

RICHMOND-AIRPORT-VANCOUVER RAPID TRANSIT PROJECT

ASSESSMENT REPORT

With Respect to:

Review of the Application for an Environmental Assessment Certificate
Pursuant to the *Environmental Assessment Act*, S.B.C. 2002, c. 43

And

The Requirements of a Screening Report Pursuant to the
Canadian Environmental Assessment Act, S.C.1992, c. 37 as amended

Prepared by

Environmental Assessment Office

April 2005

Executive Summary

BACKGROUND

RAV Project Management Ltd. is a company established under the British Columbia *Company Act* (hereafter referred to as 'RAVCo.' or 'proponent' or 'Owner'). RAVCo is a wholly-owned subsidiary of the Greater Vancouver Transportation Authority ('TransLink') and is proposing to develop an electric rail rapid transit line that will connect central Richmond, Vancouver International Airport on Sea Island, and downtown Vancouver along one of the busiest traffic corridors in the region. The Richmond-Airport-Vancouver Rapid Transit Project ('RAVP' or the 'project') is being developed as a public-private partnership and is funded by the Governments of Canada and British Columbia, TransLink and the Vancouver International Airport Authority (Funding Agencies).

On November 19, 2004, the proponent submitted to the Environmental Assessment Office ('EAO'), an application for an environmental assessment (EA) certificate for the RAVP, ('Application'), pursuant to the British Columbia *Environmental Assessment Act*, SBC 2002, c.43 ('Act'). Following a compliance reference check against the Application terms of reference issued by EAO on November 19, 2003, the Application was accepted, with specific conditions, for formal review under the Act on December 2, 2004. One of the conditions instructed the proponent to submit an Application Supplement, providing details of the project selected through the Best-and-Final-Offer ('BAFO') tendering process ('Selected Project') and any consequential changes to the impact assessments and review conclusions included in the Application (which reflected the Reference Project of the BAFO tendering process). This Application Supplement was submitted to EAO and accepted for review on December 17, 2004. On December 1, 2004 the TransLink board accepted the Selected Project and instructed the proponent to continue the negotiations with the successful consortium – SNC/Lavalin-Serco ('Concessionaire').

The RAVP system will be approximately 19.5 kilometres long and will include 17 stations: four in Richmond, four on Sea Island and nine in Vancouver. Additional stations may be considered in the future.

RAVP ALIGNMENT

As proposed, the RAVP line will connect Richmond Centre at the south, the existing Vancouver International Airport terminal at the west and the existing Waterfront Station at the north. It will follow No. 3 Road in Richmond, Grant McConachie Way on Sea Island, Cambie Street to False Creek, and Davie and Granville Streets in downtown Vancouver, terminating at Waterfront Station. From 63rd Avenue and along Cambie Street to Waterfront Station the RAVP line will be underground.

City of Vancouver defined a regional transit service to Richmond along the Cambie Street corridor, under False Creek and through downtown Vancouver to a northern terminus in the vicinity of Waterfront Station. To connect the Vancouver and Richmond segments of the line, it will be necessary to construct a new bridge over the North Arm of the Fraser River, downstream of Mitchell Island and upstream of the Oak Street Bridge. The bored tunnel and the cut-and-cover sections of the project are described in the Application Supplement.

The City of Richmond has identified No. 3 Road as the preferred corridor to provide regional access to commercial centres and institutions in Central Richmond. This corridor has been established for the existing B-Line bus service and is available to accommodate construction of the line.

The Vancouver International Airport Authority (VIAA) has identified a corridor along Grant McConachie Way on Sea Island that will connect the line to the international and domestic terminal buildings. To connect the Richmond segment of the line to Sea Island and the airport, a bridge will be built across the Middle Arm of the Fraser River upstream of the existing Middle Arm and Moray Channel bridges.

PROJECT BUDGET

The Application included limited project cost estimates due to the confidentiality associated with the BAFO tendering process. The project is being financed as a Public-Private-Partnership (P3) and the project budget as of March 24, 2005 was:

FUNDING AGENCIES	2003 DOLLARS, Million	NOMINAL DOLLARS, Million
Government of Canada	420.7	450.0
Government of British Columbia	234.8	252.3
GVTA (TransLink)	302.6	324.0
Airport Connector Funding	223.0	243.9
VIAA Common Costs	48.3	52.4
Total Source of Funds	1,229.4	1,322.6

In addition to this public sector funding, the Concessionaire will also partially finance the project. The exact amount of private funds to be contributed to the project is the subject of ongoing negotiations. Additional funds may also come from in-kind contributions from municipal partners and related development opportunities. Revisions to the project financial models will continue until Financial Close, at which point the total Estimated Project Cost, including the amount of private equity and debt invested by the Concessionaire will be confirmed. This clarification is not expected to be available before the end of July 2005.

PROJECT CONSTRUCTION

Revenue service along the whole RAVP system must commence on or before November 2009 in order to comply with Funding Agencies' requirements. To ensure that this requirement is met, project construction must begin in August 2005 with some pre-construction planning already from April 2005. A number of key activities have to be completed for this construction start date to be achieved. A summary outline schedule for construction activities is presented in PART A of EAO's Assessment Report¹. The construction start is conditional on a successful Financial Close by end July 2005 at the latest. In order to meet this deadline, federal and provincial environmental assessment approvals are required in May 2005. This public necessity has set the timelines for the project review under the Act.

FEDERAL HARMONIZATION

The project is subject to federal review (screening level assessment) under the *Canadian Environmental Assessment Act* (CEAA) S.C. 1992 c.37, as amended, as the federal government is providing funding for the project and because it requires federal authorizations specified in the CEAA Law List Regulations. The joint harmonized review has been managed by the EAO.

¹ "Richmond-Airport-Vancouver Rapid Transit Project Assessment Report", April 2005

PUBLIC AND FIRST NATIONS CONSULTATION

On September 10, 2003, the EAO issued a Section 11 Order ('Order') pursuant to the Act, defining the scope of the required assessment and the procedures and methods in conducting the environmental assessment (EA). The proponent has undertaken the required public and First Nations consultation in compliance with this Order, and applicable Government regulations and Government policies.

Public Consultation:

The Application identifies the consultation measures undertaken by the proponent prior to submitting the Application, during the review of the Application, and future consultation activities to be undertaken during final design and construction of the project. The geographic focus of the public information and consultation program was within the City of Vancouver, the City of Richmond and the Vancouver International Airport and surrounding municipalities.

From early spring 2001 to March 2003, during the *Project Definition Phase*, the proponent's technical and financial specialists conducted an analysis of the proposed project in order to define the requirements of a rail rapid transit line connecting Vancouver, Richmond and the Vancouver International Airport; to identify a structure to build and pay for the line; and to evaluate whether it would be feasible to complete construction of the line by 2009.

In February and March 2003, the proponent undertook an extensive Project Definition Consultation program, with the purpose of sharing the results of the *Project Definition Phase*; determining whether the public supported the project as defined; and identifying issues of concern. Public input was also sought regarding whether the project concept should proceed within the defined funding envelope of \$1.5 billion to \$1.7 billion; whether the route should follow the Granville Street – Cambie Street – No. 3 Road – Grant McConachie Way corridor; and whether the vertical profile of the line should be as proposed (i.e., a combination of below ground, at-grade and above-grade levels). Of those that responded to the question regarding the proposed route, 73.2 percent supported the route in its entirety.

Pre-Design Phase consultation was initiated in November 2003 to:

- Communicate key design topics outlined in the *Project Definition Phase*;
- Seek ideas and advice about station design and elevated guideway² structures in an effort to produce draft design objectives;
- Seek advice regarding the design and content of future public consultation; and,
- Provide input to development of the community consultation section of the Application.

During this time, draft design objectives were provided as part of the BAFO instructions to the two finalist proponent teams that had been selected to proceed to BAFO stage of the procurement process. Pre-Design Consultation was undertaken by the proponent in three steps as follows: (i) Small Group Consultation (November/December 2003); (ii) Broader Public Consultation (March 2004); and (iii) Public Consultation Reporting (April/May 2004). The design topics and the issues raised by the public are documented in section 4 and Table 4.6 of the Application.

Following the submission of the Application and the Application Supplement, RAVCo assisted EAO in advertising the availability of these documents for public review and comment and the notification of the public comment period. To inform the public about the joint environmental assessment of the project, RAVCo/EAO public open houses were arranged at the Roundhouse Community Centre in Vancouver on January 25, 2005; at the Vancouver International Airport on January 26, 2005; and at the Minoru Cultural Centre in Richmond on January 27, 2005.

² Pre-casted concrete sections serving as foundations for rails.

The proponent attended these three meetings and provided their key consultants for the benefit of the public attending these events and for discussions of issues and concerns raised by the public. About 350 people attended these open houses and addressed project issues. A full report on these events is covered in RAVCo's Summary of Public Consultation Activities and Input 2 December 2004 to 28 February 2005 for the Richmond-Airport-Vancouver Rapid Transit Project, dated April 8, 2005.

At the request of the Cambie Street Merchants, the City of Vancouver and RAVCo also participated in another public meeting with the Cambie Street Merchants and the public on January 31, 2005. This meeting focussed largely on consultation on issues associated with the cut-and-cover tunnelling/construction methodology along Cambie Street. The City of Vancouver and RAVCo have also arranged for and attended other group meetings that have included the Downtown Vancouver Business Improvement Association, Yaletown residents, Vancouver Board of Trade, Better Environmentally Sound Transportation (BEST) and Cambie Street Heritage Boulevard Society.

EAO made the Application and the Application Supplement available for public comment during a 45-day review and comment period, running from January 10, 2005 until February 23, 2005. The EAO received a total of 73 written comments on the review documents during the public comment period. The comments were comprised of:

- 62 emails, faxes and letters addressed directly to EAO, with proper identification of submitters;
- 2 written comments using the EAO form handed out at the three public open houses;
- 7 submissions by identified individuals who used a suggested comment form/letter posted on the Vancouver Green Club's website; and,
- 2 form letters using a suggested format posted on the "Do RAV Right" website (submitted by the Cambie Heritage Boulevard Society and the "Re-think RAV Coalition").

Apart from two submissions in general support of the project and with suggestions for modifications to the proposed alignment to interlink with the Millennium Line, all other submissions expressed concerns over and/or objections to the project. The key concerns and objections voiced by the public focussed on the need for the project and the selection of the Cambie corridor over the Arbutus corridor; the inadequacy of assessment documentation, dissemination of such information and the time for preparation of public comments; the proponent's timing of public disclosure of the extent of cut-and-cover tunnelling method along Cambie Street and the potential negative environmental effects of this construction; the potential for disruption of services to the public and commercial residents located along the northern section of Cambie Street; and concerns over loss of trees along Cambie Street.

EAO acknowledged the receipt of all public comments directly to the submitter, shared comments with regulatory agencies and forwarded public comments to the proponent for individual responses. RAVCo provided written responses to the public having offered comments, captured in "RAVCo Responses to EAC Application Public Comments", March 14, 2005 and posted on EAO's project website. The public comment process resulted in further consultation with the Do RAV Right Coalition ('Coalition'), who requested a three-week extension to the public comment period. This request was based on the assumption that agency comments would be available and could be used by the public before they submitted their written responses. The EAO rejected this request with reasons in their email to the Coalition dated February 28, 2005. There is no current policy, as reflected in the Order, suggesting that agency comments must be available before the close of a public comment period. Project review material has also been available to the public at least three weeks prior to the start of the public comment period.

The Coalition submitted a request to EAO for specific project material related to the tunnelling construction change from the Reference Project to the Selected Project under the *Freedom of*

Information and Privacy Act. EAO is responding to this request. At a public event in Vancouver on March 22, 2005, the Coalition also expressed their intention of taking the British Columbia Government to court over “changing the project to “cut-and cover” without proper public consultation or adequate environmental review” (quote from the Coalition’s News Release on March 22, 2005).

On April 11, 2005 the Coalition filed a Petition in the Supreme Court of British Columbia asking that the decision of the Project Assessment Director on December 2, 2004 to accept the RAVP application for review be quashed on the basis that the RAVP application differs “materially” from the RAVP defined in the Section 11 Order dated September 10, 2003. The Petition, among other things, also seeks to stop a referral by the EAO of the RAVP application to Ministers for their decision.

First Nations Consultation:

Effective consultation with First Nations represents a key and integral component throughout the assessment process. Such consultations are required to ensure that the Province complies with the *Provincial Policy for Consultation with First Nations* (October 2002). And meets applicable legal duties of consultation and accommodation (where indicated) as set out in Court decisions including the decisions of the Supreme Court of Canada in *Taku River Tlingit First Nation v. British Columbia (Project Assessment Director)*, 2004 SCC 74 and *Haida Nation v. British Columbia (Minister of Forests)*, 2004 SCC 73.

In the general area of the project, six First Nations were identified that may potentially have an interest in the project and its EA review. These are the Musqueam Indian Band, the Tsleil-Waututh Nation, the Squamish Nation, the Sto:Lo Nation, the Tsawwassen First Nation, and the Katzie First Nation.

The consultation process was designed to identify concerns and interests of the First Nations potentially affected by the proposed project. Early in the project review (summer of 2003), EAO conducted meetings with all the identified First Nations and informed them about the project and the review process under the Act, and solicited information on the First Nations interest in project participation and on any likely impacts on asserted aboriginal rights and title and traditional uses as a consequence of the project. EAO also invited all First Nations to be members of the two working groups organized by EAO for the project review, as set out in the Order. Throughout the project’s early Pre-Application phase, EAO has provided the First Nations with all project information and review documentation from February 2003 until the Application submission in November 2004. EAO has met with all listed First Nations, informed them of the review process under the Act and advised them of the development of study work plans and the Application Terms of Reference, issued in November 2003. EAO also invited the listed First Nations to be part of a team that reviewed Application draft material in September to November 2004.

Similarly, the proponent initiated an extensive Pre-Application Consultation Process early in the project review, designed to identify concerns and interests of First Nations potentially affected by the proposed project. The First Nations consultation and communication framework implemented for the RAVP was developed in conjunction with the EAO and reflected in the Application Terms of Reference and the Order.

The Application includes RAVCo’s consultation input and issue definitions for all six First Nations whom the proponent consulted with in the early phase of the project development. Where First Nations expressed interest in the project in general, or in the environmental, socio-economic, cultural or aboriginal rights/title issues, they were provided with an opportunity to receive funding assistance from the proponent to later review the project’s Application. In anticipation that the Musqueam, Tsleil-Waututh, Tsawwassen, Katzie, and Squamish First Nations would participate in the EAO working groups during the Application review phase and provide comments as necessary, within the timelines set by the EAO for the project EA review, RAVCo entered into

agreements with each of these First Nations to ensure that their project review comments were received by EAO within the timeline set for the review.

It was also anticipated that the Musqueam, Tsleil-Waututh, Tsawwassen, Katzie, and Squamish First Nations would continue to engage in consultation meetings with RAVCo representatives to identify any aboriginal interests which may be potentially affected by the project, including any interests described in studies or project background material developed during the Pre-Application stage; and would suggest measures to avoid, mitigate or, where appropriate, otherwise accommodate aboriginal interests.

The Sto:Lo Nation also requested information updates on the project and the proponent maintained regular contact with this First Nation. The proponent's consultation chronology demonstrates a significant effort to engage the six identified First Nations asserted to have aboriginal rights or title in the project area.

During the review of the Application and the Application Supplement, the EAO and the proponent continued to consult with First Nations on the project. This consultation was enhanced by agreements which the proponent entered into with the Musqueam, Squamish, Tsawwassen, Tsleil-Waututh and Katzie First Nations. These agreements provided the opportunity for these First Nations to (i) review the Application and Application Supplement; (ii) continue to consult with the proponent; (iii) participate in the EA review, within the timelines agreed to by the EAO, by identifying aboriginal interests that may be affected and by suggesting measures to avoid, mitigate or, where appropriate, otherwise accommodate aboriginal interests and (iv) provide comments to the EAO and receive funding for this work.

As part of this process, the proponent and EAO contacted the First Nations with an offer to meet and review the Application and the Application Supplement and to discuss issues of interest and concern. This offer was generally accepted by the First Nations and provided an opportunity to clarify issues and interests. Based on these meetings, the First Nations were able to better define the issues which they wished to address in their comments to the EAO.

Written comments on the Application and the Application Supplement were provided to EAO by the Squamish Nation, the Tsleil-Waututh Nation, the Tsawwassen First Nation and the Katzie First Nation. The Sto:Lo Nation, who had earlier verbally confirmed to EAO that they had no further interest in the project's EA review, did not provide comments. The proponent provided timely, and in EAO's view, adequate responses to these comments by individual letters to the First Nations.

Both the proponent and EAO made numerous efforts to engage the Musqueam Indian Band in consultations during the application review stage of the process. Extensive efforts were made, in particular, to identify the nature and extent of the Musqueam Indian Band's fisheries in the area of the two proposed RAVP bridges across the Fraser River. Although the EA review accepts that the Musqueam have aboriginal right to fish for food, social and ceremonial purposes, established by the *Sparrow* case³, the Musqueam did not provide sufficient information to more conclusively identify the nature and extent, if any, of potential adverse impacts. There is therefore, a process in place for the proponent to continue to consult with the Musqueam Indian Band on the extent of their fisheries and potential impacts, and to seek agreements on reasonable accommodation for any infringements on Musqueam Indian Band fishing rights.

³ R. v. Sparrow case [1990] 1 S.C.R. 1075 [1990] S.C.J. No. 49, File No. 20311.

SUMMARY OF KEY REVIEW ISSUES

General:

The EAO defined the scope of the environmental assessment in the Order and in the Application Terms of Reference issued to the proponent on November 19, 2003, and has considered the potential environmental, economic, social, heritage, health and First Nation effects of the project. The Assessment Report includes the review process and procedures and discusses the key project impact issues and appropriate mitigation measures to reduce any adverse project effects to an acceptable level. The project review concluded that there are no significant residual environmental, socio-community or First Nation effects of the project with the proposed mitigation and other commitments agreed to by the proponent.

The key project review issues, captured by the Application and the Application Supplement and other review documentation listed in *Appendix A* to the Assessment Report and raised by government agencies, First Nations and the public are summarized below. A full discussion on all impacts issues are covered in PART B of the Assessment Report.

Fisheries and Aquatic Habitat:

The project will require bridge crossings over the North and Middle arms of the Fraser River. Ditch networks that convey drainage from Sea Island and Lulu Island to the Fraser River will also be crossed. The Vancouver segment of the transit system crosses the historical alignment and relic sections of Winona Creek, one of many Vancouver streams that once conveyed flows to the Fraser River. However, it was established during the EA review that the key habitat and impact concerns, also relating to aboriginal fisheries, are confined to the two bridge crossings.

The conceptual design of the Fraser River North Arm bridge traverses inter-tidal mudflat, inter-tidal marsh and a fringe of riparian shrub woodland along the southern shoreline of the channel as defined by the Lulu Island dyke. These features have been classified by the Fraser River Estuary Management Program (FREMP), a multi-agency collaboration to facilitate environmental review within the Fraser River estuary, as highly productive fish habitat. The conceptual locations for the bridge pier footings (to be detailed during final design and prior to start of construction) avoid inter-tidal and riparian fish habitats. Densification works associated with a pier located in proximity to the local low water mark of the southern shoreline may, according to the proponent, affect a small area of inter-tidal mudflat.

