and associated infrastructure, and pipeline to transfer offloaded fuel to the storage facility and then deliver fuel to YVR (Figure 2.9).

(i) Upgrade of the existing wharf facility

VAFFC proposes to upgrade the structure to accommodate vessels ranging in size from small barge to Panamax class up to 60,000 dead weight tonnes (DWT). Upgrades such as pipe pile dolphins, re-grading of rip-rap, and land-based ground improvements are among the activities VAFFC expects to undertake.

The property is unable to accommodate fuel storage, however, adjacent land has been identified as potentially suitable for such development. The intention, therefore, is to receive and offload fuel at the upgraded marine terminal and transfer fuel by underground pipeline to a storage facility nearby.

(ii) Construction of a fuel storage facility

The optimal location for the development of a fuel storage facility has been identified within a parcel of Port Metro Vancouver (Port) lands adjacent to the wharf facility. VAFFC proposes to lease this land from the Port Authority. As currently defined, the storage facility will include six above ground steel storage tanks capable of providing a total storage capacity of up to 80 million litres. VAFFC is undertaking further studies to determine if additional storage capacity should also be incorporated into the Project planning at this time.
(iii) **Construction of a fuel delivery pipeline**

Pipeline will be constructed to deliver fuel from the storage facility to the existing VAFFC fuel facilities at YVR. A potential pipeline route has been identified that utilizes existing transportation and utility corridors in Richmond. Where significant highway and waterway crossings are unavoidable (i.e., Highway 99, Moray Channel), the pipeline will be directionally drilled to mitigate potential environmental impacts and avoid disruption of vehicle and vessel traffic. Pipeline routing options will continue to be investigated and consulted on.

A more detailed description of the proposed Project is provided in **Section 3**.

### 2.5 Key Project Features and Benefits

The Project will meet or exceed industry standards in design, construction, and operation. It will improve the efficiency of fuel delivery and, over the long-term, reduce the footprint of activity currently required to maintain fuel delivery to YVR (i.e., by eliminating the need for the use of the existing pipeline and tanker trucks), and will provide a single mode of bulk fuel delivery. The Project will be constructed and operated under the following guiding principles:

- Best industry and management practices;
- Latest petroleum handling standards;
- Current building, fire, and safety codes; and
- Applicable federal, provincial and local regulations, and environmental policies and standards.

The following sub-sections outline the main features of each Project component and identify some of the benefits that the Project will provide with respect to the long term security of fuel delivery to YVR.

#### 2.5.1 Features

**Marine Terminal**

- Will be located on one of the widest and deepest sections of the river
- Has a pre-existing wharf facility on industrially-zoned property
- Will accommodate a full range of barge and tanker class vessels
- Will integrate with the City of Richmond (City) dike trail system, providing public passage across the property
- Will be monitored 24-hours/day providing security to the property and public
- Will have on site spill prevention and emergency response equipment

**Fuel Storage Facility**

- Will be landscaped to reduce tank visibility
- Will have total containment, control, and monitoring of surface drainage
- Will implement vapour suppression technology to manage fuel vapours from storage tanks
• Will be monitored 24-hours/day providing security to the property and public
• Will have fully automated shut-down and isolation of tanks and pipeline in an emergency
• Will incorporate corrosion protection and a leak detection system

**Pipeline to YVR**

• Will be sized to meet the fuel requirements at YVR over the long-term
• Will follow established City transportation and/or utility corridors, where possible
• Will use directional drilling for major highway and waterway crossings
• Will be buried for all of its length with the exception of valve stations, where required
• Will be constructed of thick-walled, seamless pipe highly resistant to puncture and corrosion
• Will operate at a lower pressure than the existing pipeline due to its shorter length and larger diameter
• Will incorporate corrosion protection and a leak detection system
• Will be regulated by the BC Oil & Gas Commission
• Will be built using modern materials and construction methods
• Will be well marked and electronically located for reference by third parties

**2.5.2 Overall Benefits**

Some of the Project’s key benefits over the long-term include:

• Greatly reduce or eliminate the use of tanker trucks to transport aviation fuel along Highway 99 and City streets;
• Complete modernization of the fuel receiving, storage and delivery infrastructure to YVR;
• Access to more dependable, diverse and competitive offshore fuel supply sources; and
• Enhanced global competitiveness of YVR for airlines and travellers.
SECTION 3

Project Description
3. Project Description

3.1 Introduction

The proposed Project consists of three main components:

- upgrade and operation of a marine terminal on the north shore of the South Arm of the Fraser River;
- development and operation of a fuel storage facility on land adjacent to the marine terminal; and
- development and operation of a fuel delivery pipeline from the storage facility to YVR (Figure 3.1).

The final configuration of Project elements is still being evaluated and will be refined through regulatory and public consultations and the outcome of geotechnical, engineering, environmental and socio-economic assessments.

Further information regarding the Project’s main components is presented below.

3.2 Marine Terminal

The marine terminal will be located at an existing wharf facility on VAFFC property\(^1\) at the foot of Williams Road in Richmond (Latitude: 49°8'23.8'' North, Longitude: 123°3'22.8'' West\(^2\)). The property is a 4.1 hectare (10 acre) triangular shaped parcel, comprising approximately 3.1 hectares (7.7 acres) of upland and 1 hectare (2.3 acre) water lot. A separately owned 0.53 hectare (1.3 acre) Canadian National Railway (CNR) land parcel and a City dike bisect upland areas.

The property’s physical constraints, particularly due to its shape and the bisecting features, limit the ability to construct other Project-related components (i.e., fuel storage facility, operations buildings, or other permanent structures) within the property boundary. Therefore, upland portions of the site that are not occupied by the marine terminal will be leased for compatible uses.

The following sub-sections describe vessels movements and wharf facility upgrades expected to allow for the development and operation of the marine terminal.

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\(^{1}\) Legal Description: Section 34, Block 4 North, Range 5 West Except: Part (1.41 acres) shown coloured pink on Plan 4933; Secondly: Parcel A (Plan with Bylaw filed A32824); Thirdly: Parcel B (Plan with Bylaw filed A32824) New Westminster District.

\(^{2}\) UTM Coordinates: Northing 5443014.458 m North, Easting 595891.196 m (Reference North American Datum (NAD) 83, Zone 10)
3.2.1 Vessel Movements

The Project will generate movement of vessels from the Georgia Strait shipping channel to the upgraded marine terminal, a distance of approximately 21 km from Sand Heads and 15 km from the river mouth. Vessels will transit the river fully or partially laden upstream and empty downstream.

A range of vessel types will serve the marine terminal to optimize fuel supply flexibility. For example, by accommodating barges, fuel can be delivered from nearby supply sources. By also accommodating Panamax class vessels, fuel can be delivered from more distant international sources, such as the western US and Far East markets.

Initially, two to three vessels per month can be expected to deliver fuel to the marine terminal, increasing to four or five depending on the frequency of larger vessels and long-term growth. A single large tanker vessel will deliver the equivalent of three barges currently used for delivering fuel to Westridge Marine Terminal.

VAFFC has undertaken feasibility studies to determine that their property on the Fraser River is capable of receiving Panamax class product carriers. Some Panamax class vessels, however, may only be permitted to transit the river partially laden and minor and infrequent operations maintenance dredging may be required near the marine terminal to optimize vessel underkeel clearance.

If required, routine dredging will be undertaken in deep water (i.e., depths greater than what would otherwise be exposed at lowest chart datum) and in a manner that will not create undermining side slopes and affect shallow intertidal zones. Where possible, works will be timed to coincide with the period when scheduled annual maintenance dredging in the river is routinely conducted.

The area of the existing Water Lot Lease at the wharf facility may need to be expanded. VAFFC will consult with the Port to determine reconfiguration allowances and application process requirements.

An example of the range of product carriers being considered for the Project over the long-term is shown in Figure 3.2.
Types and Sizes of Potential Product Carriers
3.2.2 **Wharf Facility Upgrades**

The existing wharf facility is a bulkhead type constructed of steel pipe piles driven side by side to form a closed face structure behind which lies backfill materials (**Figure 3.3**). The steel piles were designed with a system of tie-backs to maintain structural stability. The facility is approximately 120 metres (m) wide, extends into the river by 40 m, and was designed to accommodate vessels up to 30,000 DWT. The top of the piles are at elevation (+) 4.6 m Geodetic with the high water level in the river recorded at elevation (+) 2.3 m Geodetic.

![Figure 3.3 View Northeast (Upstream) of the Existing Wharf Facility](image)

The facility is currently being evaluated to determine the full extent of upgrades required to satisfy regulatory, seismic and Project criteria, and to function through a full range of wind, tide, and river flow conditions. A conceptual illustration of how the marine terminal could look while accommodating the largest vessel expected (i.e., Panamax class vessels up to 60,000 DWT) is shown in **Figure 3.4**.

Most of the upgrade work required to the existing facility is expected to be confined to the shore-side fuel offloading, receiving and transfer facilities. Some relatively minor in-water works may be required, however, including:

- Lowering the grade of the toe of the pipe pile bulkhead to increase available vessel draft adjacent to the terminal face;
- Installing mooring or breasting dolphins for stabilizing and securing a range of vessel types and sizes; and
- Seismic upgrading of the structure.
Landside, the marine terminal will consist of fuel offloading and transfer equipment, fuel testing facilities, an operations building, and emergency response systems. Fuel offloading from vessels will be achieved using mechanical unloading arms or crane operated flexible hoses. Fuel manifold connection points will be on-board vessels, with fail-safe devices to shut down fuel flow in the unlikely event of disconnection. Vessel decks are typically designed to contain leaks and spills from the connection points.

The field of emergency response is currently being studied in depth by VAFFC in the context of this facility. However, emergency response equipment will generally consist of the following key items:

- Containment and diversion booms;
- Absorbent booms, pads, and other clean-up agents; and
- Fuel skimming equipment to recover and contain fuel releases on water.

A number of industry leading organizations have been commissioned to develop a comprehensive understanding of the risks and mitigating measures of operating a marine terminal on the South Arm of the Fraser River.

### 3.3 Fuel Storage Facility

The optimal location for the fuel storage facility has been identified within a parcel of Port lands adjacent to the marine terminal. VAFFC proposes to lease a 4.8 hectare (12 acre) area from the Port to construct the storage tanks, ancillary systems and operations building. As currently defined, the facility will include six above ground steel storage tanks capable of providing a total storage capacity of up to 80 million litres.

The proposed lease area is suitably sized to accommodate an additional two storage tanks in the event that additional fuel storage is required at some point in the future. Fuel storage is a critical component of the Project and further assessment is being undertaken by VAFFC to determine the need for this future additional storage capacity.
A high level conceptual illustration of how the fuel storage facility could look is shown in Figure 3.5.

![Figure 3.5 Fuel Storage Facility Located on Leased Port Lands– Conceptual Rendering](image)

Figure 3.5 Fuel Storage Facility Located on Leased Port Lands– Conceptual Rendering

Before the storage tanks can be constructed, the ground will require densification using conventional techniques such as stone columns or concrete piles. Densification below the footprint of the tanks will improve the overall stability of the ground in the event of a seismic disturbance. The tanks will be surrounded by an engineering containment system designed to isolate any accidental fuel release up to and including the loss of the largest tank. Federal and provincial regulations govern the size and design of tanks and containment areas to minimize potential adverse environmental impacts. Additional requirements for containment or fire suppression may be imposed by municipal departments. Figure 3.6 shows a typical cross section of a fuel storage tank confined within a containment area.