The conceptual design of the Fraser River Middle Arm bridge traverses inter-tidal marsh and mudflat along both shorelines of the channel. A small cluster of shrubs and trees occurs within the riparian environment of the western shoreline, at and about the location of a decommissioned storm-water outfall structure. Shrubs and trees are absent from the riparian environment of the eastern shoreline; the gravel road of an aggregate handling facility defines this shoreline. The marsh and mudflat along the eastern shoreline has been classified by FREMP as highly productive fish habitat as has the riparian woodland, marsh and mudflat along the western shoreline.

Considerable discussions ensued over the scope of the fisheries and aquatic resources impact assessment presented in the Application with respect to: species at risk; the use of the North Fraser Port Authority (NFPA) Habitat Bank; cumulative environmental effects, such as the river water column on fish migration; and aboriginal fishery issues.

During the review of draft Application material and the Application, as submitted, DFO noted that essentially all fish and fish habitat have been treated equally in the habitat impact assessment. Although it may be acceptable to cause a HADD⁴ of fish habitat (e.g. pier placement) under the *Fisheries Act*, it may not be acceptable if the HADD were to have an effect on a species at risk. In addition to the fish species inventory suggested by DFO for the Species at Risk, it was noted that

⁴ HADD= Harmful Alteration Disruption and Destruction as defined in the Canada *Fisheries Act*.

a description of the habitat types (i.e. sand and silt, marsh) that will be affected have been provided, but no examples of fish or their different life stages that utilise it have been identified. To determine the appropriate mitigation and compensation, a better understanding of the different species that could be affected was suggested for discussion.

In their responses, the proponent restated their basic position, included in the Application, that the review material does not focus on any single fish species or the habitat of any single fish species, because consideration of the impact of the conceptual project design, construction and operation may have on fish and fish habitat is all-inclusive. Any impact on the biophysical environment is considered in the context of an impact upon fish and fish habitat. Accordingly, the proponent states that the life history requirements of all fish species documented to inhabit the Fraser River estuary and watercourses of adjacent uplands are duly addressed, including those supporting significant fisheries (e.g. Pacific salmon) and those considered at risk.

Following a number of written submissions and exchanges, DFO accepted the habitat impact assessment and the proposed conceptual fish compensation plan, including as appropriate incorporating the NFPA Habitat Bank, as satisfying the level of details for a future authorization under section 35(2) of the federal *Fisheries Act*.

First Nations advised that aboriginal fisheries in the vicinity of the North Arm and the Middle Arm of the Fraser River constitute an important cultural and commercial activity for the First Nations who are engaged in these fisheries. The two new bridges will add some constraints to marine traffic and potentially to fisheries conducted by the Musqueam Indian Band. However, the navigational issues have been resolved by the realignment of the bridges and the repositioning of bridge support columns and associated foundations. An “approval in principle” was obtained from Transport Canada (TC) reflecting a future approval under the *Navigable Waters Protection Act*. This “approval in principle” by TC is conditional upon final design being developed to the satisfaction of TC. The proponent and DFO discussed the assessment of the project’s potential impacts on aboriginal fisheries in the area of the two Fraser River bridge crossings. The available data from non-aboriginal sources indicate some, but not extensive, aboriginal fisheries at the two river crossings, as discussed in PART B of the Assessment Report. The proponent has committed to continue to consult with the Musqueam Indian Band on the extent of their fisheries and the impact the project may cause and to seek agreement on a reasonable accommodation for any infringements on their fishing rights.

Cut-and-Cover Tunnel Construction:

A number of public comments focussed on the cut-and-cover construction methodology versus the twin-bored tunnelling approach. The Reference Project, as defined and described in earlier public consultation events and the basis for the BAFO tendering process, assumed a twin-bored tunnel in the Vancouver downtown area, under False Creek and under Cambie Street until at least 37th Avenue. The Selected Project includes a cut-and-cover section from the Waterfront Station to north of Georgia Street and from approximately 2nd Avenue to between 63rd and 64th Avenues along Cambie Street.

The option of a longer cut-and-cover section along Cambie Street was included in the BAFO tendering documents and was finalized with the decision on the Selected Project on November 19, 2004. This project, proposed by the Concessionaire, was also tabled at the TransLink board meeting on December 1, 2004, when the board instructed RAVCo to continue their negotiations with SNC/Lavalin-Serco based on the Selected Project.

In comments submitted to EAO, members of the public argued that this change in tunnelling construction method was not properly announced by RAVCo and that information on this project detail was not available until well into the public comment period on the project, closing February 23, 2005. Some members of the public accused the proponent of hiding the project change and requested that EAO should not allow the Selected Project to proceed in the EA review.

The Selected Project was summarized in RAVCo's Application, posted on the EAO's website on December 10, 2004, and more fully defined in RAVCo's Application Supplement, posted on EAO's website on December 17, 2004 – about three weeks ahead of the start of the 45-day public comment period.

In the Application Supplement, RAVCo addressed the comparative environmental and socio-economic/community impacts, resulting from cut-and-cover versus the twin-bored tunnelling method reflected in the Application. The overall impact issues associated with the additional cut-and-cover tunnelling sections are discussed in the biophysical and socio-economic/socio-community sections of PART B of the Assessment Report. Any incremental adverse impacts were identified and appropriate mitigation measures are reflected in the "Owner's Commitments and Assurances" enclosed in the Assessment Report.

Air Quality Issues:

The principal local air quality impacts of the project are expected to occur in the immediate vicinity of the transportation corridor through which the proposed rail rapid transit line will run, namely the Cambie Street corridor, starting at the downtown Vancouver waterfront. During the construction phase, the potential exists for localized air quality impacts along this corridor.

The two major sources of emissions from the RAVP development are dust emissions from non-combustion sources and exhaust emissions from construction vehicles and stationary combustion sources. Although the potential for localized air quality impacts of these activities may be foreseeable, the review established that they will be temporary and localized, as the construction progresses in street sections.

Taking into account the emissions from British Columbia electrical power generation, the proponent expects that RAVP operation will reduce emissions overall by between 168 and 235 tonnes per year of common air contaminants in 2010, and between 33 and 40 tonnes per year in 2025. These reductions arise from the expected displacement of both diesel buses and private vehicles. Reductions in fine particulate matter and oxides of nitrogen are expected to be particularly significant on the local scale, especially along the Cambie Street corridor. With the predicted RAVP ridership and reduction in vehicle usage, the proponent also expects significant amounts of GHG emissions will be avoided during the operational phase of the project. These reductions, estimated at between 16 and 21 kilo tonnes of carbon dioxide (CO₂) equivalent GHG regional emissions per year by 2021, are expected to far outweigh any temporary increase of GHG emissions during the construction phase.

The emission reductions described in the Application as a result of future displacement of vehicles and the transfer of ridership to RAVP was discussed during the EA review. It was suggested, by Environment Canada, that an uncertainty analysis would be beneficial for addressing the sensitivity of the results of the various assumptions made in the Application. In their response RAVCo concluded that such an analysis would not alter the main conclusion of the air quality impact assessment. According to RAVCo, the purpose of the emissions calculations in the air quality assessment was to determine whether or not construction of the project would result in a net benefit in terms of air emission reductions. Due to the type of project (design/build/finance/operate//maintain) the assessment was conducted during the planning stages of the project, which is typically when most of the technical environmental assessment studies are conducted. Therefore, the study was based on numerous, but acceptable, assumptions and the resultant emission estimates are general values. The review concluded that there is not sufficient information to conduct a detailed, quantitative uncertainty analysis.

The review also covered the availability of construction equipment in the Lower Mainland, as net imports may affect incremental local air quality impacts during construction.

Contaminated Soil Issues:

A number of public comments on the project, submitted to EAO, focussed on the risk to public health from excavation and disposal of contaminated soil along the RAVP corridor. The overall objective of the screening level contaminated sites assessment provided for the project, and included in the Application, is to establish a useful planning tool for multiple users working on the project. Specific objectives of the assessment include:

- To rank areas or sites with high, moderate or low risks of contamination;
- To identify contaminant parameters of concern; and,
- To determine the need for mitigation prior to and during construction.

The results of this assessment concluded that there is a moderate risk of encountering contaminants at the surface along most of the Vancouver section of the corridor, with six high risk areas; that there is a low risk of encountering contaminants at the surface along large sections of the Vancouver South portion of the corridor (but with several dispersed zones of moderate and high risk sites along False Creek, the Fraser River and major intersections); and there is a low to moderate risk of encountering contamination at the surface with five localized high risk areas in Richmond.

The working groups organized by EAO for the EA review have studied the review material presented in the Application. While it is expected that some contaminated soils will be encountered within the RAVP corridor during construction, there are stringent permitting measures associated with the removal of contaminated soil and other excavated material, complying with the "Contaminated Sites Regulation", BC Reg 375/96 and the "Hazardous Waste Regulation", BC Reg 63/88 under the British Columbia *Environmental Management Act*, SBC 2003, ch. 53. The proponent must ensure that the Concessionaire complies with all relevant permit requirements as well as conditions of project certification under the Act.

Noise Assessment:

The operational noise of the project is not likely to be materially different than what is experienced from the SkyTrain and Millennium Line operations of TransLink, recognizing that the RAVP line is underground along a significant section of the total corridor. The proponent has proposed some station noise mitigation measures in a residential area north of the Marine Drive Station. Construction noise, on the other hand, was raised by a number of review agencies and the public, especially focussing on the noise issues associated with the cut-and-cover construction along Cambie Street.

In the Application Supplement, the proponent addressed the relative noise impact issues, comparing the Reference Project and the Selected Project. The increase in the amount of cut-and-cover construction associated with the Selected Project will result in additional short-term (three-to-four months) increases in noise levels as construction progresses along the length of the Cambie Street alignment. A substantial number of the public comments submitted to EAO focussed specifically on this issue, centred around actual construction noise (excavation, piling, rigging etc.) and the extra transportation and trucking of excavated material. The extent and duration of construction noise through primarily residential areas (25th Avenue south to 63rd Avenue) introduce combined machinery/equipment noise impacts on the closest residential properties that may require further mitigation measures to reduce these impacts. RAVCo carried out an assessment of construction machinery noise generation. During the overall Cambie Street construction of two years, traffic will be significantly reduced. Thus, for most of the two year period, the noise level exposure to the residences on either side of Cambie Street will drop. When this reduced level is averaged with the relatively brief periods that the noise level will increase due to the proximity of the construction, the overall average level for the two years is expected to be lower than the existing noise level on Cambie Street.

RAVCo, through the Concessionaire, accepts that, if required by the relevant authorities, a noise monitoring protocol will be developed, such as for night work, and the affected community will be advised. The Concessionaire and RAVCo recognize that communication with the public regarding work procedures and proposed schedule changes will be important in maintaining positive community support throughout construction. RAVCo has therefore committed to implementing a Community and Business Liaison Program during construction of the project.

RAVCo proposes to undertake about 70 percent of the tunnel construction by the cut-and-cover construction methodology. While City of Vancouver noise bylaws will be adhered to during construction, this method of construction will require excavated material to be removed by trucks along a trucking corridor. The additional noise of trucking waste material along traffic corridors is a concern to the public and to reviewing agencies. Whether put to beneficial uses (e.g., such as engineering fill on other projects), deposited in an approved landfill or disposed of at sea, under federal disposal at sea permits, excavated material will be transported through the Lower Mainland along designated truck routes, or routes otherwise approved by the applicable municipalities and the Concessionaire and its agents, through contractual arrangements with RAVCo. The proponent must comply with all applicable municipal bylaws and provincial and federal regulations. In addition, the Concessionaire will develop a Traffic Management Plan and a Construction Management Plan, for each of the two municipalities (Vancouver and Richmond) and to their approval.

The Concessionaire will describe measures to address noise impacts in the Noise Management component of the Environmental Management Plan (EMP). This plan, covering the entire alignment, is to be prepared for RAVCo review and approval prior to construction, with regulatory and by-law input from the municipalities of Vancouver and Richmond and the Vancouver International Airport Authority.

Arboricultural Issues and the Cambie Heritage Boulevard:

In Vancouver, the boulevards on both the east and west sides of Cambie Street contain conventional rows of planted street trees, growing in narrow planted strips with poor soil conditions. These trees are generally young, developing and in fair condition. The Cambie Heritage Boulevard (the median) averages 10 m. in width and contains a randomly spaced planting of various tree species. The boulevard trees range in age and structural class from newly planted saplings to mature form. Generally, these trees were observed to be in fair to good condition with some close to the end of their lifespan. Due primarily to poor soil conditions, young trees within the boulevard were consistently found to be in poor condition.

A number of public comments focussed on the health of the Cambie Heritage Boulevard during construction of the cut-and-cover sections. The public open houses addressed many of these concerns and the proponent also provided further project construction details to the Cambie Heritage Boulevard Conservation Society. RAVCo received some verbal support for the change in the tunnel alignment along the boulevard, with construction largely along the northern lanes of the street which will have fewer negative impacts on the planted trees than assumed for the Reference Project. The Society expects that the proponent and the Concessionaire will apply measures for maximum protection of the boulevard trees.

The City of Richmond (COR) expressed concerns over the health of planted trees along the No. 3 Road, being located in the shade of the elevated guideway and also likely to be impacted during construction. While the Application recognizes the good health of the COR's trees, the review material does not identify what the likely impacts may be (e.g., extent of tree loss) nor what commitments will be made to protect and/or compensate for existing assets. The COR has invested significant resources into beautifying the No. 3 Road corridor and has a "no-net-loss" policy. Landscape improvements include the trees as well as other assets.

Preliminary results of further assessment work undertaken by RAVCo's arboricultural specialist following the Application submission, indicates that all of the trees and other landscape assets

(e.g., shrubs) located along the guideway construction zone down No. 3 Road will have to be removed. It is assessed that all of the affected trees and associated landscape vegetation are in good condition and of a size that should allow them to be transplanted out, temporarily stored in a nursery, before being re-planted in the green-space located adjacent to the guideway, upon completion of construction. The Concessionaire will be responsible for front-end road diversions and relocations and will, therefore, be required to coordinate salvage operations with COR, so that as much of the landscaped material as possible can be reused on the project, if COR chooses to do so. This requirement is reflected in the proposed conditions for certification, reflected in the Assessment Report.

Other Socio-Community and EA Review Issues:

The City of Vancouver, City of Richmond, other review agencies and the public also raised other socio-community issues, such as the Cambie Street Commerce and Merchant's concerns; public safety associated with station location and design; vehicle and pedestrian mobility; and community and First Nations liaison measures. These issues are further discussed in section 6 of PART B of the Assessment Report.

The review of the Application and the Application Supplement also covered other specific impact issues relevant to an environmental assessment pursuant to the Act. These issues included project need and context; terrestrial and biophysical assessment; archaeology; historical and heritage assessment; and electric and magnetic field assessment. Review coverage required under the Act is included in PART B of this Assessment Report.

The EA review of the project also covered federal CEAA requirements and included a cumulative effects assessment, an assessment of environmental effects of accidents and malfunctions and an assessment of environment's effects on the project. Neither of these assessments established any adverse residual effects.

Environmental Management Plan (EMP):

Discussions took place on the development, implementation and reporting on an acceptable EMP during project construction and operation. Acceptable commitments by the proponent are reflected in the Assessment Report.

CONCLUSIONS AND RECOMMENDATION

Based on the cooperative environmental assessment, the Environmental Assessment Office and federal Responsible Authorities are satisfied that:

- The Final Documentation, as defined in the Assessment Report, adequately identifies and assesses the potential adverse environmental, economic, social, heritage, health and First Nation effects of the RAVP;
- Public and First Nations consultation, and the distribution of information about the project have been adequate;
- Issues identified by the public, First Nations and federal, provincial and local government agencies, that are within the scope of the environmental assessment, were adequately addressed by the proponent during the review of the Application and the Application Supplement;
- First Nations comments on the project and its review have been reflected in the Final Documentation and in the Assessment Report and the proponent has agreed to continue consultation with identified First Nations on specific aboriginal impacts issues defined in the Final Documentation; and,
- Practical means have been identified to prevent or reduce to an acceptable level any potential adverse effects of the Richmond-Airport-Vancouver Rapid Transit Project.

Table of Contents

Executive Summary	ii
Table of Contents	xv
List of Acronyms and Abbreviations.....	xix

PART A – GENERAL REVIEW BACKGROUND

1. PROJECT REVIEW AND CERTIFICATION PROCESS	1
1.1 BACKGROUND.....	1
1.2 PURPOSE OF THE ASSESSMENT REPORT	1
1.3 FEDERAL AND PROVINCIAL EA REVIEW	1
1.3.1 Compliance with the Act.....	2
1.3.2 Compliance with CEAA	3
1.3.3 Other EA Involvement	3
1.4 EA REVIEW OF THE PROJECT	3
1.4.1 Advisory Review Teams.....	4
1.4.2 Consultation on the Application.....	6
1.4.3 EA Review Conclusions	6
2. PROJECT DESCRIPTION AND SCOPE OF THE REVIEW	7
2.1 PROJECT OVERVIEW	7
2.2 SCOPE OF THE PROJECT	7
2.3 SCOPE OF THE ASSESSMENT	9
2.4 PROJECT RATIONALE AND DESCRIPTION.....	10
2.4.1 Project Need in the Context of Regional Transportation Planning.....	10
2.4.2 Alignment.....	10
2.4.3 Technology	11
2.4.4 Station and Station Locations.....	11
2.4.5 Operations and Maintenance Centre	11
2.4.6 Inter-modal Facilities	11
2.4.7 Site Contamination Issues.....	12
2.4.8 Project Construction	12
2.4.9 Project Budget.....	12
2.4.10 Alternative Means of Carrying out the Project.....	14
2.4.11 Economic Benefits and Jobs	14
2.5 APPLICATION FOR PROJECT ENVIRONMENTAL ASSESSMENT CERTIFICATE	14
2.5.1 General.....	14
2.5.2 Proponent’s Responsibilities	15
2.5.3 Concessionaire’s Responsibilities	15
3. INFORMATION DISTRIBUTION AND CONSULTATION	16
3.1 ACCESS TO REVIEW DOCUMENTATION	16
3.2 NOTIFICATIONS.....	16
3.3 CONSULTATION	17
3.3.1 Public Consultation Measures Undertaken by the Proponent.....	17
3.3.2 Public Consultation Measures Undertaken by EAO.....	19
3.3.3 First Nations Consultation	20
3.4 RESPONSES AND RESULTS FROM PROJECT’S PUBLIC CONSULTATION	23
3.5 SUMMARY AND CONCLUSIONS – INFORMATION DISTRIBUTION AND CONSULTATION	24

3.5.1	Public Consultation	24
3.5.2	First Nation Consultation	24
PART B – REVIEW OF THE APPLICATION		
1.	CONSIDERATION OF POTENTIAL PROJECT EFFECTS – SUMMARY	26
2.	PROJECT NEED AND CONTEXT, PROJECT BUDGET/COST, CONSTRUCTION AND SCHEDULING	27
2.1	GENERAL	27
2.2	BACKGROUND INFORMATION	27
2.2.1	General	27
2.2.2	Project Rationale	27
2.2.3	Project Alternatives	28
2.2.4	Project Budget/Cost	28
2.2.5	Construction and Scheduling	29
2.3	REVIEW COMMENTS AND PROPONENT’S RESPONSES	29
2.3.1	Project Need and Alternatives	29
2.3.2	Project Construction	29
2.3.3	Project Costs	29
2.3.4	Project Implementation Schedules	30
2.4	CONCLUSIONS AND RECOMMENDATIONS	30
3.	FISHERIES AND AQUATIC HABITAT	31
3.1	GENERAL	31
3.2	BACKGROUND INFORMATION	31
3.2.1	The Fraser North Arm	31
3.2.2	Middle Arm Crossing	32
3.2.3	The Airport Branch	33
3.2.4	The Lulu Island Branch	33
3.2.5	The South Vancouver Branch	34
3.3	REVIEW COMMENTS AND PROPONENT’S RESPONSES	34
3.3.1	General	34
3.3.2	Scope of the Fisheries and Aquatic Resources Impact Assessment	34
3.3.3	Species at Risk	36
3.3.4	North Fraser Port Authority (NFPA) Habitat Bank	36
3.3.5	Cumulative Environmental Effects and Fish Migration	37
3.3.6	Aboriginal Fisheries Issues	37
3.3.7	Water Quality	39
3.4	CONCLUSIONS AND RECOMMENDATIONS	39
4.	TERRESTRIAL BIOPHYSICAL ASSESSMENT	40
4.1	GENERAL	40
4.2	BACKGROUND INFORMATION	40
4.2.1	Vegetation Study Results	40
4.2.2	Wildlife Study Results	41
4.2.3	Potential Impacts and Mitigation Measures	41
4.3	COMMENTS AND PROPONENT’S RESPONSES	42
4.4	CONCLUSIONS AND RECOMMENDATIONS	43
5.	ARBORICULTURAL ASSESSMENT	44
5.1	GENERAL	44
5.2	BACKGROUND INFORMATION	44
5.3	REVIEW COMMENTS AND PROPONENT’S RESPONSES	45
5.4	CONCLUSIONS AND RECOMMENDATIONS	46

6. SOCIO-ECONOMIC/SOCIO-COMMUNITY ASSESSMENT	47
6.1 GENERAL	47
6.2 BACKGROUND INFORMATION	47
6.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES.....	48
6.3.1 Description and Summary of Impacts for Socio-economic Indicators.....	48
6.3.2 Second Avenue Station and Cut-and-Cover Construction Along Cambie Street	49
6.3.3 Public Health Effects	49
6.3.4 Cambie Street Commerce and Merchants' Concerns.....	50
6.3.5 Public Safety.....	50
6.3.6 Vehicle and Pedestrian Mobility	51
6.3.7 Burkeville Residential Community.....	51
6.3.8 Construction Issues and Economic Dev. Community and First Nations Liaison	51
6.4 CONCLUSIONS AND RECOMMENDATIONS.....	52
7. CONTAMINATED SITES ASSESSMENT.....	53
7.1 GENERAL	53
7.2 BACKGROUND INFORMATION	53
7.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES.....	54
7.4 CONCLUSIONS AND RECOMMENDATIONS.....	55
8. AIR QUALITY ASSESSMENT	56
8.1 GENERAL	56
8.2 BACKGROUND INFORMATION	56
8.2.1 RAVP Impacts on Local Air Quality	56
8.2.2 RAVP Impacts on Greenhouse Gas (GHG) Emissions	56
8.2.3 RAVP Impacts on Regional Air Quality	57
8.2.4 Mitigation of Air Quality Impacts and GHG Emissions During Construction	57
8.2.5 Modification to Air Quality Assessment with Selected Project	57
8.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES.....	57
8.4 CONCLUSIONS AND RECOMMENDATIONS.....	59
9. NOISE ASSESSMENT	60
9.1 GENERAL	60
9.2 BACKGROUND INFORMATION	60
9.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES.....	61
9.3.1 Noise Issues Raised During Review of Application Draft Material.....	61
9.3.2 Construction Noise	62
9.3.3 Operational Noise.....	64
9.4 CONCLUSIONS AND RECOMMENDATIONS.....	65
10. ARCHAEOLOGICAL IMPACT ASSESSMENT	66
10.1 GENERAL	66
10.2 BACKGROUND INFORMATION	66
10.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES.....	67
10.4 CONCLUSIONS AND RECOMMENDATIONS.....	67
11. HISTORICAL AND HERITAGE ASSESSMENT.....	69
11.1 GENERAL	69
11.2 BACKGROUND INFORMATION	69
11.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES.....	70
11.4 CONCLUSIONS AND RECOMMENDATIONS.....	70
12. ELECTRIC AND MAGNETIC FIELDS (EMF) ASSESSMENT	71
12.1 GENERAL	71
12.2 BACKGROUND INFORMATION	71

12.2.1	Electric Field Generation (0 to 3,000 Hz)	71
12.2.2	Magnetic Field Generation (0 to 3,000 Hz)	71
12.2.3	Electromagnetic Compatibility	72
12.3	REVIEW COMMENTS AND PROPONENT'S RESPONSES	72
12.4	CONCLUSIONS AND RECOMMENDATIONS	73
13.	FEDERAL REVIEW ISSUES	74
13.1	INTRODUCTION	74
13.2	CUMULATIVE IMPACT ASSESSMENT	74
13.2.1	General	74
13.2.2	Results	75
13.2.3	Review Comments	76
13.3	ENVIRONMENTAL EFFECTS OF ACCIDENTS AND MALFUNCTIONS	76
13.4	EFFECTS OF THE ENVIRONMENT ON THE PROJECT	77
PART C – REVIEW CONCLUSIONS		
1.	GENERAL	78
2.	PROJECT NEED AND CONTEXT, PROJECT BUDGET/COST, CONSTRUCTION AND SCHEDULING	78
3.	FISHERIES AND AQUATIC HABITAT	79
4.	TERRESTRIAL BIOPHYSICAL EFFECTS	80
5.	ARBORICULTURAL EFFECTS	80
6.	SOCIO-ECONOMIC/SOCIO-COMMUNITY ISSUES	81
7.	CONTAMINATED SITE ISSUES	82
8.	AIR QUALITY EFFECTS	82
9.	NOISE ASSESSMENT	82
10.	ARCHAEOLOGICAL IMPACTS, EFFECTS ON HISTORICAL AND HERITAGE RESOURCES AND ELECTRIC AND MAGNETIC FIELD ASSESSMENT	83
11.	ENVIRONMENTAL MANAGEMENT PLAN	83
12.	FEDERAL REVIEW ISSUES	84
13.	OVERALL CONCLUSION	84
FIGURES		
Figure 1:	Proposed RAV Alignment	2
Figure 2:	RAVP Transportation and Geographic Setting	8
Figure 3:	Summary Project Schedule	13
TABLES		
Table 1:	Sources of Public Funding	14
APPENDICES		
Appendix A:	Documents and correspondence for the Richmond-Airport-Vancouver Rapid Transit Project by or for the Proponent	
Appendix B:	Working Group/Agency Membership List	
Appendix C:	Summary of Working Group/Agency Comments During Review of Application	
Appendix D:	Summary of Public Comments During Review of Application	
Appendix E:	Owner's Commitments and Assurances	

List of Acronyms and Abbreviations

ACT	British Columbia <i>Environmental Assessment Act</i>
APPLICATION	Application for an Environmental Assessment Certificate
ARSB	Archaeology and Registry Services Branch of MSRM
ATOR	Approved Terms of Reference
BAFO	Best and Final Offer
BCEAA	British Columbia <i>Environmental Assessment Act</i>
BMP	Best Management Practise
CEAA	<i>Canadian Environmental Assessment Act</i>
CEA Agency	Canadian Environmental Assessment Agency
CEPA	<i>Canadian Environmental Protection Act</i>
COALITION	Do RAV Right Coalition
CONCESSIONAIRE	SNC Lavalin-Serco
COR	City of Richmond
COV	City of Vancouver
CPTED	Crime Prevention through Environmental Design
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAO	British Columbia Environmental Assessment Office
EC	Environment Canada
EMP	Environmental Management Plan
FREMP	Fraser River Estuary Management Program
GVRD	Greater Vancouver Regional District
HC	Health Canada
INFC	Infrastructure Canada
KFN	Katzie First Nation
LWBC	Land and Water British Columbia Inc.
MIB	Musqueam Indian Band
MBCA	<i>Migratory Birds Convention Act</i>
MBR	Migratory Birds Regulation
MOT	Ministry of Transportation
MWLAP	Ministry of Water, Land and Air Protection
MSRM	Ministry of Sustainable Resource Management
NFPA	North Fraser Port Authority
NWPA	<i>Navigable Waters Protection Act</i>
OAC	Owner's Commitments and Assurances
OCP	Official Community Plan
ORDER	Section 11 Order
P3	Public-Private-Partnership
RAVCo	Richmond-Airport-Vancouver Rapid Transit Project Management Ltd.
RAVP	Richmond-Airport-Vancouver Rapid Transit Project (RAVP)
RAs	Responsible Authorities
SARA	<i>Species at Risk Act</i>
SEWG	Socio-economic/Community Working Group
SN	Squamish Nation
SNC	SNC-Lavalin-Serco ("the Concessionaire")
TBWG	Technical/Biophysical Working Group
TC	Transport Canada
TFN	Tsawwassen First Nation
TWFN	Tsleil-Waututh Nation

TOR
TRANSLINK
VIAA
WCB

Terms of Reference
Greater Vancouver Transportation Authority
Vancouver International Airport Authority
Workers' Compensation Board

PART A

General Review of Background

1. Project Review and Certification Process

1.1 BACKGROUND

RAV Project Management Ltd. is a company established under the British Columbia *Company Act* (hereafter referred to as 'RAVCo' or 'proponent' or 'Owner'). RAVCo is a wholly-owned subsidiary of the Greater Vancouver Transportation Authority ('TransLink') and is proposing to develop an electric rail rapid transit line that will connect central Richmond, Vancouver International Airport on Sea Island, and downtown Vancouver along one of the busiest traffic corridors in the region. The horizontal alignment of this rail line is depicted in **Figure 1**. The Richmond-Airport-Vancouver Rapid Transit Project ('RAVP' or the 'project') is being developed as a public-private partnership, and intending to use an international consortium⁵ for the design, construction, financing, operation and maintenance of the project ('Concessionaire'). The project is funded by the Government of Canada, Government of British Columbia, Translink and the Vancouver International Airport Authority ('Funding Agencies').

On November 19, 2004, the proponent submitted to the Environmental Assessment Office ('EAO'), an application for an environmental assessment (EA) certificate for the RAVP ('Application'), pursuant to the British Columbia *Environmental Assessment Act*, SBC 2002, c.43 ('Act'). Following a compliance reference check against the Application terms of reference issued by EAO on November 19, 2003, the Application was accepted, with specific conditions, for formal review under the Act on December 2, 2004. One of the conditions instructed the proponent to submit an Application Supplement, providing details of the project selected through the Best-and-Final-Offer ('BAFO') tendering process ('Selected Project') and any consequential changes to the impact assessments and review conclusions included in the Application⁶. This Application Supplement was submitted to EAO and accepted for review on December 17, 2004.

The results of the review of the Application and the Application Supplement are contained in this Assessment Report.

1.2 PURPOSE OF THE ASSESSMENT REPORT

The purpose of this report is to:

- Briefly describe the project;
- Report on the adequacy of distribution of information and public and First Nations consultation during the review by RAVCo;
- Summarize the issues considered during the review of the Application;
- Report on whether the Application has considered and adequately assessed the project's identified potential environmental, economic, social, heritage, health and First Nations effects; and,
- Identify the measures required to prevent or reduce to an acceptable level the potential adverse effects of the project.

1.3 FEDERAL AND PROVINCIAL EA REVIEW

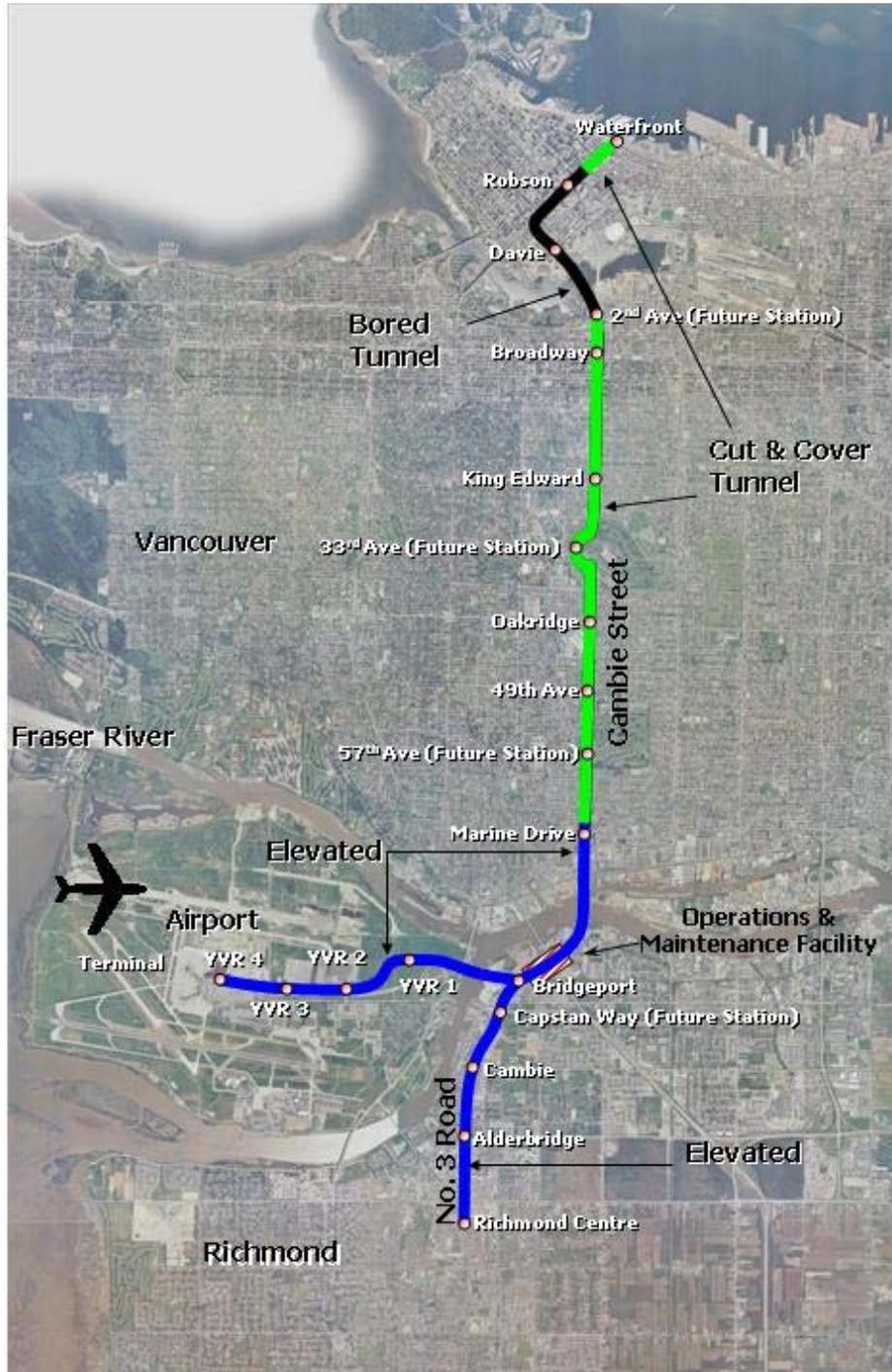
⁵ InTransit BC Limited Partnership including SNC Lavalin-SERCO

⁶ This requirement, complying with the review process defined by EAO (see section 1.3.1), is a result of the proponent presenting the Reference Project in the Application, rather than the Selected Project introduced by the successful consortium during the tendering process and announced by the proponent on November 19, 2004 – the date of Application submission to EAO. For further details, see section 2 of this Assessment Report.

1.3.1 Compliance with the Act

On January 13, 2003 the proponent applied in writing to request that the RAVP be designated as a reviewable project under section 7(1) of the Act. On January 22, 2003, the Executive Director of the EAO granted this request. On February 10, 2003, the EAO issued a Section 10 Order pursuant to the Act, ordering that the project will require an environmental assessment certificate and that the proponent may not proceed with the project without an assessment.

Figure 1: Proposed RAVP Alignment (Credit: RAVCo)



On September 10, 2003, the EAO issued a Section 11 Order pursuant to the Act, defining the scope of the required assessment and the procedures and methods for conducting the assessment for the purposes of the Act.

1.3.2 Compliance with CEAA

An EA of a project is also required under the *Canadian Environmental Assessment Act*, SC 1992, c.37 as amended ('CEAA') before a federal authority exercises certain powers or performs certain duties or functions in respect of a project for the purposes of enabling the project to be carried out, in whole or in part. In relation to the RAVP, an EA is required before Infrastructure Canada ('INFC') and Transport Canada (TC) provide financial assistance to the proponent, before authorizations or approvals are issued pursuant to section 35(2) of the *Fisheries Act*, and section 5(1)(a) of the *Navigable Waters Protection Act* and section 127(1) of the *Canadian Environmental Protection Act* relating to Environment Canada's statutory responsibilities for disposal at sea. Pursuant to an MOU between TC and INFC, TC is responsible for coordinating the environmental assessment on behalf of both INFC and TC. Canadian Transportation Agency is providing rail assessment input to the project's EA. The North Fraser Port Authority also exercises regulatory approval participation through federal port regulations. Since the project is not described in the Comprehensive Study List Regulation of CEAA, a screening assessment is required

INFC, Fisheries and Oceans Canada ('DFO'), Environment Canada ('EC') and Transport Canada ('TC') were identified as federal Responsible Authorities ('RAs') for the purposes of this project assessment. The Canadian Environmental Assessment Agency ('CEA Agency'), with the input and involvement of the RAs, coordinated federal involvement throughout the cooperative EA.

1.3.3 Other EA Involvement

An EA is also required under the Airport Authority Policy as part of their Development Permit process, before the Vancouver International Airport Authority would allow the RAVP airport connection to proceed.

1.4 EA REVIEW OF THE PROJECT

The procedural Order issued on September 10, 2003 under section 11 of the Act ('Order') outlines the scope, procedures and methods for the EA review⁷ of the proposed RAVP, including both Pre-application and Application review stages. The assessment procedures at the Pre-application stage focused on the scoping of issues for review and the development of Terms of Reference for the Application through consultation with First Nations and federal, provincial, municipal agencies and other organizations.

The "Canada/British Columbia Agreement for Environmental Assessment Cooperation" provides for coordinated environmental assessment processes to avoid uncertainty and duplication where the project is subject to review under the Act and CEAA. The cooperative assessment of the project was conducted using the process established by the Act and the results are documented in this Assessment Report.

Revenue service along the whole RAVP system must commence on or before November 2009 in order to comply with Funding Agencies' requirements. To ensure that this requirement is met, project construction must begin in August 2005 with some pre-construction planning already from April 2005. A number of key activities have to be completed for this construction start date to be achieved. A summary outline schedule for construction activities is presented in **Figure 3** on page 13. The construction start is conditional on a successful Financial Close by end July 2005 at the latest. In order to meet this deadline, federal and provincial environmental assessment approvals

⁷ EA is one component of British Columbia's overall land and resource management system. Other components include land use planning, land and resource tenuring, permitting and other review/approval mechanisms, and operations management. Each component and its applicable laws, regulations, policy and technical guidelines, supports provincial goals for economic development, environmental protection and community stability.

are required in May 2005. This public necessity has set the timelines for the project review under the Act.

1.4.1 Advisory Review Teams

The EAO, in accordance with section 6 of the Order, took steps to establish working groups to advise the EAO on the assessment of the RAVP. A Technical/Biophysical Working Group ('TBWG') and a Socio-economic/Community Working Group ('SEWG') were organized early in the Pre-Application stage of the project review and examined impact issues described in this Assessment Report.

Specific tasks of the working groups, defined in section 6.7 of the Order, were to include:

- Reviewing the Application when filed; and,
- Providing advice on the assessment findings to the EAO and their Environmental Assessment Report prepared for Ministers at the conclusion of the EA review.

The federal RAs also relied on the advice of the working groups in making their determination under CEAA.