![Figure 3.6 Cross Section of a Typical Fuel Storage Tank and Containment Area](image)

Figure 3.6 Cross Section of a Typical Fuel Storage Tank and Containment Area

The facility will be secured by fencing and monitored through CCTV. All vehicle parking, operational and auxiliary buildings will be located outside of the containment area. Additional features of the storage tank system will include:

- Computerized leak detection monitoring, tank overfill protection systems, and emergency shut-off valves;
- Tank vapour suppression;
• Cathodic protection to inhibit corrosion and maintain infrastructure lifespan;
• Fire protection measures; and
• Drainage control system, including valves, separators, and oil-stop valves, which prevents accidental fuel releases from entering the surrounding environment.

The storage facility will be constructed and operated in compliance with the following codes, regulations and fuel handling standards:

• National Fire Code;
• BC Fire Code;
• City and Metro Vancouver Bylaws, where applicable;
• American Petroleum Institute Standards;
• Canadian Environmental Protection Act (1996) - Technical Guidelines for Aboveground Storage Tank Systems Containing Petroleum Products;
• Canadian Environmental Protection Act (1997) - Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal Lands Regulations;
• Canadian Standards Association B836 - Storage, Handling and Dispensing of Aviation Fuels at Aerodromes; and

3.4 Pipeline

All pipeline and associated infrastructure will incorporate the same fundamental and standard civil design details. Such details include encasements for railway and road crossings, valve stations, rectifiers, anode beds, pressure transmitters, and cathode protection test stations. The frequency and specific locations of these features will depend on final alignment, the surrounding environment and land use. Many of these civic features will require an aboveground fence or other similar measure to provide the necessary security.

Pipeline will be constructed in accordance with current codes and standards, such as the Canadian Standards Association\(^3\), and will be regulated by the BC Oil and Gas Commission under the Pipeline Act.

3.4.1 Fuel Transfer Pipeline

A pipeline, approximately 1 km long and 400 millimetres (mm) in diameter, will be constructed to transfer fuel from the marine terminal to the storage facility. With the exception of a single road crossing, the pipeline will be contained on VAFFC-owned land and VAFFC land leased from the Port.

\(^3\) Standard Z662-03 for Oil and Gas Pipeline Systems
3.4.2 Fuel Delivery Pipeline

A second pipeline, approximately 15 km long and 300 mm in diameter, will deliver fuel from the storage facility to the existing VAFFC fuel facilities at YVR (Latitude: 49°12'21.8'' North, Longitude: 123°9'32.9'' West). It will be buried for most of its length at a depth of 2 m to 3 m below grade. The alignment is expected to follow existing and dedicated transportation or utility right-of-ways and will not cross any private lands. Final alignment will be evaluated and selected based on the outcome of public and regulatory consultation, and detailed engineering and environmental feasibility studies.

A preliminary alignment for the pipeline has been identified based on early consultations with City planning department staff. Below is a more detailed description of this route.

Preliminary Pipeline Alignment

The route extends west from the fuel storage facility along Williams Road to No. 5 Road, then north along No. 5 Road to Westminster Highway. The crossing of Highway 99 will be achieved using directional drilling. Continuing west from No. 5 Road on Westminster Highway, the route turns north on Shell Road and extends to Bridgeport Road. From here, the route extends west along existing transportation or utility corridors in the region of Bridgeport Road or follows the Bridgeport Trail, an old rail right-of-way further north.

The route is expected to cross the Moray Channel to airport lands north of where the Canada Line bridge is located. This crossing will be achieved using directional drilling to avoid disturbance to fish and sensitive shoreline habitat. On airport lands, the route will extend along a series of airport service roads prior to arriving at a valve station adjacent to the existing VAFFC storage facility.

See Figure 3.1 for an overview of the preliminary route and potentially feasible alternatives.

Similar to the marine terminal and fuel storage facility, the pipeline will be owned by VAFFC and operated and maintained by a qualified and experienced third party.

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4 UTM Coordinates: Northing 5450374.603 m North, Easting 488408.273 m (Reference NAD 83, Zone 10)
SECTION 4

Project Setting
4. **Project Setting**

The following sections provide an overview of the Project setting, including the South Arm of the Fraser River and the general surroundings of proposed Project components.

4.1 **Introduction**

The Project footprint encompasses the proposed marine terminal and fuel storage facility on the South Arm of the Fraser River north to the downstream connection of the proposed delivery pipeline at the existing VAFFC fuel facilities at YVR, and includes the areas required to develop, operate and maintain these Project components.

4.2 **Marine Terminal**

4.2.1 **South Arm of the Fraser River**

**Background**

The Fraser River is the largest river in BC. It flows through the biggest industrial area in BC and forms an internationally recognized wetland estuary important for various species of fish, shorebirds and waterfowl. Well known for being a "working river", it has been a focal point for harvesting the resources of the region. Industries and urban areas along the river have expanded to the point where the economic activity within the Fraser River Basin accounts for a significant proportion of the provincial gross domestic product.

The river divides into the North Arm and South Arm at the upstream end of Lulu Island. The South Arm makes up one third of the main tidal tributaries of the river, separates Richmond and Delta, and discharges to the Strait of Georgia at Westham Island. Approximately 90% of the total volume of river flow is directed to the South Arm and around Annacis Island with the remaining 10% directed to the North Arm.

Much of the coastline within the first 15 km or so upstream of the river mouth is described under the Fraser River Estuary Management Program (FREMP) Habitat Inventory Classification Scheme as having “High Productivity” habitat (Figure 4.1).

**Environmental Conditions**

Environmental conditions in the river with the potential to affect vessels include tides, salinity, wind, waves, and currents.

**Tides:**

The South Arm is heavily influenced by tides, which could affect vessel draft limitations (i.e., the distance from the waterline to the lowest point of the keel or how deep a vessel sits in water). For example, Panamax class tankers with a draft of 11.5 m are able to navigate the river during normal high tide windows, while smaller barges have unrestricted tidal access. Optimal conditions in the river (i.e., spring high tides) may allow the transit of vessels with a draft greater than 11.5 m at certain times of the year, as determined by the Fraser River Pilots.

The South Arm is heavily influenced by tidal movement which reaches further upriver during periods of low river discharge than during high river discharge, the latter of which is typically experienced in late spring/early summer.
Figure 4.1

FREMP Habitat Inventory Classification

- Red: High Productivity
- Yellow: Moderate Productivity
- Green: Low Productivity
- Pink: Habitat Compensation
During periods of low river discharge tidal influence extends as far upstream as Sumas, while during high river discharge it only reaches Mission. During strong river discharge conditions (i.e., spring freshets) the flow is outward all the way to the mouth of the river and normally at all stages of the tide. Water levels are also subject to seasonal fluctuations, with the peak outward flow usually occurring in June and the lowest outward flow occurring in January and February.

**Salinity:**
Salinity has an effect on the density of water – the higher the salinity content the higher the density. Density in turn has an effect on the draft of vessels, such that in conditions where salinity, and therefore water density, are high, the draft of a vessel is reduced compared with conditions of low salinity and water density. As salinity and water density decreases in the transition from oceanic to estuarine conditions, vessel draft will, therefore, increase. For example, if a vessel transiting oceanic waters has a draft of 10 m, this draft will increase as this vessel moves into brackish or freshwater conditions. As a consequence, vessel underkeel clearance will decrease in situations where the water depth remains constant during the transition.

The extent of salinity at a given location in an estuary or river will depend on a combination of factors. For example, saline water will migrate upriver beneath the less dense freshwater as a salt wedge during a flood tide. Upstream distance reached will be affected by the freshwater discharge conditions of the river. For example, a salt wedge will migrate further upstream on a high flood tide in conditions of low river discharge.

During periods of low river discharge, the upper limit of salinity in the Fraser River has been observed as far upstream as the Alex Fraser Bridge. As the river discharge increases, the upper limit of salinity lessens to the area of the George Massey Tunnel.

Saline conditions in the river up to the location of the proposed marine terminal will be taken into account for scheduling vessel transits and determining maximum draft limitations.

**Wind and Waves:**
The South Arm of the Fraser River provides for relatively protected transit and berthing of vessels. The dominant wind direction at Sand Heads is southeast, east and northwest, with the majority of winds less than 10 m/second (19 knots). Although the maximum recorded hourly wind speed has reached 26 m/second (50 knots), average wind speed is approximately 4 to 5 m/second (8 to 10 knots). Maximum wind and wave conditions at the proposed marine terminal are expected to be similar or smaller than that experienced at Sand Heads.

Vessels are expected to be unaffected by winds up to 15 m/second (30 knots), which would be rare (i.e., a few times per year and for a few hours). Wind and wind-driven waves, therefore, are not a significant concern for vessels transiting the river or berthed at the marine terminal.

**Currents:**
Typical tidal currents in the river are about 0.8 m/second (1.5 knots). During periods of low river discharge, tides create alternating flood and ebb currents. The Fraser River Pilots report that ebb currents during periods of strong river discharge can reach 3 m/second (5 to 6 knots) in the narrow portions of the river, while currents near the wharf facility can vary from 0.8 m/second to 1.5 m/second (3 knots).

The Steveston North Jetty aids in controlling flow and currents across the estuary mouth. The presence of this training structure helps to ensure that depths suitable for deep-sea vessel navigation are maintained in the river which assists the transit of Panamax class vessels.
Currents in the navigable channel are not a significant concern as all vessel transits in the river will be tug-assisted and overseen by the Fraser River Pilots.

**Physical Conditions**

The river’s 35 km long deep-sea navigation channel, which stretches from Sand Heads in the Strait of Georgia to New Westminster, currently has an inner and outer shipping channel (Figure 4.2).

The outer channel is primarily designed for two-way shipping traffic, while the inner channel is designed for one-way shipping traffic. Under the current configuration, the transit of Panamax class tankers may not allow for two-way traffic in the outer channel. Two-way passing may, however, be possible in the wider, naturally deep reaches of the river at the discretion of the Fraser River Pilots.

It is the Port’s policy to ensure a minimum 2-hour transit window for each day of the year. To implement this policy, the Port undertakes selective dredging operations, particularly following strong river discharge conditions, to manage sediment accumulation. The dredging program is necessary to maintain channel depths, while allowing for vessel underkeel clearance and tidal aid throughout the year.

Schedule planning is expected to mitigate potential conflicts with other vessels transits, which could otherwise limit when Panamax class vessels are able to transit the river. VAFFC will consult with the Fraser River Pilots and the Port to determine optimal timing windows for barge and Panamax class vessel transits.

The riverbed at the face of the wharf facility is self-scouring. Sediment, therefore, does not naturally or significantly accumulate, so any initial scour blanket removal and operations maintenance dredging, if required, would be minor and infrequent.

**4.2.2 Site History / Physical Description**

The CNR land parcel that bisects VAFFC’s property has been loaded with sand surcharge since early 2007. The CNR parcel runs parallel to the top of the river bank and approximately 75 m inland from it. The area between the CNR land parcel and the riverbank was previously built up to an elevation of approximately (+) 4.1 m Geodetic. The dike, which is a continuation of coastal City diking, runs parallel to the shoreline approximately 25 m inland from the wharf facility.

Based on a review of historical aerial photographs, the property was undeveloped up to the mid 1950s. From the early 1960s to mid 1980s the surrounding area was developed from agricultural lands to a progressive mix of agricultural and industrial uses. The wharf facility was constructed in the late 1990s and the foreshore of the property was stabilized using rip-rap protection. The site was developed for the purposes of storing, importing and exporting scrap metal material.

In late 2007, VAFFC improved upland areas of the property to provide a uniform flat grade and adequate drainage.