Membership

An invitation to participate in the working groups was circulated to:

- Federal government departments;
- Provincial government ministries and agencies;
- The City of Vancouver;
- The City of Richmond;
- The Greater Vancouver Regional District (GVRD); and,
- The following First Nations:
 - Musqueam Indian Band;
 - Squamish Nation;
 - Tsleil-Waututh Nation;
 - Sto:Lo Nation;
 - Tsawwassen First Nation; and,
 - Katzie First Nation.

Members of the working groups at the time of Application review are listed in *Appendix B*.

All working group members were not involved in every meeting. The six First Nations identified as potentially having an interest in the project were issued with all project review documents and were invited to join the two working groups and to attend all meetings. Proposed agendas were distributed in advance of the meetings to enable members to decide which meetings warranted their participation. RAVCo provided funding support for those First Nations that expressed an interest in reviewing the EAC Application.

Meetings

During Pre-Application:

Potential members of the two working groups were invited to an orientation meeting with the proponent and their consultants in Victoria on February 6, 2003. The meeting discussed project details, likely impacts and the EA process. The first formal pre-application meeting, following the issuance of the section 10 Order under the Act on February 10, 2003, was arranged in Vancouver on April 23, 2003. This meeting, with TBWG and SEWG members attending two separate sessions and partly by conference call, discussed draft study work plans. Subsequent working group meetings, discussing a series of draft work plans for studies required for the project, were conducted in Vancouver on June 16, 2003 and on July 18 2003, respectively. Working group

members met again in Vancouver on October 16, 2003 to be briefed on the project and on studies being undertaken, and to discuss the draft Terms of Reference (TOR) for the Application the proponent would submit to the EAO. The proponent had issued the first draft of the TOR on September 12, 2003 and comments on this document were prepared by EAO for discussion at the meeting.

The working groups met again in Vancouver on November 6, 2003 to discuss the revised TOR, based on comments received, and to finalize the TOR which were subsequently issued as final and Approved Terms of Reference (ATOR) to RAVCo on November 19, 2003. The working groups met in Vancouver on December 9, 2003 to receive an update on the project and to discuss draft study reports to be incorporated in the Application. As the proponent proceeded with drafting the Application based on the ATOR, it became apparent that the progress would be impacted by the BAFO selection process and the endorsement of this process by the Funding Agencies and by the TransLink board deliberations. The working group members did not meet again until September 8, 2004 to receive an update on the project and the BAFO tendering process. It became clear to the proponent, the EAO and the federal and provincial review agencies as well as local governments that an accelerated review of draft Application material would be required to conduct the project's EA in a timely fashion. At meetings on September 8, 2004, October 26, 2004 and November 5, 2004 respectively, working group members, having expressed an interest in reviewing draft Application material, met in Vancouver to discuss such review material.

The Application was submitted to EAO on November 19, 2004 and EAO, supported by a small team of working group members, conducted an Application screening meeting⁸ on November 26, 2004. The Application was subsequently accepted, with specific conditions, for formal review under the Act on December 2, 2004. One condition pertained to the preparation and submission of an Application Supplement, providing further details on the Selected Project⁹. This Application Supplement was discussed at a teleconference meeting on December 10, 2003 by the "screening team" and accepted for formal review.

Final meeting notes for all TBWG and SEWG meetings are available through the EAO's Project Information Centre online at www.eao.gov.bc.ca.

During Application Review:

Following a TransLink board meeting resolution on December 1, 2004 to proceed with the contract negotiations for RAVP and endorsement of the 'Selected' Project proposed by the Concessionaire during the BAFO process, RAVCo amended the Application with an Application Supplement which was accepted for formal review on December 17, 2004.

The EAO invited the working groups to meet with the proponent and their consultants in Vancouver on January 7, 2005 and January 20, 2005 respectively. At these meetings working group members raised and discussed comments on the Application and the Application Supplement and received an update on the project and the public open houses scheduled for January 25th, 26th and 27th respectively. At the third review meeting in Vancouver on February 15, 2005, agencies discussed comments on the Application and the Application Supplement and the proponent's responses to comments, which were issued prior to the meeting. RAVCo informed this meeting on the results of the three public open houses, referred to above. Public comments were solicited as part of the public input to the EA during the public comment period (January 10, 2005 until February 23, 2005).

On March 2, 2005 the working groups met in Vancouver for the fourth review meeting to discuss the results of the public comments on the Application and the Application Supplement and to

⁸ Pursuant to the procedural Order issued by EAO on September 10, 2003.

⁹ For further details, see section 2.4 of this report.

discuss further agency and First Nations review comments and RAVCo's responses to such comments. The working groups also discussed the structure and content of the Assessment Report and the process for EA review conclusions.

On March 15 and on March 31 2005 respectively, the working groups met to discuss the results of the Application review, the recommended conditions for project certification and the drafting of the Assessment Report. For further details see PART B below. Final meeting notes from these review meetings are available on the EAO website noted above.

1.4.2 Consultation on the Application

The procedural Order for the project specifies that First Nations and public consultation must be undertaken. This process, complying with the Provincial Policy for Consultation with First Nations (October 2002) and the *Public Consultation Policy Regulation*, BC Reg 373/2002, is described in more detail in section 3 of this PART A of the Assessment Report.

1.4.3 EA Review Conclusions

The results and conclusions of the EA review are covered in PART C of this Assessment Report. The Assessment Report forms the basis of a referral to the Minister of Sustainable Resources Management; the Minister of Water, Land and Air Protection; and the Minister of Community, Aboriginal and Women's Services for a project decision pursuant to section 17(3) of the Act. The report will also be used to inform federal RAs in making their determinations under section 20(1) of CEAA on whether the project is likely to cause significant adverse environmental effects.

It should be noted that the working groups identified in section 1.4.1 above acted in an advisory capacity to EAO during the review of the project and for the formulation of appropriate project mitigation measures and recommended conditions for project certification pursuant to the Act. In addition, separate consultations were carried out by the proponent and EAO with the First Nations, whether they participated as members of the working groups or not. First Nations comments, proponent and EAO responses to those comments, including measures to avoid or mitigate potential impacts on aboriginal interests are set out in this Assessment Report.

PART B of this Assessment Report discusses the major review issues and includes statements that the working groups generally agree with the review of individual impact issues. Not all members of the working groups have studied and formulated opinions on all review comments, on the proponent's responses to those comments and on the conclusions drawn. However if members of the working groups presented different opinions or conclusions, significant for the EA review of the project, they are recorded in the individual sections of PART B.

2. Project Description and Scope of Review

2.1 PROJECT OVERVIEW

The RAVP will provide an electric rail rapid transit connection between downtown Vancouver, Vancouver International Airport and Richmond City Centre, as illustrated in **Figure 1**.

The project is located in Richmond and Vancouver in B.C.'s Lower Mainland region, which includes the largely rural Fraser Valley and the urban area of Greater Vancouver, as depicted in **Figure 2** on the next page. The region is bounded by the international border with the United States to the south, the Coast Mountains to the north and east, and the Pacific Ocean to the west.

Although the RAVP line will not connect directly to existing rapid transit systems, it will include a station located near the existing Waterfront SkyTrain Expo Line Station, a station at Broadway and Cambie to interface with a future extension of the SkyTrain Millennium Line, and be designed to complement existing services. This will contribute to, and further enhance, the transit network within the Greater Vancouver Region.

The RAVP system will be approximately 19.5 kilometres long and will include 17 stations: four in Richmond, four on Sea Island and nine in Vancouver. Additional stations may be considered in the future. Generally, the line will serve major employment and commuter destinations including Richmond City Hall, Richmond Hospital, Richmond Centre, Lansdowne and Aberdeen Centre shopping malls, the Vancouver International Airport, Langara Community College, Oakridge Shopping Centre, Vancouver City Hall, Vancouver Hospital, BC Cancer Agency, Central Broadway business district, Downtown Vancouver business district, and Canada Place and cruise ship facilities.

2.2 SCOPE OF THE PROJECT

The scope, procedure and methods of the assessment of the RAVP were defined in section 3, Schedule A of the procedural Order issued under section 11 of the Act. The working group discussions, study definitions and impact assessments prior to the Application submission were based on a Reference Project – also used in the BAFO process¹⁰. The review of the project was undertaken pursuant to the federal/provincial Work Plan of November 10, 2004 for the joint project review and assessment, and with reference to the ATOR issued to the proponent on November 19, 2003.

The Application would have benefited from the inclusion of design/construction details of the actual project, the Selected Project, as a result of the BAFO and Concessionaire selection process – for which an EA certificate is being requested.¹¹ However, due to the strict confidentiality applied to the BAFO process, and the proponent's decision to submit the Application on November 19, 2004 – the day of the public announcement of the results of the BAFO process – the Application described only the Reference Project¹² and the associated impacts. However, the EA review continued with the request for and submission of an Application Supplement, describing the details of the Selected Project, as described below.

The Reference Project and the associated project scoping, pursuant to federal and provincial EA legislation, defined the horizontal and vertical alignment, and construction methodology for various sections of the alignment. Without section specifics, the legislated scoping of the project

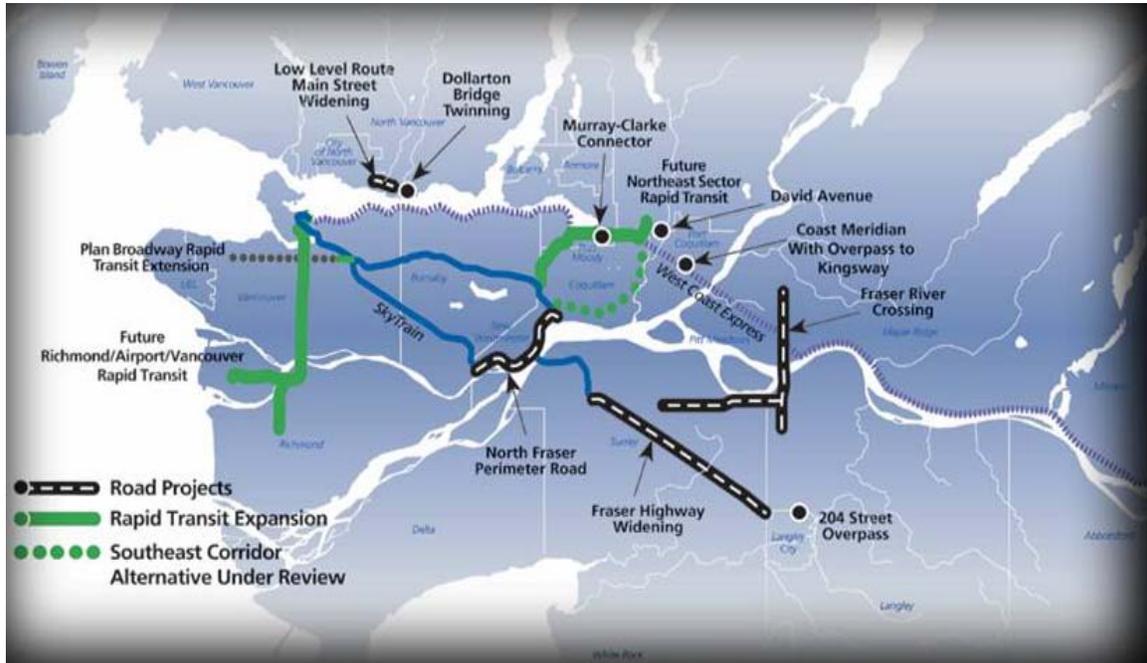
¹⁰ A further description of the tendering process based on the Reference Project, including the BAFO approach, is included in section 2.6 of the Application.

¹¹ Environmental assessment of the RAVP, being a linear project, is by and large an assessment of a defined corridor.

¹² Apart from Table 2-2, briefly outlining the project as proposed by the successful Concessionaire.

included the following on-site and off-site physical works and the activities associated with the construction and operation of these physical works:

Figure 2: RAVP Transportation and Geographic Setting



Credit: RAVCo/TransLink

- The rail line, as proposed, between Richmond Centre, Vancouver Airport and the Vancouver Waterfront Station, including all associated structures and infrastructure essential to construct and operate this rapid transit rail line. This will include fabrication of associated structures, such as – but not limited to – bridges; pilings; structural fills; works in a water body; power supply; fuel storage facilities; sewage disposal; construction platforms; storage sites and all equipment and machinery.
- New fabrication facility for guideway components, if required.
- Construction of all proposed stations including all associated structures and infrastructure, such as – but not limited to – ticketing facilities; access (elevators/walkways); parking; bus loading bays; waste disposal; power and lighting.
- Any future stations, known at the time of the EA review.
- Construction of the project's Operation and Maintenance Centre on industrial lands located on the north side of the North Arm of the Fraser River, including all associated structures, infrastructure and machinery and equipment.
- Construction and operation of any new barge loading facilities for offshore disposal of tunnelling and other excavation material.
- All construction activities including marine operations of barges used for project-specific ocean disposal of excavated or other project construction material.
- Construction and decommissioning of any temporary haul roads and tunnelling access points.
- Modification of existing infrastructure, such as roads that may need to be widened or relocated as a result of the project (such as the No. 3 Road in Richmond).

- Maintenance work, such as rail grinding.
- Any off-site or on-site compensation and/or mitigation works, if required.

On December 17, 2004 the proponent submitted an Application Supplement which clarified modifications to the project described in the Application, including relocation of the Operations and Maintenance Centre to Richmond, and identification of additional cut-and-cover tunnel segments. A detailed description of this Selected Project and the alignment changes, compared to the Reference Project, is included in Table 3.1 and in section 4.4.1 of the Application Supplement. This review material is referenced in *Appendix A* to this report. Further project descriptions are included in section 2.4 below.

2.3 SCOPE OF THE ASSESSMENT

To meet requirements of the Act and CEAA, the assessment must consider the following potential impacts of the project:

- (a) Environmental effects of the project, including, but not necessarily limited to, effects on:
 - (i) Fish and fish habitat;
 - (ii) Wildlife, including birds and marine mammals;
 - (iii) Vegetation and city trees;
 - (iv) Air and water quality;
 - (v) Marine environment resulting from ocean dumping;
 - (vi) Noise, dust and vibration; and,
 - (vii) Electric and magnetic fields.
- (b) Effects of the project on asserted aboriginal rights and title claims
- (c) Social, Economic and Health Values
- (d) Heritage Values and Archaeological Resources
- (e) Environmental Effects of Accidents and Malfunctions
- (f) Cumulative Environmental Effects
- (g) Effects of the environment on the Project
- (h) Criteria for Determining Significance of Effects
- (i) Measures that are technically and economically feasible to mitigate any adverse environmental effects
- (i) Comments from the public and First Nations

The assessment took into account practical means to prevent or reduce to an acceptable level any potential significant adverse effects.

RAVP is being developed by RAVCo, a subsidiary of TransLink, as a Public-Private-Partnership (P3) project. RAVCo completed a BAFO tendering process, for the selection of a Concessionaire to be responsible for the final design, financing, construction, operation and maintenance of the project over a 30-year period. A commitment of this undertaking is that the project shall be commercially operational by November 2009.

The EA process under the Act and CEAA is based on the assessment scoping listed above. The project review material is based on the selected concept of the project, as presented in November/December 2004. Mitigation measures to address potential significant adverse effects of RAVP are proposed in the light of the project concept presented in the Application, Application Supplement and other review material listed in *Appendix A* to this Assessment Report. This report addresses the best efforts in defining the "Owner's Commitments and Assurances" as pertinent conditions for project certification pursuant to the Act. As RAVP proceeds through final design and construction, some project details will change, but the conditions reflected in this Assessment Report ensures that the EA of RAVP will continue to meet the intentions of the Act and CEAA.

2.4 PROJECT RATIONALE AND DESCRIPTION

The project description and associated review material presented below are taken from the Application of November 19, 2004 and the Application Supplement of December 17, 2004.

2.4.1 Project Need in the Context of Regional Transportation Planning

The GVRD's population, currently close to two million, is steadily increasing, with projections of an additional 620,000 people between 2001 and 2021. Most population growth since 1996 has occurred in the region's growth concentration area communities, such as Vancouver. Other significant population growth to date has also occurred in the region's low density suburban municipalities, with an increasing demand for new residential and commercial development, as well as supporting infrastructure. The strong population growth in Vancouver and Richmond has demonstrated the need to provide improved transit service and better connections between these communities. Vehicle ownership is growing at a faster rate than population, resulting in approximately 20,000 more cars per year, according to RAVCo and TransLink, despite an overall absence of new road capacity. Increasing traffic congestion and travel times are significant impediments to the efficient and reliable movement of goods and people along the region's trade and transportation corridors.

In the Lower Mainland, about 500,000 people travel daily between downtown Vancouver, central Richmond and the Vancouver International Airport along the busy traffic corridors that include Main, Cambie, Oak and Granville streets. On a typical weekday, this involves approximately 288,000 vehicles and 19,000 transit riders. Since 1988, travel time along these routes has increased by 20 percent to 60 percent. Similar increases in commuter trips and travel time are expected to and from Central Richmond. The expansion of roads and bridges to accommodate this traffic is neither practical nor desirable.

Long-term plans to address population growth, while maintaining liveability at the regional level and in areas serviced by the Richmond/Airport/Vancouver corridor, include those set out in a number of studies referenced in section 2.1 of the Application. Each of these documents envisions a rapid transit corridor, generally consistent with the proposed RAVP alignment, as a viable means of addressing the challenges associated with increasing commuter traffic (i.e., the need to reduce reliance on and use of single-occupant vehicles)¹³. TransLink's most recent amendment to its *Strategic Transportation Plan*, the 2005 – 2007 Three-Year Plan and Ten-Year Outlook (see Application section 2.1.5), briefly describes the social and economic impacts associated with increasing transportation demand, identifies the completion of the GVRD's rapid transit network as a high priority in the next decade, and specifically refers to the RAVP as the next component of this network to be constructed.

2.4.2 Alignment

As proposed, the RAVP line will connect Richmond Centre at the south, the existing Vancouver International Airport terminal at the west and the existing Waterfront Station at the north. It will follow No. 3 Road in Richmond, Grant McConachie Way on Sea Island, Cambie Street to False Creek, and Davie and Granville Streets in downtown Vancouver terminating at Waterfront Station. From 63rd Avenue and along Cambie Street to Waterfront Station the RAVP line will be underground.

City of Vancouver policy defines a regional transit service to Richmond along the Cambie Street corridor, under False Creek and through downtown Vancouver to a northern terminus in the vicinity of Waterfront Station. To connect the Vancouver and Richmond segments of the line, it will be necessary to construct a new bridge over the North Arm of the Fraser River, downstream

¹³ For a list of land use and transportation planning documents relative to the RAVP corridor, see Application Table 4.1.

of Mitchell Island and upstream of the Oak Street Bridge. The bored tunnel and the cut and cover sections of the project are described in section 6 of the Application Supplement.

The City of Richmond has identified No. 3 Road as the preferred corridor to provide regional access to commercial centres and institutions in Central Richmond. This corridor has been established for the existing B-Line bus service and is available to accommodate construction of the line.

The Vancouver International Airport Authority (VIAA) has identified a corridor along Grant McConachie Way on Sea Island, that will connect the line to the international and domestic terminal buildings. To connect the Richmond segment of the line to Sea Island, a bridge will be built across the Middle Arm of the Fraser River upstream of the existing Middle Arm and Moray Channel bridges.

During the BAFO Concessionaire selection process, and as discussed above, minor adjustments were made to this horizontal alignment scenario included in the Application Reference Project. The selected horizontal and vertical alignments are described in detail in the Application Supplement, including information on design and construction methodology.

2.4.3 Technology

“Rail technology” refers to different types of rail systems. These systems fall on a continuum from a system that resembles a street car running on the street in mixed traffic to a system that is fully separated from the street (like the SkyTrain system in Greater Vancouver or heavier rail subway systems in Toronto or Montreal). Within this broad range, there are systems that are fully separated from street traffic (i.e., they are elevated or located in a tunnel or a fenced right-of-way). These types of systems, of which SkyTrain is an example, are often automated. In the Greater Vancouver region, these systems are sometimes referred to as “Automated Light Rail Technology” (ALRT). Also within this range are systems that operate with varying degrees of separation from street traffic. Within the RAVP corridor, these systems would generally operate in a separate “lane” or right-of-way.

The RAVP line will consist of an electric rail transportation system with electrical current supplied via a live feed rail (i.e., third rail system) at 750 volts (DC). The line will be equipped with an Automatic Train Control (ATC) System based on the proven Alcatel SelTrac S40 communication-based moving block system, similar in functionality to the ATC System utilized in the Vancouver SkyTrain transit system. Maximum operational speed will be 80 km/h.

2.4.4 Station and Station Locations

The project is proposed with 17 stations (for reference consult **Figure 1**) in its first development phase. Station details are provided in section 4.4.3 of the Application Supplement.

2.4.5 Operations and Maintenance Centre

A new Operations and Maintenance Centre will be constructed to service the RAVP system. In the Reference Project, the centre was to be located in Vancouver on the north shore of the Fraser River. In the Selected Project, the centre will be located on a 7.7 ha industrial property in Richmond beneath the Oak Street Bridge, south of River Road. This location has good access to the adjacent highway and is centrally located along the RAVP alignment.

2.4.6 Inter-modal Facilities

Inter-modal facilities to be provided in conjunction with the RAVP system include:

- A 1,200-car park-and-ride facility at Bridgeport Station;
- Passenger pickup and drop off zones at all stations in Vancouver and Richmond;

- Bus loop facilities at Richmond Centre, Bridgeport and Marine Drive stations; and,
- Bike lockers and on-street bus stops.

Inter-modal facilities will be designed in accordance with applicable Crime Prevention through Environmental Design (CPTED) principles. They will be typically landscaped and feature good illumination, and will be equipped with emergency call boxes or public phones for security where appropriate, pedestrian boulevards and other innovative designs will be used to enhance the pedestrian-transit system interface, while minimizing potential pedestrian-vehicular conflicts.

Further details of the inter-modal facilities are provided in section 4.4.8.3 of the Application Supplement.

2.4.7 Site Contamination Issues

During the project planning phase, the proponent retained Pottinger Gaherty Environmental Consultants Ltd. to undertake a screening level contaminated sites assessment along the proposed RAVP alignment (see Application section 10). The purpose of the study was to evaluate the risk of encountering soil and groundwater contamination during project construction. Where site-specific work is planned, or where property transaction negotiations require more detailed assessment of contaminant risk, more comprehensive environmental assessments or soil/groundwater investigation may be necessary. Once the final design configuration is determined, as part of its overall Environmental Management Plan, the Concessionaire will prepare a Contaminated Sites Management Plan for areas with moderate to high contamination risks (reference is also made to section 20 of the Application).

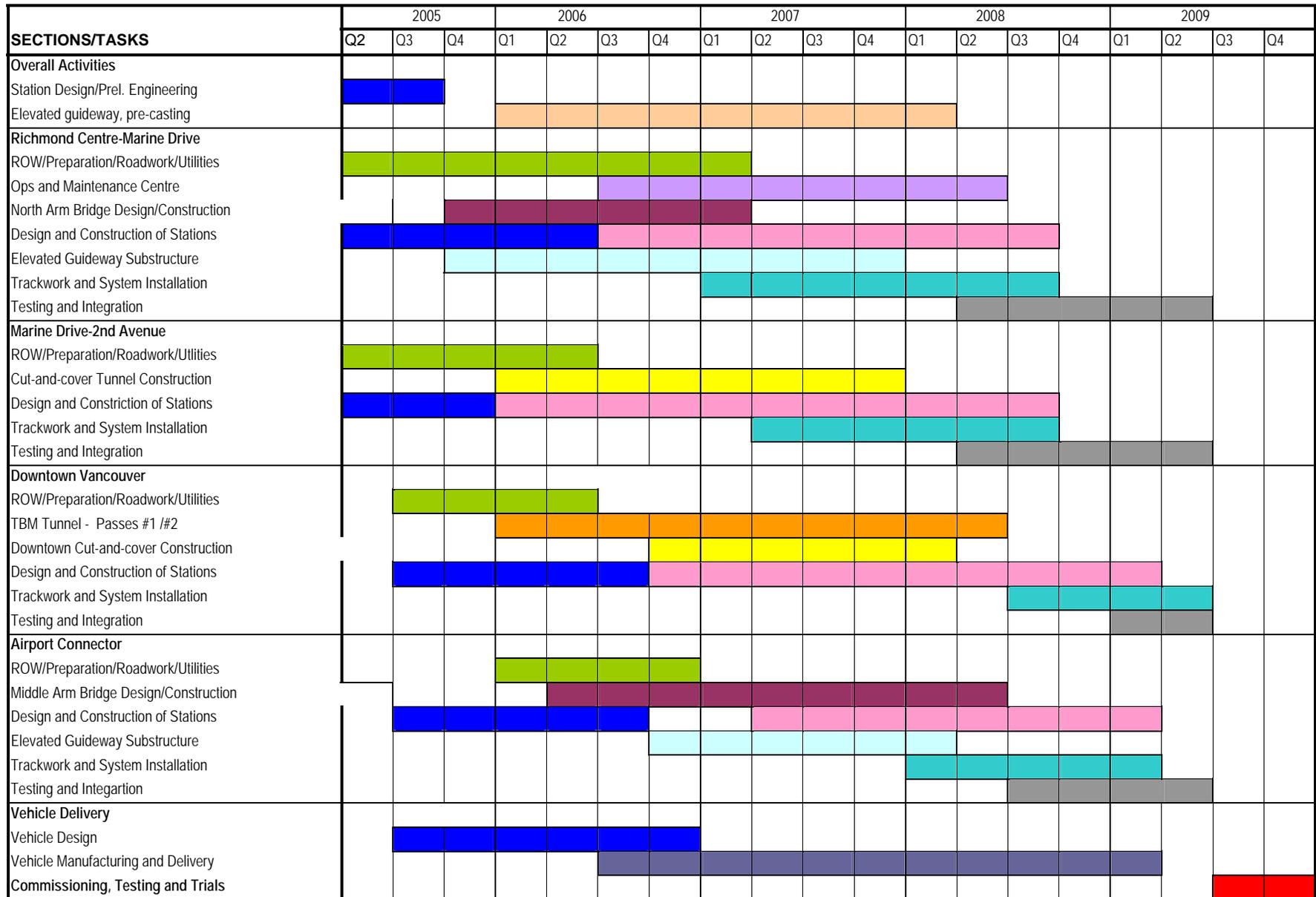
2.4.8 Project Construction

Revenue service along the whole RAVP system will commence on or before November 2009. To ensure that this requirement is met, construction must begin in August 2005. A number of key activities have to be completed for this construction start date to be achieved, as discussed in section 1.4 above. A summary outline schedule for pre-construction and construction activities is presented in **Figure 3** on the next page.

2.4.9 Project Budget

The proposed project is being delivered as a public-private partnership. The public sector funding available to RAVCo is provided by each of the Government of Canada, the Government of British Columbia, the GVTA and the Vancouver International Airport Authority, is indicated in **Table 1** on page 14, as of March 24, 2005.

In addition to this public sector funding, the Concessionaire will also partially finance the project. The exact amount of private funds to be contributed to the project is the subject of ongoing negotiations. Additional funds may also come from in-kind contributions from municipal partners and related development opportunities. Revisions to the project financial models will continue until Financial Close, at which point the total Estimated Project Cost, including the amount of private equity and debt invested by the Concessionaire will be confirmed. This clarification is not expected to be available before end July 2005.



NOTE: The tasks are shown in the calendar quarter they start and end. Schedule is for general illustration purposes only. RAVCo has presented detail schedules.
 NOTE: ROW/Preparation/Roadworks/Utilities: refers to surveys, planning, design and relocation of services.

Schedule is prepared by EAO, based on RAVCo input

Figure 3. RAVP. Summary Project Schedule – Design and Construction

Table 1 – Sources of Public Funding

FUNDING AGENCIES	2003 DOLLARS, Million	NOMINAL DOLLARS, Million
Government of Canada	420.7	450.0
Government of British Columbia	234.8	252.3
GVTA (TransLink)	302.6	324.0
Airport Connector Funding	223.0	243.9
VIAA Common Costs	48.3	52.4
Total Source of Funds	1,229.4	1,322.6

2.4.10 Alternative Means of Carrying out the Project

Over the last 30 years, numerous potential corridors have been considered for development of a rail rapid transit line between Richmond and Vancouver. The Application includes a discussion of transportation alternatives to the corridor connecting Richmond Centre at the south, the Airport terminal at the west and the existing Waterfront Station at the north. As proposed, the RAVP line will follow No. 3 Road in Richmond, Grant McConachie Way on Sea Island, Cambie Street to False Creek, and Davie and Granville streets in downtown Vancouver to Waterfront Station.

Project alternatives are discussed in more detail in section 2.2 of the Application.

2.4.11 Economic Benefits and Jobs

The project is assessed to have major impacts on the regional and local economy. This impact is generated by construction activities and spin-off effects, project acquisitions and employment and improved transportation and mobility in the Vancouver area.

During construction, expected to last from August/September 2005 until November 2009, the proponent has estimated that 6,250 person-years of construction jobs will be generated. The operation of the project, within the TransLink system, is expected to generate between 130 to 150 full-time equivalent jobs during the 30 years of operations.

2.5 APPLICATION FOR PROJECT ENVIRONMENTAL ASSESSMENT CERTIFICATE

2.5.1 General

The proponent has submitted an Application, an Application Supplement and other requested review material for an environmental assessment certificate¹⁴. The project is subject to a joint federal/provincial review, managed by the EAO.

RAVCo and DFO have discussed the development of a framework leading to the issuance of a Section 35(2) authorization under the *Fisheries Act* that will permit construction of in-stream works in the North and Middle arms of the Fraser River. At the March 2, 2005 meeting of the working groups DFO provided an endorsement of the conceptual compensation plan developed for the project. The Concessionaire will be ultimately responsible for obtaining the Section 35(2) authorization, based on detailed project design and construction plans.

¹⁴ Section 2.2 of this Assessment Report describes the submission circumstances associated with the Application, the Application Supplement and additional review material.

2.5.2 Proponent's Responsibilities

The proponent will be responsible for obtaining the following regulatory approvals:

- Project certification under the Act;
- Project EA screening study determination under *CEAA*;
- Development permit from VIAA for the airport segment;
- Approval from the North Fraser Port Authority (NFPA);
- Approval under the Fraser River Estuary Management Program (FREMP); and,
- Section 14 permit under the British Columbia *Heritage Conservation Act*.

2.5.3 Concessionaire's Responsibilities¹⁵

The Concessionaire will be required to obtain all necessary project permits, other than those listed above. These additional permits include (but may not be limited to):

- Section 35(2) authorizations under the *Fisheries Act* for any works involving surface crossings of water bodies;
- *Navigable Waters Protection Act* approvals for any works involving crossings of navigable waters;
- Federal disposal at sea approvals under the Disposal at Sea Regulation (2001) for disposal of clean material removed from tunnels or other subsurface excavations;
- Section 9 approvals under the British Columbia *Water Act* for any works in and about a watercourse;
- facility permit under the VIAA Construction By-laws and Policies for the airport connector; and,
- City of Vancouver and City of Richmond approvals, including those related to the design advisory process, construction approval process and applicable by-laws such as tree removal, noise, hours of work, street access and traffic.

¹⁵ The Concessionaire will be *InTransit BC Limited Partnership, a partnership including SNC-Lavalin*. The holder of the Certificate, if issued, will be the proponent (RAVCo), who will be responsible for all assurances and commitments in the Certificate, unless such assurances and commitments are transferred to the Concessionaire with the Minister's consent under the Act.

3. Information Distribution and Consultation

3.1 ACCESS TO REVIEW DOCUMENTATION

The EAO maintains an electronic Project Information Centre (the 'ePIC') (formerly known as the Project Registry) in Victoria for the purpose of facilitating public access to records relating to EAs and project reviews. In addition, records and documents related to the review of the project were posted on the EAO's website (<http://www.eao.gov.bc.ca>).

The Application and the Application Supplement, once accepted for formal review, were also available at the public libraries in Vancouver and Richmond, as well as at the David Lam Library at the University of British Columbia and at the Bennett Library at Simon Fraser University. The public were also encouraged to visit the proponent's project office in Vancouver to view project review material. These review options were referred to in the notifications issued to the public. For reference, see section 3.2 below.

Under CEAA, a public registry was established to ensure the public are provided with an opportunity to review:

- The notice of commencement of the environmental assessment;
- The description of the scope of the project being assessed and the scope of the assessment;
- The copy of the environmental assessment report (or how a copy may be obtained);
- The responsible authority's decision on the environmental assessment; and,
- Details on follow-up programs, when they are implemented for an environmental assessment.

3.2 NOTIFICATIONS

Pursuant to the Order, the EAO arranged for notification of the public review of the Application as follows:

- Advertisements in the *Vancouver SUN* newspaper on January 3, 2005 and on January 4, 2005 respectively;
- Advertisements in the *Ming Pao* daily newspaper on the same dates; and,
- Notification on the EAO Website on December 17, 2004.

In addition the proponent took steps to inform the public on the Application review using the Vancouver electronic media, as referenced in the Application, section 4.1.6.

To inform the public on the joint environmental assessment of the project, RAVCo/EAO public open houses were arranged at the Roundhouse Community Centre in Vancouver on January 25, 2005; at the Vancouver International Airport on January 26, 2005; and at the Minoru Cultural Centre in Richmond on January 27, 2005. Advertisements were also placed in the above referenced media, the *Vancouver Courier*, *Richmond News*, *Richmond Review and Westender*, as follows:

- Advertisements in the *Vancouver SUN* newspaper on January 15 and 17, 2005
- Advertisements in the *Ming Pao* daily newspaper on January 15 and 17, 2005
- Advertisements in the *Richmond News* weekly newspaper on January 15 and 19, 2005;
- Advertisements in the *Richmond Review* weekly newspaper on January 15 and 20, 2005
- Advertisement in the *Vancouver Courier* on January 19, 2005;
- Advertisement in the *Westender* on January 20, 2005; and,
- Notification on the RAVCo website on or about 15 January 2005.

These open houses provided the public with information on the project and public comment process relating to the review of the Application and Application Supplement.

On December 30, 2004 RAVCo also issued about 1,300 letters to individuals and interest groups who had earlier expressed an interest in the project and invited these parties to the above referenced public open houses.

3.3 CONSULTATION

3.3.1 Public Consultation Measures Undertaken by the Proponent

General:

Section 4.1 of the Application identifies the consultation measures undertaken by the proponent prior to submitting the Application, during the review of the Application, and future consultation activities that would be undertaken during construction of the project. The geographic focus of the public information and consultation program was within the City of Vancouver, the City of Richmond and the Vancouver International Airport and surrounding municipalities.

Consultation Prior to Submission of the Application:

Since 2001/2002, the public consultation process for RAVP has proceeded through a Project Definition Consultation, completed in March 2003, and a Pre-Design Consultation, initiated in November 2003 and completed in May 2004. Further details of these two initiatives are presented below.

The consultation process by the proponent followed the essential elements of the EAO's public consultation policies. The goals of the RAVP public consultation program were to ensure that:

- The public was consulted, on both a regional and a community/neighbourhood level, consistent with EAO's *Public Consultation Strategy/Framework for Lower Mainland Infrastructure Projects* (2003), and the Act and CEAA requirements;
- The review process was open, accountable and considered regional and local/community interests;
- Community support for the overall project planning process was fostered; and,
- Ongoing relations with local communities were strengthened.

From early spring 2001 to March 2003, during the *Project Definition Phase*, the proponent's technical and financial specialists conducted an analysis of the proposed project in order to define the requirements of a rail rapid transit line connecting Vancouver, Richmond and the Vancouver International Airport; to identify a structure to build and pay for the line; and to evaluate whether it would be feasible to complete construction of the line by 2009. In February 2003, the proponent launched an interactive website for the *Project Definition Phase*. The website provided a vehicle by which the public could gain access to consultant reports, press releases and other project-related information.

In February and March 2003, the proponent undertook Project Definition Consultation, to share the results of the Project Definition Phase, to determine whether the public supported the project as defined, and to identify issues of concern. Public input was also sought regarding whether the project should proceed within the defined funding envelope of \$1.5 billion to \$1.7 billion; whether the route should follow the Granville Street – Cambie Street - No. 3 Road – Grant McConachie Way corridor; and whether the vertical profile of the line should be as proposed (i.e., a combination of below ground, at-grade and above-grade levels).

More than 1,500 people participated in this phase of public consultation. Participants provided input through a consultation Discussion Guide and Feedback Form and attended open houses/public workshops at Vancouver City Hall, Richmond City Hall, Richmond Centre, and the Vancouver International Airport; participated in one public workshop in Richmond and two in

Vancouver; and attended 17 small group meetings. The results of this consultation were provided to the public in a consultation report and are included in two appendices to the Application's section 4. Overall, 82 percent of those who filled out the feedback form indicated that they somewhat or strongly agreed with the project proceeding at an estimated cost of \$1.5 billion to \$1.7 billion. Of those that responded to the question regarding the proposed route, 73.2 percent supported the route in its entirety.

Pre-Design Phase consultation was initiated in November 2003 to:

- Communicate key design topics outlined in the Project Definition Phase;
- Seek ideas and advice about station design and guideway structure in an effort to produce draft design objectives;
- Seek advice regarding the design and content of future public consultation; and,
- Provide input to development of the community consultation section of the Application.

During this time, draft design objectives were provided as part of the BAFO instructions to the two finalist proponent teams that had been selected to proceed to BAFO stage of the procurement process. Pre-Design Consultation was undertaken by the proponent in three steps as follows:

Step 1: Small Group Consultation (November/December 2003)

Step 2: Broader Public Consultation (March 2004)

Step 3: Public Consultation Reporting (April/May 2004)

Step 1 of the Pre-Design Consultation was undertaken to generate ideas and advice that were compiled into draft design objectives and presented to the broader public at open houses in March 2004. The objective was to meet with groups and/or individuals with a specific interest in the project. The consultation was designed to recognize the unique needs of communities along the three major segments of the line: Richmond, Vancouver International Airport and Vancouver.

Fifty-one pre-consultation meetings were held between November 17, 2003 and December 12, 2003. A total of 270 individuals participated in these meetings. Participants were guided through a Draft *RAV Project Pre-Design Work Book* to seek their advice on each design topic, on construction and operational issues, and on future consultation. Participants documented their feedback on the perforated panels of the *Work Book*, and these were collected at the end of each meeting.

The design topics and the issues raised by the public are documented in section 4 and Table 4.6 of the Application.

Consultation Following the Submission of the Application:

Following the submission of the Application and the Application Supplement, RAVCo assisted EAO in advertising the availability of these documents for public review and comments and the notification of the public comment period. Further, RAVCo also supported EAO with three public open houses in Vancouver, at the Vancouver Airport and in Richmond (see section 3.2 above).