**Land Use and Zoning**

The current zoning of the property is industrial I-1 (Industrial District), permitting a variety of uses from light to heavy industrial under the City’s Official Community Plan (Figure 4.3). Adjacent lands are similarly designated as industrial or industrial/commercial, with the exception of Agricultural Land Reserve (ALR) lands located northwest of the property. Land located upstream (east) is industrial land administered by the Port.
A residential condominium and recreational complex is located over 400 m southwest of the property. The recreational complex consists of an ice arena, aquatics centre, brew pub and restaurant, and various other recreational/retail outlets.
4.2.3 **Environmental Conditions**

Upland areas are devoid of vegetation, which is thought to have been removed during site development works in the 1990s. Open ditches extend along the north and west periphery of the property boundary. This surface drainage system is colonized with typical ditch vegetation (Figures 4.4, 4.5 and 4.6). This drainage ditch flows east along Williams Road and away from the Fraser River, at the northern boundary of the property. The ditch is described by the City as a Riparian Management Area (RMA) with a 5 m buffer zone, according to information on the City’s website.

There are no vegetated intertidal or riparian areas along the foreshore of the property. The steeply sloping foreshore is protected by rip-rap that was installed by a previous land owner (see Figure 4.3). The foreshore is described under the FREMP Habitat Classification Scheme as having “Low Productivity” habitat. The foreshore upstream of the property is described under FREMP as having “High Productivity” habitat, while the foreshore immediately downstream of the property is described as having “Moderate Productivity” habitat (see Figure 4.1).

Figure 4.4 View Northwest of Upland Areas of VAFFC Property

Figure 4.5 View South of Upland Areas and the Wharf Facility on VAFFC Property
4.3 Fuel Storage Facility

The proposed fuel storage facility will be located on industrial zoned Port-administered lands. During the 1960s the land was mined for peat and latterly for use as a fill site for various local excavations of silts and sands. Therefore, the land is expected to be generally covered with silt and sand fills underlain by peat and, likely, clay deposits (Figure 4.7).

Peat and clayey silts are considered to be highly compressible materials, with loose sand having a moderate to high potential for liquefaction during a major seismic event. VAFFC will undertake geotechnical investigations to determine the full extent of underlying materials and ground improvements required for developing the fuel storage facility.
Under the Port’s current Land Use Plan, Port lands have been set aside for mixed, port terminal/industrial and business park uses. The South Arm of the Fraser River and adjacent shoreline is under the jurisdiction of the Port, which is responsible for regulating its use and development.

The CNR land parcel that bisects VAFFC’s property continues north, adjacent and west of Port lands. ALR land, also described by the City as an environmentally sensitive area (ESA), is located further to the west (Figure 4.8).

Figure 4.8 Overview of Port Lands and the Potential Fuel Storage Location

4.4 Pipeline

4.4.1 Fuel Offloading and Transfer Pipeline

The pipeline for transferring fuel from the upgraded marine terminal to the fuel storage facility will traverse mostly industrial zoned land owned by VAFFC or land leased by VAFFC from the Port. A new right-of-way will be required for a crossing under Williams Road.

4.4.2 Fuel Delivery Pipeline

A dedicated right-of-way will be required for the pipeline, which is expected to be routed within existing transportation and/or utility corridors.

The preliminary corridor alignment has been divided into four segments to facilitate the geo-referencing of potential key environmental, socio-economic, regulatory and technical issues.
These segments are:

- Segment A – B: Fuel Storage Facility to No.5 Road
- Segment B – C: No.5 Road to Bridgeport Road
- Segment C – D: Bridgeport Road to YVR (see Figure 4.1)

The terminal descriptions for each segment have been assigned to provide an indication of where significant directional changes in the preliminary route could occur. They do not infer where the final route will be located or directed, which requires further refinement based on consultations and studies.

**Segment A – B: Fuel Storage Facility to No.5 Road (~3 km long)**

A combination of City surface drainage ditches and storm drainage mainlines parallel the north and south sides of the Williams Road right-of-way, and are described by the City as RMA’s with either 5 m or 15 m buffer zones. Storm drains also run north to south, parallel and adjacent to No. 5 Road, No. 6 Road and Highway 99.

East of No. 6 Road, and on either side of the Williams Road right-of-way, two small land parcels are described by the City as ESA’s. This segment traverses adjacent to ALR lands.

Pipeline road crossings include Triangle Road, No. 6 Road, Palmberg Road, Sidaway Road, Highway 99, and No. 5 Road. The Mylora Golf Course is located on either side of Highway 99, north of the Williams Road right-of-way.

In its 2010 Strategy, the City proposes new trails and greenways in areas of this segment.

**Segment B – C: No.5 Road to Bridgeport Road Trail (~7 km long)**

ALR lands are located on either side of No. 5 Road. The northwest corner of the Mylora Golf Course is described as a City RMA with a 15 m buffer zone, which extends into a portion of No. 5 Road opposite the King Road junction.

ALR lands and lands described by the City as ESA’s are located south to north between the Francis Road right-of-way and Alderbridge Way, and east to west between Highway 99 and No. 4 Road.

Department of National Defence land is located west of this segment between Westminster Highway and Alderbridge Way. Richmond Nature Park, described by the City as an ESA and conservation area, is located on the east side. The Richmond Nature Park is accessed via Shell Road and Side Trail. Storm drains extend north and south adjacent to the Shell Road corridor.

Pipeline road crossings include King Road and Knightsbridge Drive, Blundell Road, Granville Avenue, Westminster Highway, Shell Road, Alderbridge Way, Cambie Road, Shellbridge Way, and Bridgeport Road. Highway 99 overpasses this segment.

A possible alignment alternative along the Shell Road right-of-way between the Francis Road right-of-way and Westminster Highway, is used as a trail and is surrounded by land described by the City as an ESA. The trail is located parallel to an active rail corridor. To reach the Shell Road right-of-way the pipeline could be constructed along existing transportation corridors such as Francis Road right-of-way, Blundell Road or Granville Avenue. Surrounding land is zoned ALR.
Segment C – D: Bridgeport Road to YVR (~5 km long)

Of the two preliminary route options currently identified, one follows the Bridgeport Trail and local roads. Pipeline road crossings include Van Horne Way, Great Canadian Way, Charles Street and River Road. The Oak Street Bridge overpasses this possible segment route option.