The proponent attended these three meetings and provided all their key consultants for the benefit of the public attending these events and for discussions of issues and concerns raised by the public. Further details of this consultation are included in a RAVCo report to EAO dated April 8, 2005¹⁶

At the request of the Cambie Street Merchants, the City of Vancouver and RAVCo also participated in another public meeting with the Cambie Street Merchants and the public on

¹⁶ "Summary of Public Consultation Activities and Input December 2, 2004 to February 28, 2005 for the Richmond-Airport-Vancouver Rapid Transit Project."

January 31, 2005. This meeting focussed largely on consultation on issues associated with the cut-and-cover tunnelling/construction methodology along Cambie Street. The City of Vancouver (COV) and RAVCo have also arranged for and attended other group meetings that have included the Downtown Vancouver Business Improvement Association, Yaletown residents, Vancouver Board of Trade, Better Environmentally Sound Transportation (BEST) and Cambie Street Heritage Boulevard Society

The next phase of community consultation, the Preliminary Design Consultation, will take place in May/June 2005. This phase of consultation will:

1. Inform participants about the key features of the line, including new features or options;
2. Review the design objectives generated from past consultation and how they have been incorporated into the preliminary functional and site designs for stations; and,
3. Gather input from participants on preliminary functional designs and site plans for stations, as well as the integration of the elevated guideway in Richmond.

The Preliminary Design consultation will be led by RAVCo and will include the active participation of the Concessionaire, the COV and the City of Richmond (COR). The consultation methods will include development of a discussion guide with feedback mechanism; functional design level site plans, renderings and display boards; small group meetings; community open houses; and a public summary report. RAVCo need the cooperation of the Concessionaire to ensure the availability of functional design level plans, images and renderings, which will be critical to the success of this consultation.

Detailed Design Consultation will be undertaken by the Concessionaire, early in the design phase of the project, and will focus on receiving input from the public on aspects of station design. As the project moves into construction, community and business liaison activities will be undertaken to address such issues as traffic and construction management.

The Proponent's commitments to liaising with the public during RAVP construction, and the assurances of having the Concessionaire complying with the same principles and commitments, are further confirmed in *Appendix E* and PART B of this Assessment Report.

3.3.2 Public Consultation Measures Undertaken by EAO

Representatives of EAO attended a number of the proponent's open houses during the *Pre-Design Phase* consultation. The EA process pursuant to the Act was presented and questions from the public were responded to. From April 2003 and until the Application was submitted in November 2004, EAO entertained a number of requests from the public and interest groups for project material and description and definition of the EA process. EAO also frequently met with the proponent to discuss a targeted public consultation process pursuant to available government policy and regulation. EAO posted all relevant project material on the project website. This process started with the issuance of the Section 10 Order on February 10, 2003.

Pursuant to the Section 11 Order issued on September 10, 2003, and the British Columbia *Public Consultation Policy Regulation*, BC Reg 373/2002, the EAO arranged for public comment on the Application and the Application Supplement, as described in section 3.4 below. EAO acknowledged the receipt of all public comments directly to the submitter, shared all comments with federal RAs and forwarded such comments to the proponent for individual responses.

This process resulted in further consultation with the Do RAV Right Coalition ("Coalition"), who also requested a three-week extension to the public comment period, based on the argument that such an extension would benefit the public intending to comment on the project as it was assumed that agency comments would be available prior to such a deadline extension. The EAO, in an e-mail dated February 28, 2005, turned down the Coalition's request. The e-mail also provided EAO's reasons for this decision. There is no current policy, as reflected in the Order, suggesting that agency comments must be available before the close of a public comment period.

Project review material has also been available to the public at least three weeks prior to the start of the public comment period.

The Coalition also submitted a request to EAO for specific project material related to the tunnelling construction change from the Reference Project to the Selected Project under the *Freedom of Information and Privacy Act*. EAO is responding to this request. At a public event in Vancouver on March 22, 2005, the Coalition also expressed their intention of taking the British Columbia Government to court over “changing the project to “cut-and-cover” without proper public consultation or adequate environmental review” (quote from the Coalition’s News Release” on March 22, 2005). On April 11, 2005 the Do RAV Right Coalition filed a Petition in the Supreme Court of British Columbia asking that the decision of the Project Assessment Director on December 2, 2004 to accept the RAVP application for review be quashed on the basis that the RAVP application differs “materially” from the RAVP defined in the Section 11 Order dated September 10, 2003. The Petition, among other things, also seeks to stop a referral of the RAVP application to Ministers for their decision.

3.3.3 First Nations Consultation

Effective consultation with First Nations represents a key and integral component throughout the assessment process. Such consultations are required to ensure that the Province meets policy requirements as outlined in the *Provincial Policy for Consultation with First Nations* (October 2002) and legal duties of consultation and accommodation (where indicated) as set out in Court decisions including the decisions of the Supreme Court of Canada in *Taku River Tlingit First Nation v. British Columbia (Project Assessment Director)*, 2004 SCC 74 and *Haida Nation v. British Columbia (Minister of Forests)*, 2004 SCC 73.

In the general area of the project six First Nations were identified that may potentially have an interest in the project and its EA review. These are the Musqueam Indian Band, the Tsleil-Waututh Nation, the Squamish Nation, the Sto:Lo Nation, the Tsawwassen First Nation, and the Katzie First Nation.

Pre-Application Consultation:

RAVP falls within the asserted traditional territories of the following First Nations groups, as referenced in section 1.4.1 of this PART A:

- Musqueam Indian Band
- Squamish Nation
- Sto:Lo Nation
- Tsleil-Waututh Nation
- Tsawwassen First Nation

Early in the project planning process, these groups were identified by the EAO and RAVCo as the First Nations with whom consultation efforts should be undertaken. The asserted traditional territory of the Katzie First Nation lies to the east of the project area. To determine whether the Nation had any interest in the project, initial discussions were carried out between Band representatives and RAVCo. During those discussions, and subsequently in July 2004, the Katzie indicated an interest in participating in the project’s EA review and has asked for input on such shared material. The asserted traditional territories for each of these First Nations are depicted by Statement of Intent maps filed with the B.C. Treaty Commission (see Application, Figures 4.1 to 4.6).

Early in the project review, EAO met with all the identified First Nations to discuss the project and the review process under the Act, and to solicit information on the their interest in project participation and on any likely impacts on asserted aboriginal rights and title and traditional uses as a consequence of the project. Throughout the project review, EAO has made all relevant

documents available to the identified First Nations, either by electronic mail, by fax or by courier/surface mail.

Similarly, the proponent initiated an extensive Pre-Application Consultation Process early in the project review, designed to identify concerns and interests of First Nations potentially affected by the proposed project. The First Nations consultation and communication framework implemented for the RAVP was developed in conjunction with the EAO and reflected in the ATOR document. The RAVP consultation program was based on a number of principles in support of or in addition to First Nations consultation policies of the Government, including:

- Consultation approach must include First Nations in identification and design of a meaningful First Nations consultation plan;
- Consultation approach needs to be flexible and designed to meet the needs of each First Nation;
- Consultation approach must be inclusive of all First Nations who identify that their interests may be affected;
- Consultation approach must provide an opportunity to effectively participate; and,
- Consultation approach must be accountable.

The First Nations consultation process prior to submission of the Application is described in section 4.2 of the Application. In section 4.2.4 consultation input and issue definitions are listed for all six First Nations the proponent consulted with in the early phase of the project development. Where First Nations expressed interest in the project in general, or in the aboriginal rights/title, environmental, socio-economic or cultural issues in particular, they were provided with an opportunity to receive assistance to review RAVCo's Application. It was assumed during the later consultation phase that the Musqueam, Tsleil-Waututh, Tsawwassen, Katzie, and Squamish First Nations would participate in the EAO working groups and in the Application review process and provide comments as necessary, within the timelines set by the EAO for the project EA review.

It was also anticipated that the Musqueam, Tsleil-Waututh, Tsawwassen, Katzie, and Squamish First Nations would continue to engage in consultation meetings with RAVCo representatives to:

- Identify any aboriginal interests which may be potentially affected by the project, as identified in studies or project background material developed during the Pre-Application stage and shared with First Nations; and,
- Suggest measures to avoid, mitigate or, where appropriate, otherwise accommodate aboriginal interests.

The Sto:Lo Nation also requested information updates on the project and the proponent maintained regular contact with this First Nation. The proponent's consultation chronology demonstrates a significant effort to engage the six identified First Nations asserted to have aboriginal rights or title in the project area.

The EAO also provided the same First Nations with all project information and review documentation from February 2003 until the Application submission in November 2004. EAO has met with all listed First Nations and informed them on the review process under the Act and advised them of the development of study work plans and the Application Terms of Reference, issued in November 2003. EAO also solicited comments on these documents from the First Nations. In addition, EAO invited the First nations to be part of the review of Application draft material, carried out by members of the working groups in September to November 2004.

There was limited First Nations response during the early consultation phase (i.e prior to the Proponent submitting their Application to EAO in November 2004). Although RAVCo had concluded agreements with the Musqueam Indian Band, the Tsawwassen First Nation, the

Squamish Nation and the Tsleil-Waututh Nation for their participation in the EA review process, First Nations representatives attended few meetings and did not provide meaningful input to the Proponent or EAO on their interests in the project; or identification of likely adverse impacts on their asserted aboriginal rights and traditional use of the land and resources in the vicinity of the project. Despite attempts by the proponent and the EAO to engage First Nations in project discussions and to facilitate and encourage active participation on the project's working groups discussed in section 1.4.1 of this Assessment Report, limited participation was achieved.

Consultation Following the Submission of the Application:

During the review of the Application and the Application Supplement, the EAO and the proponent continued to consult with First Nations on the project. This communication and consultation was enhanced by agreements which the proponent had earlier entered into with interested First Nations. These agreements provided the opportunity for the First Nations to: (i) review the Application and Application Supplement; (ii) continue to consult with the proponent; (iii) participate in the EA review, within the timelines agreed to by the EAO, by identifying aboriginal interests that may be affected and by suggesting measures to avoid, mitigate or, where appropriate, otherwise accommodate aboriginal interests and (iv) provide comments to the EAO and receive funding for this work.

As part of this process, the proponent contacted each First Nation with an offer to meet with RAVCo to review the Application and the Application Supplement and to discuss issues of interest and concern. This offer was accepted by most of the First Nations and provided an opportunity to clarify issues and interests. Based on these meetings the First Nations were able to better define the issues which they wished to address in their comments to the EAO.

Comments on the Application and the Application Supplement were provided to EAO as follows:

- Katzie First Nation: February 9, 2005
- Tsawwassen First Nation: February 17, 2005
- Squamish Nation: February 23, 2005
- Tsleil-Waututh Nation: March 4, 2005

The proponent provided timely responses to the above comments by individual letters to the listed First Nation. The proponent is also engaged in continuing consultations with the Musqueam Indian Band (MIB) to identify specific adverse effects on their aboriginal fisheries resulting from the bridge crossings of the North and Middle Arms of the Fraser River and to address or accommodate such impacts (where required). The proponent arranged a meeting with MIB's fishery coordinators and band executives on January 14, 2005 and on January 18, 2005 to discuss these impacts. The proponent also provided a written description of the proposed bridge alignments and details of foundations structures in their letter to MIB dated February 2, 2005. The requested information on the extent and nature of MIB fisheries were not submitted by the MIB to the proponent or EAO.

A meeting was therefore arranged at the band office on March 22, 2005 to discuss this situation and MIB's general consultation position by the band's un-dated letter to RAVCo received by them on March 2, 2005. At the meeting it was agreed that the MIB's Fishery Department would call a community meeting on March 31, 2005 for a briefing on the project and to provide information on aboriginal fisheries.

At the March 31, 2005 meeting, attended by the proponent and EAO, the MIB provided anecdotal information on MIB's fishing activities in the area of the two bridge crossings. MIB also stressed their aboriginal title and rights to the land and natural resources and that the project would impose major restrictions to their fisheries. To date, MIB has stated that the project will significantly impact their aboriginal fisheries, but has not provided any specific information to the RAVCo or

EAO to delineate the nature and extent of such impacts, despite concerted efforts by RAVCo and EAO to obtain such information.

The EAO also continued in their efforts to engage the First Nations during the review of the Application and Application Supplement and other relevant project EA review material distributed to the working groups, including the First Nations identified above. EAO alerted all First Nations on the RAVP project review process pursuant to the Act and CEEA and as defined in the procedural Order – and invited the First Nations to the review meetings described in section 1.4.1 above. The First Nations were issued with the meeting notes and the agenda for future meetings. The Tsawwassen First Nation attended a number of working group meetings and participated in the drafting and preparation of this Assessment Report.

EAO also took steps to engage the MIB in identifying and defining any impacts on their aboriginal rights, such as aboriginal fishing, in the vicinity of the RAVP transportation corridor in general and at the crossings of the Fraser River in particular. EAO issued two letters to MIB soliciting input and also met with the band on March 22, 2005 and March 31, 2005 respectively.

EAO recognizes that there are asserted MIB rights to fish for food, cultural and ceremonial purposes in the area of the two proposed bridge crossings, substantiated by the *Sparrow* case. However; the effects of bridge piers on navigation and the traditional Fraser River salmon drift net fishery in the immediate area of the two new bridge crossings has not been fully assessed due to lack of meaningful MIB input on their aboriginal fisheries in this project area. Consultation and appropriate accommodation (where indicated) will continue with the proponent in accordance with the “Owner’s Commitments and Assurances”. This issue is further discussed in section 3.3.6 of PART B of this Assessment Report.

3.4 RESPONSES AND RESULTS FROM PROJECT’S PUBLIC CONSULTATION

The public were invited to provide comments to EAO on specific public issues as they relate to the technical review of the Application and Application Supplement. The public comment period ran from January 10, 2005 until February 23, 2005. The EAO received a total of 73 written comments on the review documents during the public comment period. The comments were comprised of:

- 62 emails, faxes and letters addressed directly to EAO, with proper identification of submitters;
- 2 written comments using the EAO form handed out at the three public open houses
- 7 submissions by identified individuals who used a suggested comment form/letter posted on the Green Club’s website; and,
- 2 form letters using a suggested format posted on the “Do RAV Right” website (submitted by the Cambie Heritage Boulevard Society and the “Re-think RAV Coalition”).

Apart from two submissions in general support of the project and with suggestions for modifications to the proposed alignment to interlink with the Millennium Line, all other submissions expressed concerns over and/or objections to the project. The key concerns and objections voiced by the public focussed on:

- Need for the RAVP;
- Inadequacy of assessment documentation and dissemination of such information;
- Too few public open houses;
- Inadequate time to prepare public comments;
- Use of Cambie corridor versus the Arbutus corridor;
- Timing of public disclosure by RAVCo of the extent of cut-and-cover tunnelling methodology along Cambie Street;

- Potential for disruption of services to the public and commercial residents and located along the northern section of Cambie Street (connectivity, public transportation, emergency services, mobility and safety of seniors; reduced business; deliveries to business; etc.);
- Potential for negative effects and impacts during cut-and-cover tunnelling construction along Cambie Street and in the Granville Mall area (exposure to toxic substances from contaminated sites; increased noise and vibration; dust and diesel fume exposure; impacts to public health; risk and safety, etc.);
- Preference for a twin-bored tunnel along the full length of Cambie Street;
- Concerns over loss of trees along Cambie Street; and,
- Perceived inadequacy of site investigations.

For further details of public comments, reference is made to *Appendix D* of this report.

3.5 SUMMARY AND CONCLUSIONS – INFORMATION DISTRIBUTION AND CONSULTATION

3.5.1 Public Consultation

The notification of the public consultation process complied with the procedural Order issued by EAO. The consultation program also met the outline defined in the proponent's *Community and Public Consultation and Communications Plan Nations* issued on November 7, 2003, and formally endorsed by the EAO on November 27, 2003. This plan is further described in section 4.1 of the Application.

EAO assessed the Application's coverage of consultation measures, as specified in the Application ATOR¹⁷ and defined in RAVCo's consultation plans; and adherence to the provincial consultation policy regulation¹⁸ and EAO consultation guidance made available to the proponent¹⁹. EAO accepted the public consultation measures outlined in the Application in their letter to the proponent dated December 19, 2004²⁰.

Public comments on the project and its review pursuant to the Act did not raise any additional substantive issues in relation to the EA not otherwise covered in this Assessment Report and raised by review agencies and local governments. However, EAO acknowledges the public concerns over the impacts of the cut-and-cover tunnelling construction along Cambie Street. The concerns expressed by business owners relating to the disruption of commerce along the northern section of Cambie Street towards 2nd Avenue, is also understood. The cut-and-cover tunnelling method was defined in the Selected Project in the Application Supplement under review pursuant to the Act and EAO is satisfied that the EA of the project has been properly executed under provincial and federal legislation and operational policies.

3.5.2 First Nation Consultation

The First Nations consultation process met the terms of the procedural Order issued by EAO for the project. The consultation program also met the requirements outlined in the proponent's *First Nations Consultation and Communications Plan Nations* issued on November 7, 2003, and formally endorsed by the EAO on November 27, 2003. This plan is further described in section 4.2 of the Application and reflects the *Provincial Policy for Consultation with First Nations* (October 2002).

EAO assessed the Application's coverage of consultation measures, as specified in the Application ATOR; defined in the above RAVCo's consultation plans; and adherence to the

¹⁷ Issued on November 19, 2003.

¹⁸ BC Reg 373/2002.

¹⁹ *Public Consultation Strategy/Framework for Lower Mainland Infrastructure Projects*, EAO, April 2003.

²⁰ This consultation assessment was also discussed at a Working Group meeting in Vancouver on January 7, 2005.

provincial First Nations consultation policy and applicable legal requirements. EAO accepted the First Nations consultation measures outlined in the Application in their letter to the proponent dated December 19, 2004 referenced above.

Although the First Nations engaged late in the project's EA review, EAO is satisfied that the that consultations carried out by the proponent and/or EAO meet applicable policy and legal requirements, and that the proponent has made a series of good-faith efforts to consult with those First Nations who have not been participating in the review of project EA material. EAO is also satisfied that sufficient time was provided to the Musqueam Indian Band to meaningfully engage in consultations related to identification of specific impacts on asserted aboriginal rights and title and proposed ways to avoid, mitigate or other address or accommodate such impacts, in particular in relation to their aboriginal fisheries.

PART B

Review of the Application

1. Consideration of Potential Project Effects – Summary

For the purpose of assessing the potential effects of the project, relevant documentation and correspondence received from the proponent after the submission of the environmental assessment certificate Application is considered to form part of the Application²¹. *Appendix A* of this Assessment Report lists the documents and correspondence deemed to be part of the Application for an environmental assessment certificate under the Act.

As the proponent proceeded with drafting the Application based on the approved Terms of Reference (ATOR), it became apparent that the progress would be impacted by the tendering process, based on the Reference Project described in PART A, and the endorsement of this process by the Funding Agencies and by the TransLink board deliberations. It became clear to the proponent, the EAO and the federal and provincial review agencies as well as local governments that an accelerated review of draft Application material was required. This early review of biophysical/technical sections, as well as of the socio-economic/socio-community sections of an Application draft in October/November 2004 greatly enhanced the reviewed material, subsequently reflected in the Application as formally submitted and accepted for formal review.

RAVCo completed an environmental impact statement, in the form of the Application and an Application Supplement for the Selected Project that considered the project's impacts on: fisheries and aquatic habitat; the terrestrial and biophysical settings; the arboricultural environment; socio-economic and socio-community issues; site contamination; air quality and GHG emissions; noise and nuisance; archaeological and heritage resources; electric and magnetic field issues; cumulative environmental effects; effects of accidents and malfunctions; effects of the environment on the project; and First Nations' interests. The review material also addressed public health effects of assessed project impacts. Finally, the review material included mitigation measures to reduce assessed effects to an acceptable level and outlined a series of environmental management plans and measures for the project's construction and operation.

The baseline information relating to the project, the assessment of impacts, and proposed commitments and mitigation measures presented in the Application and the Application Supplement, and additional and supporting documents discussed during the project review, provided the basis for responding to issues raised by the public, First Nations and government agencies. To address such issues the proponent produced written responses and provided further clarification of analyses contained in the Application and the Application Supplement.

Appendix C summarizes the issues considered by the working groups and other agencies, and *Appendix D* summarizes project impact issues raised during the public comment period.

Based on comments received from municipal governments, federal and provincial review agencies, the First Nations and the public, the discussion during the EA review focused on some of the impact sections referred to above. Only such issues that generated significant review and formulation of resolutions are covered in PART B of this Assessment Report. All other issues were deemed to be satisfactorily addressed in the available project assessment material shared during the project review and requiring limited attention, assessment, and comments. For guidance on issue resolutions not covered in this PART B, the reader is referred to Appendices C and D. The information contained under the "Background Information" sections in the subsequent chapters of this report is largely taken from material presented in the Application, in the Application Supplement and in any updated material provided by RAVCo.

²¹ As defined in section 16 of the Act.

2. Project Need and Context, Project Budget/Cost, Construction and Scheduling

2.1 GENERAL

The key review material, pertaining to the captured heading is covered in the following sections of the Application and in the Application Supplement:

Application:

- 2.1 Need and Context
- 2.2 Project Alternatives
- 2.3.7 Project Budget
- 2.9 Construction Scheduling and Sequence

Application Supplement:

- 4 Project Description
- 5 Project Cost
- 6 Design/Construction Schedules

A number of other sub-sections of the Application, such as design principles, the BAFO selection process, project alternatives, project location and footprint etc., also provided input to the working groups and reviewers for their consideration and conclusions on the project review.

2.2 BACKGROUND INFORMATION

2.2.1 General

A general project description and rationale is described in section 2.4 of PART A of this Assessment Report. As the need for the project, the selected alignment and alternatives to the project, project costs and implementation schedule were issues frequently raised by the public, but also resulted in comments from some regulatory agencies, these issues are further discussed below. Brief summaries from the review material and from PART A are enclosed below.

2.2.2 Project Rationale

The Richmond/Airport/Vancouver Rapid Transit Project is a rapid rail connection between downtown Vancouver and central Richmond, with a connection to the Vancouver International Airport. A rail connection in the north/south corridor has a long history of study, which dates back to the early 1970's. During the consultation program for the TransLink *Strategic Transportation Plan, 1999*, several regional agencies expressed renewed interest in a rapid transit link to connect Richmond and Vancouver, with a link to serve both the growing employment base at the Airport, and existing and future terminals.

The regional plan²² calls for increased transit capacity in this corridor. The north-south corridor between Richmond, the Airport and Vancouver is one of the busiest in the region. Over the next 20 years, employment will grow significantly; by 50 percent in Vancouver's central business district, 70 percent in central Richmond, and 70 percent at the airport, according to the project proponent.

Long-term plans to address population growth, while maintaining liveability at the regional level and in areas serviced by the Richmond/Airport/Vancouver corridor include those set out in a number of studies referenced in section 2.1 of the Application. Each of these documents envisions a rapid transit corridor, generally consistent with the proposed RAVP alignment, as a

²² GVRD's Livable Region Strategic Plan.

viable means of addressing the challenges associated with increasing commuter traffic (i.e., the need to reduce reliance on and use of single-occupant vehicles)²³. TransLink’s most recent amendment to its *Strategic Transportation Plan*, the 2005 – 2007 Three-Year Plan and Ten-Year Outlook (see Application section 2.1.5), briefly describes the social and economic impacts associated with increasing transportation demand, identifies the completion of the GVRD’s rapid transit network as a high priority in the next decade, and specifically refers to the RAVP as the next component of this network to be constructed.

2.2.3 Project Alternatives

At present, traffic demand on the three available bridge links between Richmond and Vancouver – the Arthur Laing, the Oak Street and the Knight Street bridges – exceeds operation capacity during morning and afternoon peak traffic periods. As a result, the bridges act as “choke points”, often resulting in traffic congestion that translates into lengthy delays for commuters. It is suggested by RAVCo that operation of a rapid transit line between Richmond and Vancouver would significantly reduce traffic demand on these bridges and associated roadways.

Over the last 30 years, various technical studies have evaluated several alternative RAVP corridors along which a rail rapid transit line could be constructed between Richmond and Vancouver. These studies identified Arbutus and Cambie streets as the two most viable corridor options south of False Creek. Ultimately, the Cambie Street corridor was selected and the arguments for this decision are listed on page 2-7 and 2-8 of the Application.

Alternative alignments have also been subjected to a large number of studies in 2002/2003²⁴, confirming the feasibility of the Cambie Street corridor.

2.2.4 Project Budget/Cost

Section 2.3.7 of the Application included limited project cost estimates. The main reason for this omission was the confidentiality associated with the BAFO tendering process. The project is being financed as a Public-Private-Partnership (P3) The public sector funding as of March 24, 2005 was:

FUNDING AGENCIES	2003 DOLLARS, Million	NOMINAL DOLLARS, Million
Government of Canada	420.7	450.0
Government of British Columbia	234.8	252.3
GVTA (TransLink)	302.6	324.0
Airport Connector Funding	223.0	243.9
VIAA Common Costs	48.3	52.4
Total Source of Funds	1,229.4	1,322.6

In addition to this public sector funding, the Concessionaire will also partially finance the project. The exact amount of private funds to be contributed to the project is the subject of ongoing negotiations. Additional funds may also come from in-kind contributions from municipal partners and related development opportunities. Revisions to the project financial models will continue until Financial Close, at which point the total Estimated Project Cost, including the amount of private equity and debt invested by the Concessionaire will be confirmed.

²³ For a list of land use and transportation planning documents relative to the RAVP corridor, see Application Table 4.1.

²⁴ See Application section 2.2.3.

2.2.5 Construction and Scheduling

The Application's section 2.9 included an overview of the project's implementation schedule and key milestones are shown in Table 2.8. This table outlines a construction start by end August 2005 and a project completion in November 2009.

The Application Supplement provided some further narrative details of the design and construction schedules in section 6. The supplement did not provide any changes to the general construction start and projection completion dates noted above. An abbreviated project construction schedule is shown in **Figure 3** of PART A of this Assessment Report.

2.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

2.3.1 Project Need and Alternatives

During the public open houses, arranged on January 25, January 26 and January 27, 2005 respectively, considerable interest was demonstrated in the need for the project and in project alternatives – in particular alternatives to the Cambie corridor. The elevated guideway along No. 3 Road in Richmond also attracted many public comments.

The majority of working group members addressing these issues recognizes that RAVCo, through a significant number of technical studies and feasibility assessments, has demonstrated the need for and viability of the project and its horizontal and vertical alignment.

2.3.2 Project Construction

A considerable number of public comments focussed on the cut-and-cover construction methodology versus the twin-bored tunnelling approach. The Reference Project, as defined and described in earlier public consultation events, assumed a twin-bored tunnel in the Vancouver downtown area, under False Creek and under Cambie Street until at least 37th. Avenue. The Selected Project includes a cut-and-cover section from the Waterfront Station to north of Georgina Street and from approximately 2nd Avenue until the 63rd Avenue along Cambie Street.

The public voiced concerns that the additional cut-and-cover would significantly increase the project's impacts along the alignment sections previously considered with twin-bored tunnelling construction methodology. Most of the public comments focussed on the Cambie Street situation, referring to increased negative impacts on traffic, noise and accessibility.

RAVCo addressed the comparative environmental and socio-economic/community impacts, resulting from cut-and-cover versus tunnelling methodology in the Application Supplement. The overall impact issues associated with the additional cut-and-cover tunnelling sections are discussed in the biophysical and socio-economic/socio-community sections of this PART B of the Assessment Report. Any incremental adverse impacts were identified and appropriate mitigation measures are reflected in the "Owner's Commitments and Assurances" (*Appendix E* to this Assessment Report).

2.3.3 Project Costs

Members of the public and members of the working groups raised the absence of a detailed project cost estimate. In a socio-economic context such cost estimates are normally provided for assessments of economic impacts and tax revenues.

It is, however, accepted that the total estimated budget for the project is well known and binding on the Concessionaire. It is also accepted that the continuing contract negotiations between RAVCo and the Concessionaire, to be concluded with the Financial Close, at latest in June/July 2005, are by their nature confidential and that detail design, construction, operation and financing costs will only become public at the time of Financial Closure. The working groups have acknowledged this process and situation as a consequence of the public private partnership arrangement selected for RAVP.

2.3.4 Project Implementation Schedules

Members of the public expressed a strong interest in construction scheduling, as concerns were raised about construction noise and traffic interruptions. The expanded design and construction schedule prepared for the public open houses and also included in a roll-up format in PART A of this Assessment Report, provided satisfactory input for the Environmental Assessment under the Act.

2.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, the RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner's Commitments and Assurances* as listed in *Appendix E* of this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse effects on the environment as a result of the project's general setting, design and proposed construction.

3. Fisheries and Aquatic Habitat

3.1 GENERAL

The Project will require bridge crossings over the North and Middle arms of the Fraser River. Ditch networks that convey drainage from Sea Island and Lulu Island to the Fraser River will also be crossed. The Vancouver segment of the transit system crosses the historical alignment and relic sections of Winona Creek, one of many Vancouver streams that once conveyed flows to the Fraser River.

The key review material, pertaining to EA issues and review discussions, is covered in the following sections of the Application:

- 2.3 Project Description
- 6 Fisheries and Aquatic Habitat Assessment
- 9.9.8 Fraser River Crossing (socio-economic/socio-community assessment)
- 16.4.1 Cumulative Effects on the Aquatic Environment
- 20 RAV Project Environmental Management

In the Application Supplement, section 7.2.1 describes amendments to the Application section 6 material. The Application Supplement also provides amendments to the North Arm Fraser River Bridge Crossing and the Middle Arm Fraser River Bridge Crossing (Figure 4.6 and Figure 4.7 respectively).

3.2 BACKGROUND INFORMATION

The information and assessments presented in section 6 of the Application refer to baseline alignment and station locations for the Project as of August 1, 2003. Bridge alignments were amended and based on the Selected Project, as presented in the December 2004 Application Supplement. According to the proponent, changes and refinements during the detailed planning and design-build phase are unlikely to exceed the type and magnitude of impacts currently identified and relevant for the project's EA. It is likely that the detailed design and associated construction and operation components of the project will result in impacts to fish and fish habitat that are less than those identified by the fisheries and aquatic resources impact assessment. This assessment approach applied to RAVP was discussed with the Major Projects Review Unit of Fisheries and Oceans Canada (DFO) during the Pre-Application phase of the Project. The information presented in section 6 of the Application is intended to facilitate the issuance of a Section 35(2) authorization under the *Fisheries Act* by providing design concepts for consideration by the Concessionaire and DFO.

RAVCo's fisheries and aquatic habitat assessment does not focus on any single fish species or the habitat of any single fish species. Consideration of the impact the project design, construction and operation may have on fish and fish habitat is all-inclusive. Any impact on the biophysical environment is considered in the context of an impact upon fish and fish habitat. Accordingly, the life history requirements of all fish species documented to inhabit the Fraser River estuary and water courses of adjacent uplands (see Application Appendix 6-A: Table 6-A1) are duly addressed, including those supporting significant fisheries and those considered to be at risk.

3.2.1 The Fraser North Arm

The conceptual design²⁵ of the North Arm Crossing traverses inter-tidal mudflat, inter-tidal marsh

²⁵ "Conceptual Design" refers to the level of design details that can be presented in the Application and the Application Supplement, without the proponent having undertaken a detailed design of the project. The Concessionaire will develop the final design and any deviation from concept definitions included in the EA review material may require

and a fringe of riparian shrub woodland along the southern shoreline of the channel as defined by the Lulu Island dyke. This shoreline has been classified by the Fraser River Estuary Management Program (FREMP), a multi-agency collaboration to facilitate environmental review within the Fraser River estuary, as high productive (red-coded) fish habitat. Features associated with past and existing forest product operations define the northern shoreline.

The conceptual locations for the bridge pier footings (to be detailed during final design and prior to start of construction) avoid inter-tidal and riparian fish habitats. Densification works associated with a pier located in proximity to the local low water mark of the southern shoreline may, according to the proponent, affect a small area of inter-tidal mudflat²⁶.

RAVCo anticipates that impacts associated with construction of the crossing will not exceed the footprint of temporary wood piles on inter-tidal marsh and mudflat. The piles would support timber decks that may be used as temporary work pads. The piles and decks would be decommissioned upon completion of construction. Impact mitigation protocols will be implemented as part of normal construction practices. Plans involving storm-water and sediment control, concrete management, and spill prevention and emergency response will be implemented (see section 20 of the Application).

Prospective impacts to fish habitat associated with the river crossing include shading of inter-tidal marsh and riparian shrub woodland, hydraulic scour and deposition of river bottom sediments. The crossing has been designed to prevent any de-icing or rail grinding substances from entering the watercourse. The height of the conceptual bridge structure is sufficient to minimize shading such that impacts upon the vigour of the marsh and woodland would be insignificant, according to the proponent. The assessment of impacts of piers upon the immediate hydraulic environment requires further investigation during final design. Impacts upon bottom sediments, however, are not anticipated to be significant. Impacts upon fish habitats supported by bottom sediments in proximity to piers of other recently constructed crossings of the Fraser River, most notably the No. 2 Road and the Airport Connector bridges, have been studied by other developers.

The proponent concludes that the marginal impacts to inter-tidal marsh and mudflat that may be associated with the design and construction of the Project can be readily offset through the creation of replacement fish habitats or through the purchase or withdrawal of habitat credits from North Fraser Port Authority's (NFPA) habitat bank. Accordingly, significant residual impacts to fish habitat are not anticipated for the conceptual design, construction and operation of the North Arm Crossing.

3.2.2 Middle Arm Crossing

The conceptual design of the Middle Arm Crossing traverses inter-tidal marsh and mudflat along both shorelines of the channel. A small cluster of shrubs and trees occurs within the riparian environment of the western shoreline, at and about the location of a decommissioned storm-water outfall structure. Shrubs and trees are absent from the riparian environment of the eastern shoreline; the gravel road of an aggregate handling facility defines this shoreline. The marsh and mudflat along the eastern shoreline has been classified by FREMP as highly productive fish habitat. The riparian woodland, marsh and mudflat along the western shoreline are considered by FREMP to be high productivity fish habitat.

A bridge pier footing along the eastern shoreline is located upon inter-tidal marsh and mudflat. A pier footing along the western shoreline is located upon riparian woodland. Densification works

additional review not covered in this Assessment Report. Such steps are committed to in *Appendix E* of this Assessment Report.

²⁶The north pier at the western end of Mitchell Island will impact sub-tidal habitat and will also infill habitat between the proposed pier and the island.

will impact inter-tidal marsh and mudflat at both pier locations. Armament of the pier footings may further impact marsh and mudflat. Two other piers are also proposed in the middle of the channel and will impact sub-tidal habitat.

It is anticipated by the proponent that impacts associated with construction of the crossing will be, in part, associated with the footprint of temporary work pads along both shorelines. A work pad would occur on a timber deck along the eastern shoreline. The deck would be supported on wood piles. The footprint of the piles would occur on inter-tidal marsh and mudflat. The work pad along the western shoreline may be constructed of aggregate fill along the western shoreline; the fill would cover inter-tidal marsh and mudflat. All work pads would be decommissioned in their entirety upon completion of construction. Impact mitigation protocols will be implemented as part of normal construction practices. Plans involving storm water and sediment control, concrete management, and spill prevention and emergency response will be implemented, as outlined in section 20 of the Application.

Prospective impacts to fish habitat associated with the operation of the crossing include shading of inter-tidal marsh and hydraulic scour and deposition of river bottom sediments. The crossing has been designed to prevent any de-icing or rail grinding substances from entering the watercourse. The orientation of the conceptual bridge structure is such that shading of marsh would not significantly impact the vigour of the marsh, according to the proponent. The assessment of impacts of piers upon the immediate hydraulic environment will require further investigation during final design. In contrast to the North Arm Crossing, there is the potential for channelization between the proposed bridge piers and those of the Airport Connector and Moray Channel bridges. However, as the piers of the three bridges are not aligned and are predominantly located in immediate proximity to the navigation channel, a feature that is regularly dredged, significant impacts upon fish habitats associated with bottom sediments are not anticipated by the proponent. Significant impacts upon fish habitats supported by bottom sediments in proximity to piers of other recently constructed crossings of the Fraser River, most notably the No. 2 Road and the Airport Connector bridges, have not been documented.

The area extent of impacts to inter-tidal mudflat, inter-tidal marsh and riparian woodland associated with the conceptual design of the project is not anticipated to exceed several hundred square metres. According to the proponent, these impacts can be readily offset through the creation of replacement fish habitats or through the purchase or withdrawal of habitat credits from NFPA's habitat bank. Accordingly, significant residual impacts to fish habitat are not anticipated for the conceptual design, construction and operation of the Middle Arm Crossing.

3.2.3 The Airport Branch

The conceptual alignment of the Airport Branch of the rail system traverses several ditches on Sea Island. The ditches encompassed by the RAVP conceptual design are not inhabited by fish. Fish habitat values sustained by the ditches are marginal. The conceptual design of the project, therefore, does not significantly impact fish habitat.

Project construction and operation will not significantly impact fish habitat, according to the proponent. Impact mitigation protocols will be implemented as part of normal construction practices to avoid impacts to the storm-water receiving environments of the Fraser River. Plans involving storm-water and sediment control, concrete management, and spill prevention and emergency response will be implemented.

3.2.4 The Lulu Island Branch

The conceptual rail alignment of the Lulu Island Branch traverses several ditches on Lulu Island. The ditches encompassed by the conceptual design of the project are not inhabited by fish. Fish habitat values sustained by the ditches are marginal. The project's conceptual design and attendant construction does not significantly impact fish habitat, according to the proponent.

Impact mitigation protocols will be implemented as part of normal construction practices to avoid impacts to the storm-water receiving environments of the Fraser River. Plans involving storm-water and sediment control, concrete management, and spill prevention and emergency response will be implemented. The proponent also concludes that the operation of the project will not significantly impact fish habitats associated with the Lulu Island Branch.

3.2.5 The South Vancouver Branch

The conceptual rail alignment of the South Vancouver Branch traverses the historical alignments of the main channel and a tributary of Winona Creek. The prospective impact of the conceptual design of the project upon fish habitat is founded upon its potential to pre-empt enhancement opportunities associated with 'daylighting' sections of historical channels and/or augmenting flows of such sections with storm-waters from existing catchment areas. According to the proponent, the conceptual design of the project does not impact fish habitat. It does not pre-empt 'daylighting' of channels nor does it interfere with the prospective conveyance of storm waters to enhanced channels.

Project construction and operation will not significantly impact fish habitat associated with the South Vancouver Branch. Impact mitigation protocols will be implemented as part of normal construction practices to avoid impacts to the storm-water receiving environments of the Fraser River. Plans involving storm-water and sediment control, concrete management, and spill prevention and emergency response will be implemented.

3.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

3.3.1 General

A number of working group members, in particular representatives of DFO, the NFPA and the Vancouver International Airport Authority, as well as members of the public and First Nations, raised concerns with the two bridge crossings and their foundations potential impacts on fish habitat. In addition the Musqueam Indian Band and the Tsawwassen First Nation raised concerns with the project's impacts on their aboriginal fisheries. The Proponent has responded to written comments by the Tsawwassen Band, but written comments on the Application and Application Supplement from the Musqueam Band have not been received.