The other route west is along existing transportation or utility corridors in the region of Bridgeport Road, through the City toward Moray Channel.

Coastal and intertidal areas of Moray Channel, where the pipeline crossing will be directionally drilled, are described as City ESA’s.

The pipeline will traverse Sea Island along existing airport service roads, south of the Sea Island Conservation Area. It will traverse a small portion of Sea Island Conservation Area where it connects with the VAFFC fuel facilities.
SECTION 5

Environmental Regulatory Overview
5. **Environmental Regulatory Overview**

5.1 **Introduction**

Development projects in BC are subject to a provincial, federal or harmonized provincial/federal environmental assessment (EA) review if they:

- exceed a development threshold in the case of the *British Columbia Environmental Assessment Act* (BCEAA); or
- require a listed federal authorization in the case of the *Canadian Environmental Assessment Act* (CEAA).

Where no such trigger is present, projects may still be reviewable under BCEAA and/or CEAA if the respective Ministers deem such a review to be in the best interest of the public. Further, under section 7 of BCEAA, a Proponent may apply to the BCEAO requesting that a project is designated as reviewable under the provincial EA process. The decision to allow a project to “opt in” under BCEAA is at the discretion of the BCEAO. The provincial, and harmonized, EA process has a prescribed review timeframe after which a decision is made on the issuance of an Environmental Assessment Certificate (EAC) for the project.

5.2 **Potential Project EA Requirements**

5.2.1 **Regulatory Interests**

Legislation of relevance to the Project and identified to date include the following:

- *Canadian Environmental Protection Act* - the principal federal environmental statute;
- *Canadian Environmental Assessment Act* - creates a federal process for EA’s and includes the Canadian Port Authority EA Regulations;
- *Canada Shipping Act* - sets standards for domestic and international shipping in Canada;
- *Canada Marine Act* - establishes Canadian port corporations and harbour commissions, and regulations to govern Canadian Port Authority projects;
- *Canada Wildlife Act* - protects wildlife and habitats in Canada;
- *Fisheries Act* - regulates fish protection and fish habitat conservation;
- *Transportation of Dangerous Goods Act* - sets standards for safety in transporting dangerous goods;
- *Navigable Waters Protection Act* - regulates safe navigation in navigable waters;
- *Agricultural Land Commission Act* - regulates developments on agricultural land;
- *BC Pipeline Act* – regulates construction and operation of a pipeline;
- *BC Oil and Gas Commission Act* - regulates oil and gas activities and pipelines;
- *BC Environmental Assessment Act* - creates a scheduled provincial review process for EA’s;
• **BC Environmental Management Act** - sets provincial regulations for special waste disposal, contaminated site remediation, and ozone depleting substances;

• **BC Water Act** - regulates use, licensing, and changes in provincial streams and other bodies of water;

• **BC Water Regulation - Part 7** regulates “Changes in and About a Stream” within provincial territory; and

• **Metro Vancouver Air Quality Management Bylaw No. 937** - permitting system to manage the nature and quantity of air emissions.

Potential regulatory interests in the Project are listed in Table 5.1:

### Table 5.1 Potential Regulatory Interests in the Project

<table>
<thead>
<tr>
<th>Federal Interests</th>
<th>Provincial Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Environmental Assessment Agency</td>
<td>Environmental Assessment Office</td>
</tr>
<tr>
<td>Port Metro Vancouver</td>
<td>Ministry of Environment</td>
</tr>
<tr>
<td>Fisheries and Oceans Canada</td>
<td>Ministry of Agriculture and Lands</td>
</tr>
<tr>
<td>Transport Canada</td>
<td>Ministry of Energy, Mines and Petroleum Resources</td>
</tr>
<tr>
<td>Environment Canada</td>
<td>Ministry of Public Safety and Solicitor General</td>
</tr>
<tr>
<td>Vancouver Airport Authority</td>
<td>Ministry of Tourism, Sport and the Arts</td>
</tr>
<tr>
<td>Indian and Northern Affairs Canada</td>
<td>Ministry of Transportation</td>
</tr>
<tr>
<td>Health Canada</td>
<td>Oil and Gas Commission</td>
</tr>
<tr>
<td>Natural Resources Canada</td>
<td>Agricultural Land Commission</td>
</tr>
</tbody>
</table>

**Other Interests**

- Inter-Governmental Partnerships - FREMP
- Municipal - City of Richmond
- Regional - Metro Vancouver

A summary of potential regulatory requirements for the Project is also shown in Figure 5.1.

VAFFC expects that most environmental regulatory requirements will be coordinated through a BCEAO-led EA review process. A listing of these requirements is summarized below.

- **Vancouver Airport Authority** – for pipeline and associated infrastructure on airport-administered lands:
  - Development Permit (DP) and facility permit approval processes;
  - Environmental Review – integrated with the DP process to regulate the EA for the construction and operation of projects; and

- **City of Richmond** – for wharf facility upgrades and pipeline located on City lands:
  - DP approval process (and Sustainability Checklist, if applicable).
Potential Environmental Regulatory Approvals
• Port Metro Vancouver – for wharf facility upgrades, maintenance dredging and Water Lot Lease expansion, if required, and for the fuel storage facility:
  ♦ EA and DP review and approval processes;
  ♦ Dredging application and approval;
  ♦ Water Lot Lease application and approval; and
  ♦ Navigational risk assessment for vessel transits in the river.

• BC Oil and Gas Commission – for pipeline construction and operation (Note: pipeline on Sea Island will be regulated by VAA):
  ♦ Permit application and approval process.

• BC Agricultural Land Commission – for pipeline development on ALR lands, if applicable:
  ♦ Permit application and approval process (Note: may be covered under the BC Oil and Gas Commission’s permit process).

• Fraser River Estuary Management Program – for wharf facility upgrades, maintenance dredging if required and, possibly, a pipeline crossing of the Moray Chanel:
  ♦ FREMP Track 2 Environmental Review Committee (ERC) Coordinated Project Review process for wharf facility upgrades (Note: directional drilling method for the pipeline crossing of the Moray Channel is not expected to trigger a FREMP ERC Coordinated Project Review – FREMP will be consulted for confirmation); and
  ♦ Dredging application for FREMP ERC Coordinated Project Review, if minor operations dredging is required.

5.2.2 BCEAO Review

The Project, as currently defined, does not exceed development thresholds under the BCEAA Reviewable Project Regulation.

However, in December 2008 VAFFC applied to the BCEAO requesting that the Project be designated as a provincially reviewable project. This designation would allow for a coordinated review of the Project components under a BCEAO-led process.

If the Project is designated as reviewable, a Working Group of representatives will be established under the leadership of the BCEAO. This will help to coordinate the harmonizing of the various federal, provincial, regional and municipal regulatory interests.

5.2.3 CEA Agency Review

In terms of the CEAA Law List Regulations, potential Project triggers include a Section 35(2) Fisheries Act Authorization where a harmful alteration, disruption or destruction of fish and/or fish habitat (HADD) is likely to occur, and a Section 5(1) or 6(4) Navigable Waters Protection Act Approval where there will be substantial interference to navigation. Based on the current Project concept, neither of these circumstances are expected to be present.
In-water works for wharf facility upgrades are expected to be relatively minor and are not expected to:
affect fish habitat; be located in the designated navigable channel; or interfere with navigation in the
river.

If required, operations maintenance dredging near the upgraded marine terminal will be minor and
infrequent. The works will be undertaken in deep water and in compliance with the FREMP
Environmental Dredging Guidelines for the Lower Fraser River to mitigate the potential for a HADD.
Where possible, dredging will be timed to coincide with the period when scheduled annual
maintenance dredging is routinely conducted in the river to mitigate potential interference with
navigation. Fisheries and Oceans Canada and Transport Canada will be consulted to confirm an
authorization under the Fisheries Act and/or an approval under the Navigable Waters Protection Act will
not be required.

A federal authority is not proposing or providing financial assistance to enable the Project to be carried
out.

Where the pipeline crosses the Moray Channel (Middle Arm of the Fraser River) and, potentially,
significant watercourses on Lulu Island, directional drilling will be used to avoid potential fisheries,
navigation and social impacts. However, VAFFC may need to apply to Transport Canada for an
Exemption Letter under Section 5(2) of the Navigable Waters Protection Act and may need to submit a
Notification to Fisheries and Oceans Canada. Transport Canada and Fisheries and Oceans Canada will
be consulted to determine regulatory requirements.

If the federal Responsible Authorities determine that either the upgrade of the wharf facility or the
potential operational dredging activities require a review under CEAA, then the EA of the Project will
proceed according to a harmonized federal and provincial EA process. Given the scale of the Project,
VAFFC expects that any federal review would involve only a Screening level assessment under CEAA.

5.2.4 Port Metro Vancouver Review

The Port Project Review Process involves both a Planning Review and an Environmental Assessment
Procedure. The Project Review Process applies to all construction activities and demolition on land,
water and air space administered by the Port, including all property leased or licensed to other parties.

The leasing of land for the fuel storage facility and, if applicable, an application for an increase in the
area of the Water Lot Lease, would be excluded from a CEAA review process led under the guidance of
the Canadian Environmental Assessment Agency, but will instead be required to satisfy the Port’s internal
Project Review Process.

As the Lead Agency responsible, the Port will be consulted for obtaining a dredging approval, if these
works are required. As part of this approval process, VAFFC will submit a Dredging Application to the
Port for onward distribution to the FREMP ERC Coordinated Project Review process.

VAFFC will ask the Port to coordinate their Project Review Process and Environmental Assessment
Procedure with the BCEAO-led EA review process.

5.2.5 Vancouver Airport Authority Review

A review by VAA will be triggered as a result of the development permitting requirements for sections of
pipeline and associated infrastructure located on airport lands. Similar to the Port, VAA’s internal
Environmental Impact Assessment (EIA) Program would normally require an EA that emulates the scope and nature of a CEAA Screening.

VAA have indicated that the requirements of their EIA Program could be harmonized with a BCEAO-led EA review process, thereby avoiding unnecessary duplication. To satisfy VAA EIA Program requirements (and the Port’s Project Review Process), the Project’s EAC Application will be tailored to include criteria normally assessed under a CEAA Screening, such as cumulative environmental effects and effects of the environment.

5.2.6 BC Oil and Gas Commission Review

The Oil and Gas Commission is responsible for regulating oil and gas activities and pipelines in BC. The Commission provides for effective and efficient processes for the review of permit applications related to oil and gas activities or pipelines. It ensures that permit applications that are approved are in the public interest as having regard to potential environmental, economic and social effects.

VAFFC will be required to submit a permit application for the development and operation of pipeline on Lulu Island. Sections of pipeline on Sea Island will be regulated by VAA.
SECTION 6
Consultation
6. Consultation

6.1 Introduction

VAFFC will undertake public consultation to receive input on the Project from potentially interested parties such as First Nations, the public, local governments, provincial and federal agencies, and other stakeholders. VAFFC will follow the BCEAA Public Consultation Policy Regulation which sets out standards in accordance with which a Proponent is required to conduct a public consultation program for the BCEAO-led review process.

6.2 EAC Application

Prior to submitting the EAC Application, VAFFC will prepare and submit a Public Consultation Plan to the BCEAO for general endorsement. Table 6.1 outlines the areas expected to be addressed by the plan.

<table>
<thead>
<tr>
<th>Sections</th>
<th>Application Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overview of Consultation Program</td>
<td>A summary of the consultation and communication plan will be provided based on the BCEAO “Public Consultation Strategy Framework for Lower Mainland Infrastructure Projects”.</td>
</tr>
<tr>
<td>2. Overview of Information Distribution</td>
<td>The distribution of information material, notification given and communications methods used will be summarized.</td>
</tr>
<tr>
<td>3. Consultation Activities</td>
<td>A summary of participation by interested parties, through various means of communication including public events, will be included in the EAC Application.</td>
</tr>
<tr>
<td>4. Issues Identification</td>
<td>Documentation of how project-related issues raised by the public and government agencies have been, or will be addressed, will be included. First Nations issues will be covered under a separate engagement plan.</td>
</tr>
<tr>
<td>5. Future Consultation</td>
<td>An outline of the proposed public and First Nations consultation following the EAC Application submission, will be provided, together with government agency consultation.</td>
</tr>
</tbody>
</table>

VAFFC has had preliminary meetings with federal, provincial and municipal regulatory authorities, as well as stakeholders and First Nations representatives, to elicit their views and respond to their concerns.

As the first stage of consultation, VAFFC plans to conduct Project Definition Consultation in February / March 2009. Individuals will be able to learn more about the Project and provide feedback through a series of stakeholder meetings, public open houses, telephone surveys and feedback submissions. A website and Discussion Guide will be made available for participants wishing to provide written feedback on the Project. Submissions will be accepted by mail, email, or the online feedback form.
Feedback gathered through consultation will be used along with technical and financial input to refine elements of the Project’s design and to assist in defining the scope and nature of ongoing environmental and technical studies.

A subsequent series of consultation venues will be required later in 2009 to gather feedback on more specific features of the Project.

6.3 First Nations

6.3.1 Background

Based on an initial strength of claim analysis, VAFFC is consulting with the following First Nations: Tsawwassen; Musqueam; Kwantlem; Hwiltsum; Chemainus; Penelakut; Layackson; Halalt; Lake Cowichan and Cowichan Tribes.

The BCEAO has a consultative boundary list that they use to assess First Nations with whom consultations are expected for a proposed Project. VAFFC will discuss this list with the BCEAO.

The intent of first round consultations is to:

• Provide First Nations with preliminary information regarding the Project, and the processes and timelines expected;
• Identify First Nations’ interest in participating in the consultative process;
• Identify the key contact person(s) within representative organizations who will lead the consultation process;
• Identify any interests; and
• Identify how First Nations wish to be consulted.

6.3.2 Consultation To Date

As of November 31 2008, meetings have been held with eight of the ten First Nations and there has been correspondence with Lake Cowichan First Nation and an exchange of letters with the Chemainus First Nation.
SECTION 7

Proposed Development Schedule
7. Proposed Development Schedule

The Project Schedule will include five distinct phases; the Identification Phase (current); the Definition Phase, the Procurement/Approvals Phase, the Construction Phase, and the Operations Phase.

The expected timing of these phases is outlined in Table 7.1.

Table 7.1 Expected Project Schedule

<table>
<thead>
<tr>
<th></th>
<th>Identification</th>
<th>Definition</th>
<th>Procurement/Approvals</th>
<th>Construction</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>3 months</td>
<td>18 months</td>
<td>10 months</td>
<td>20 months</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>to Dec ‘08</td>
<td>Jan ‘09 to Jun ‘10</td>
<td>Nov ‘09 to Aug ‘10</td>
<td>Aug ‘10 to Mar ‘12</td>
<td>Apr ‘12</td>
</tr>
</tbody>
</table>

The EAC Pre-Application processes and EAC Application review will be undertaken during the Project Definition Phase. The additional environmental permitting and approvals processes will fall under the Procurements/Approvals Phase. It may be possible to commence with the application for some of the additional permits and approvals during the Definition Phase prior to receiving the Project’s EAC.

A summary of the expected EA processes and timeframes is shown in Table 7.2.

Table 7.2 Expected EA Schedule

<table>
<thead>
<tr>
<th></th>
<th>EAC Pre-Application</th>
<th>EAC Application Review</th>
<th>Additional Environmental Permitting/Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>12 months</td>
<td>6 months</td>
<td>10 months</td>
</tr>
<tr>
<td>Date</td>
<td>Jan ‘09 to Dec ‘09</td>
<td>Jan ‘10 to Jun ‘10</td>
<td>Nov ‘09 to Aug ‘10</td>
</tr>
</tbody>
</table>

VAFFC expects to initiate environmental and socio-economic assessment studies for the Project in early 2009, subject to regulatory requirements identified in the Project review process, and submit its EAC Application to the BCEAO in early 2010.

Subject to review by the BCEAO, VAFFC estimates that it will obtain its EAC Application Approval by early summer 2010 and the additional environmental permits and approvals by late summer 2010. Depending on the progress and outcome of the Project review and permitting processes, construction is expected to commence late summer 2010 and take around 20 months to complete.
APPENDIX A

Current VAFFC Members
(January 2009)
Appendix A

Current VAFFC Members (January, 2009)

1. Air Canada
2. Air China International Corporation
3. Air North Charter & Training Ltd.
4. Air Transat A.T. Inc.
5. Alaska Airlines, Inc.
6. US Airways
7. American Airlines, Inc.
8. British Airways PLC
9. Cargojet Canada Ltd.
10. Cathay Pacific Airways Limited
11. China Airlines Ltd.
12. Continental Airlines Inc.
14. Deutsche Lufthansa AG
15. Eva Air Corporation
16. Globespan Airways Ltd.
17. Air New Zealand
18. Japan Airlines Company Limited
19. Jazz Air Limited Partnership
20. KLM (Koninklijke Luchtvaart Maatschappij n.v.)
21. Korean Air
22. Northwest Airlines, Inc.
23. Sunwing Airlines Inc.
24. Philippine Airlines, Inc.
25. Singapore Airlines Limited
26. Skyservice Airlines Inc.
27. United Air Lines, Inc.
28. Westjet Airlines
29. Skywest Airlines