Some of these impact issues were raised during the early review of draft Application material. The Application, when submitted, reflected some of these comments, but the impact assessment and associated Application material were re-visited during the review of the Application and the Application Supplement. The main issues are covered below.

3.3.2 Scope of the Fisheries and Aquatic Resources Impact Assessment

During the review of draft Application material and the Application, as submitted, the working groups (DFO in particular) raised the fact that essentially all fish and fish habitat have been treated equally (see also section 3.2 introduction above). Although it may be acceptable to cause a HADD²⁷ of fish habitat (e.g. pier placement) under the *Fisheries Act*, it may not be acceptable if the HADD were to have an effect on a species at risk. For reference, section 32(1) of the federal *Species at Risk Act* (SARA) states that "No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed...." and section 33 states that "No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed...."

In addition to the fish species inventory suggested by DFO for the Species at Risk assessment discussed in section 3.3.2 below, DFO notes that a description of the habitat types (i.e. sand and silt, marsh) that will be affected have been provided, but no examples of fish or their different life stages that utilise it have been identified. To determine the appropriate mitigation and

²⁷ HADD= Harmful Alteration Disruption and Destruction as defined in the Canada *Fisheries Act*.

compensation, a better understanding of the different species that could be affected should be discussed.

In their responses to the above comments on the draft Application material, included in RAVCo's submission to EAO of December 16, 2004²⁸, the proponent restates the basic position, included in the Application that the review material does not focus on any single fish species or the habitat of any single fish species. Consideration of the impact of the conceptual project design, construction and operation may have on fish and fish habitat is all-inclusive (emphasis added). Any impact on the biophysical environment is considered in context of an impact upon fish and fish habitat. Accordingly, the proponent states that the life history requirements of all fish species documented to inhabit the Fraser River estuary and watercourses of adjacent uplands (see Application Appendix 6-A, Table A1) are duly addressed, including those supporting significant fisheries (e.g. Pacific salmon, *Oncorhynchus* spp.) and those considered at risk.

RAVCo also stated that the compensation measures identified for impacts attributable to the conceptual design of the project adequately address impacts for all fish species. The mitigation measures identified for impacts attributable to the construction and operation of the project, as defined by the conceptual design, also adequately address impacts for all fish species, according to the proponent.

Finally, RAVCo suggested that fish species are managed through management of their habitats. The habitat types identified provide a myriad of ecological functions for fish species inhabiting the Fraser River. To manage habitats in the context of shoreline development projects, where the ultimate objective is to achieve a net gain in each of the habitat types affected by development, is to manage for all fish species inhabiting the river. This is essentially the approach employed by the FREMP, of which DFO is an active participant. The Application, according to the proponent, applies the contemporary model of fish species management currently applied within the Fraser River estuary by DFO for shoreline development projects.

In their submission to EAO on December 6, 2004, DFO questioned the proponent's responses, referenced above, that the habitat types identified provide a "myriad of functions for fish species". For the assessment to be complete and to determine appropriate compensation, DFO requested the proponent to provide examples of the different fish species and life stages that utilise the habitat types that will or may potentially be impacted by the project. Compensation habitat will need to be developed based on the functioning of the habitat type that will be impacted. Monitoring of the compensation habitat will include ensuring the site is stable, and designed and functioning as proposed. It may be difficult to develop and monitor compensation habitat without knowing the function of the habitat types that will be impacted. A literature search will likely assist in providing information on fish utilisation and invertebrate and fish densities for different species in the habitat types found near the North and Middle Arm crossings of the Fraser River estuary.

In subsequent discussions, and based on RAVCo's follow-up, it was agreed that further literature searches would not add materially to a better understanding of the aquatic habitat and the definition of an agreement to a fish habitat compensation plan.

In their response to DFO of January 27, 2005, RAVCo noted that the management of fish habitat within the Fraser River estuary, under the auspices of the Fraser River Estuary Management Program (FREMP) and DFO, focuses on the direct management of habitat types. In managing habitat types, resource agencies adopt a multi-species approach, whereby all invertebrate and vertebrate species that utilize a particular habitat type are conserved. The functions that these habitat types provide, such as food, rearing and reproduction, are understood by RAVCO as well as those resource agencies that participate in the contemporary management of habitat within the Fraser River estuary. A compensation habitat is functioning as intended if it reproduces the biophysical features of the natural habitat.

²⁸ "Responses to Environmental Assessment Certificate Application Agency Pre-screening Comments".

3.3.3 Species at Risk

In their comments on the scope of the impact assessment, included in the draft Application material, DFO also raised concerns over Species at Risk (see first paragraph under 3.3.1 above). The Application lists all fish species observed and captured in the estuary and concluded that HADD will likely occur at the bridge crossings, but the impact assessment has not determined if it will likely contravene section 32(1) or section 33 of SARA. Under CEAA, DFO must consider "any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species...." DFO suggested that a separate section for Species at Risk should be made available with a list of fishes present at or migrating (and their timing) past the proposed crossings, including any additional mitigation measures (e.g. timing windows, exclusion zones) that may be required to address those impacts.

In their response to the scope of the fish habitat assessment referenced in section 3.3.2, RAVCo provides a general discussion of habitat assessments for the Fraser River. Based on this response, DFO assumed in their submission to EAO on December 6, 2004 that the habitat of red-and blue-listed species, as well as, a potential SARA species (white sturgeon is being considered for listing on SARA Schedule 1) will likely be impacted by the project. DFO advises that compensation habitat may not be acceptable for impacts to Species at Risk. DFO required that RAVCo provide a discussion on Species at Risk and the measures that will be taken to avoid or lessen those effects and how they will be monitored.

In their response to DFO on January 27 2005, RAVCo concludes that there are no SARA listed fish species that potentially occur within aquatic and near-shore environments of the RAVP. Provincially listed threatened or endangered (red-listed) species that potentially occur within aquatic and near-shore environments of the project include pygmy longfin smelt (*Spirinchus sp. 1*), green sturgeon (*Acipenser medirostris*), and white sturgeon (*A.transmontanus pop.4*). Vulnerable or sensitive (blue-listed) species include eulachon (*Thaleichthys pacificus*), Dolly Varden trout (*Salvelinus malma*), bull trout (*S. confluentus*) and cutthroat trout (*Oncorhynchus clarki clarki*). RAVCo is of the opinion that it is highly unlikely that pygmy longfin smelt, green sturgeon and bull trout occur within the environmental setting of the project. In their letter of January 27, 2005 to DFO²⁹ RAVCo provides technical input for this assertion.

In their referenced letter, RAVCo also concludes that impact mitigation and compensation measures prescribed for inter-tidal habitats adequately offset any losses to the functional attributes of such habitats for fish. Accordingly, a loss of critical inter-tidal habitat for fish considered to be 'species at risk' will not occur. According to RAVCo, impacts to channel (i.e. sub-tidal) habitats attributable to the design footprints of piers and associated structures are highly localized and encompass a very small area of the channel bottom. It is unlikely, according to RAVCo that the hydraulic analysis for the project will reveal significant changes to the hydraulics and channel morphology of the North and Middle arms of Fraser River. It is also highly unlikely that impacts to channel habitats will affect the capacity of the channel environments to sustain habitat functions for fish. As such, RAVCo considers that a loss of critical channel habitat for fish considered to be 'species at risk' will not occur. DFO has accepted this position.

3.3.4 North Fraser Port Authority (NFPA) Habitat Bank

DFO's comment of September 27 2004 suggested that RAVCo should provide an explanation for the "readers" on "how this habitat bank operates and how the funds may be used". In their comments DFO also provided an itemized overview of the habitat compensation issues and the NFPA Habitat Bank.

²⁹ Reflected in RAVCo's *Responses to Environmental Assessment Certificate Application and Application Supplement. Agency Comments*, referenced in *Appendix A* to the Assessment Report.

In their response to DFO on January 27, 2005, RAVCo confirms their awareness of the NFPA habitat banking program. The scope of the fisheries and aquatic assessment report for the RAVP Application was meant to focus, primarily, on the technical and scientific aspect of the discipline, and not on the applicability of the regulatory and resource management regime to the RAVP as it may affect the Fraser River. It is expected by RAVCo that those individuals, agencies and organizations that engage in the review of the fisheries and aquatic assessment will have solid working knowledge of the management of fisheries resources in the Fraser River estuary.

3.3.5 Cumulative Environmental Effects and Fish Migration

In their comments on the Application and the Application Supplement dated January 6, 2005, DFO raised a fish migration component of the project's Cumulative Effects Assessment (CEA). According to DFO an Environmental Component that needs to be considered with the Water Column is impacts to "upstream and downstream fish migration". The bridge design should incorporate an assessment of both the pier configuration/orientation and the hydraulics study to ensure there will be no impacts to fish migration, and also to reduce the amount of shoreline scour protection that may be required.

DFO anticipates that there will be residual effects from the construction of the Fraser River crossings, particularly due to temporary habitat losses. It may be low and short term, but this will only be concluded after the monitoring of the compensation habitat has been established and executed. The success of the compensation habitat and the evaluation of the residual effects, as part of a CEA, are therefore uncertain.

In their responses to DFO dated January 17, 2005, RAVCo informs that the design and construction of the North and Middle Arm RAVP bridges will be the carried out by the Concessionaire. The Concessionaire will be responsible for obtaining *Navigable Waters Protection Act* (NWPA) approval(s), and Section 35(2) *Fisheries Act* Authorization(s). It is anticipated by the proponent that detailed design work and studies, in support of the NWPA and Section 35(2) approvals/authorizations, will commence in April/May 2005, once a contract is in place with RAVCo, but will not be concluded until after the Environmental Assessment Certificate and CEAA approval have been issued. In preparing the submission for an NWPA application, Transport Canada's Navigable Waters Protection Division has advised the proponent on information that will be required for the RAVP bridges.

This information, as appropriate, will be available for use in preparing the application for Section 35(2) Authorization(s). The issue of whether or not residual effects from construction of the crossings may result in temporary losses to fish habitat, as well as the issue of long-term monitoring of compensation habitats will be further discussed in the Section 35(2) Authorization application and in ongoing meetings held with DFO in advance of the application submission for *Fisheries Act* authorization.

3.3.6 Aboriginal Fisheries Issues

Aboriginal fisheries in the vicinity of the North Arm and the Middle Arm of the Fraser River constitute an important cultural and commercial activity from the perspective of the First Nations who are engaged in these fisheries. The two new bridges will add some constraints to marine traffic and potentially to fisheries. However, the navigational issues have been resolved by the realignment of the bridges and the repositioning of bridge support columns and associated foundations. An "approval in principle" was obtained from TC reflecting a future approval under the *Navigable Waters Protection Act*. This "approval in principle" by TC is conditional on final design being developed to the regulatory satisfaction of TC. Further consultation with the Musqueam Indian Band (MIB) on the extent of the aboriginal fisheries and associated impacts will be advanced by RAVCo. The EA review accepted that a clear-span bridge across the Middle Arm of Fraser River, and thereby avoiding in-river foundations, is not achievable due to height restrictions set by approach profiles for landing at the airport.

The Tsawwassen First Nation (TFN) raised the issue of in-water works on the bridge foundations and the migration of juvenile salmon. RAVCo confirms that it will require the Concessionaire to adhere to the in-stream construction windows defined by DFO, which for the lower Fraser River typically include closure that extends from 1 March to 15 June. TFN also questioned the reference to the potential for vortexes and flow disturbance at the bridge sites discussed in the Application. RAVCo confirms that the positive or negative results of this will be determined from the hydraulic and scour studies being conducted by the Concessionaire in support of the NWPA application(s).

The TFN expressed concerns over disturbances of marshes and mudflats during removal of temporary piles during bridge foundation construction. RAVCo informs that any impacts to marsh and mudflat areas during pier construction will, wherever possible, be minimized through such measures as contractually required construction environmental inspection and direction to contractors, single point access, regular clean up of lay-down, staging and equipment areas – including decking. It is also expected that long term program monitoring in these areas will be a requirement of the *Fisheries Act* Section 35(2) Authorization as reflected in Appendix E. Initiated concerted efforts to solicit input from the MIB as to the location of their drift-net or gill-net fishing and the resources extracted from the Fraser River at the two bridge locations. RAVCo met with MIB's Fishery Department on October 22, 2004. RAVCo reported to EAO, from this meeting, that there are approximately 192 licensed holders in the MIB communal aboriginal fishery; that the MIB fish the Middle Arm from its confluence with the North Arm to its mouth at tidewater; and fish the North Arm from the Knight Street Bridge to the Arthur Laing Bridge. Up to 100 boats can be spread out over the MIB fishing area during a given fishery. However, it is reported that only about 20 of the MIB fishers fish in the vicinity of the new bridges.

RAVCo met again with the MIB Fishery Department on January 14, 2005 and on January 18, 2005 respectively to discuss this issue. RAVCo also provided further details on the two bridges in their written submission to MIB dated February 2, 2005. RAVCo followed up with reminders on the need for input from MIB on the pending issue and MIB advised that they were collecting the material. EAO and RAVCo met with the MIB on March 22, 2005 to discuss consultation, the EA review and the need for the MIB feed-back regarding the nature and extent of their aboriginal fisheries and associated impacts. MIB agreed to arrange a meeting with the MIB community on March 31, 2005 for RAVCo to present the current bridge alignments and supporting structures and to obtain information from MIB on their aboriginal fisheries.

At the March 31, 2005 meeting MIB stressed the traditional, cultural and commercial value of their fisheries in the two bridge areas. Whereas it was admitted at this meeting³⁰ that fishing in the North Arm at this location was increasingly difficult and un-safe due to the heavy marine traffic in the navigation channels, it was stressed by MIB that the Middle Arm provides good fishing areas. No further details on the specific extent of MIB fisheries or associated impacts were provided to RAVCo and EAO at this meeting.

In the absence of further and more detailed MIB data on their fisheries, the review acknowledged the receipt of RAVCo's letter of March 17, 2005 providing some anecdotal evidence of aboriginal fisheries at the river crossing areas. This input was provided by Envirowest Environmental Consultants Ltd. based on information available from non-aboriginal sources. The March 17 2005 letter reports that First Nations fishers (food and commercial) within the North Arm concentrate their efforts downstream of the Oak Street Bridge. At least 6 to 8 food fishers and 5 commercial fishers may be observed downstream of the Oak Street bridge during salmon runs. Fishing very rarely occurs in proximity to Mitchell Island. Fishing within the Middle Arm appears to be linked to fishing within the North Arm immediately downstream of the Oak Street bridge. Drift nets are set immediately downstream of the bridge. A natural drift carries the nets into the Middle Arm. The nets are allowed to drift to approximately the historic downstream end of Duck Island, upstream of the Airport Connector bridge, at which point the nets are hauled out of the water and back onto

³⁰ Presentation by Arthur Stogan Sr.

the vessel. Approximately 4 to 5 food fishers and 4 commercial fishers may be observed in this area during salmon runs.

The EAO accepts for the purpose of the EA review that MIB has aboriginal rights to fish for food, social and ceremonial purposes in these sections of the Fraser River, established by the *Sparrow* case³¹. The full extent of any adverse effects on aboriginal fisheries, including affirmation of the information provided by non-aboriginal sources to date, will be further established through continuing consultation between RAVCo and MIB. The EA review accepts that interference to MIB fisheries may exist, but also acknowledges that there is an agreed process in place to resolve this issue. Through the “Owner’s Commitments and Assurances” defined in *Appendix E* to this Assessment Report, the proponent agrees to continue to consult with the MIB on the extent of their fisheries and the impact the project may cause and to seek agreement on a reasonable accommodation (where indicated) for any identified infringements on MIB’s fishing rights.

3.3.7 Water Quality

Several sections of the Application stated that RAVCO’s goal is to remove suspended solids to 75ppm (mg/L) above receiving water concentrations before release. EC stated that the proponent should meet the criteria of the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* and the *BC Approved Water Quality Guidelines*. RAVCo agreed, as reflected in their letter to EC of March 17, 2005 and Appendix E.

Water quality impacts related to operational issues such as chemical de-icers, rail grinding, and storm-water management were raised and addressed satisfactorily in the review.

3.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner’s Commitments and Assurances* as listed in *Appendix E* to this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse effects on fish habitat and the estuarine environment.

Integrated in the conclusions and recommendations is DFO’s determination that residual effects resulting from the harmful alteration, disruption or destruction (HADD) of fish habitat will likely be low and short term (5 to 10 years) provided the development of appropriate compensation habitat is successful. Monitoring (i.e. Recommended Mitigation Measure) will be used to determine the stability, design and functioning of the compensation habitat and to ensure there is “no net loss” in the productive capacity of fish habitat in each habitat management unit. If the compensation habitat is not functioning to DFO’s satisfaction, the Section 35(2) *Fisheries Act* Authorization will be used to ensure the compensation habitat is maintained or additional habitat is provided.

³¹ R. v. Sparrow case [1990] 1 S.C.R. 1075 [1990] S.C.J. No. 49, File No. 20311.

4. Terrestrial Biophysical Assessment

4.1 GENERAL

Studies for the terrestrial biophysical assessment included collection and review of existing information, field inventory, habitat assessment, impact assessment, evaluation of mitigation and habitat compensation measures, assessment of residual impacts, and project implications for cumulative impacts.

The key review material, pertaining to EA issues and review discussions, is covered in the following sections of the Application:

- 2.3 Project Description
- 7 Terrestrial Biophysical Assessment
- 16.4.2 Cumulative Effects on the Terrestrial Environment
- 20 Construction EMP Outline and Component Plan Guidelines

The Application Supplement addressed terrestrial biophysical issues in section 7 and concluded that the findings described in section 7 of the Application continue to accurately reflect the potential impacts associated with the Selected Project.

4.2 BACKGROUND INFORMATION

The terrestrial biophysical study area consists of the RAVP corridor from downtown Vancouver to Richmond, and to the Vancouver International Airport. Considering the highly urbanized nature of the study area, the terrestrial biophysical assessment focused on those locations that supported remnants of natural habitat; this was limited to the shoreline of the North Arm and Middle Arm of the Fraser River and land on Sea Island approaching the airport terminals (mostly highly modified habitat).

4.2.1 Vegetation Study Results

The Project falls within two biogeo-climatic units: the Very Dry Maritime sub-zone of the Coastal Western Hemlock zone and the Moist Maritime sub-zone of the Coastal Douglas-fir zone. Vegetation surveys to characterize plant communities and to assess the potential for rare plants or rare plant communities were carried out at naturally vegetated sites along the RAVP line, all of which occurred on Lulu Island or Sea Island. Those few natural plant communities that remain in the area consist of upland riparian habitat or foreshore marsh habitat. Sites dominated by anthropogenic vegetation (i.e., managed parks, Cambie Heritage Boulevard, and sites where vegetation is planted and managed) were excluded from sampling.

In general, surveyed upland plant communities occur on anthropogenic landforms. They are composed of a high proportion of non-native species, reflecting past and current anthropogenic disturbances such as clearing, mowing, seeding, and dumping of garden waste. The marsh plant communities occur on natural riparian landforms that have been altered by flood control measures such as dyking, and are dominated by native species that are adapted to periodic flooding with brackish water.

Information on rare plants and rare plant communities was obtained from several sources, including the BC Conservation Data Centre (CDC), the City of Richmond, and various reference sources. Field surveys conducted at the sample locations did not find any rare plants or rare plant communities. The non-marsh plant communities were small, and in a non-natural condition: highly disturbed and supporting a high number of non-native species. The marsh plant communities were in a more natural condition, but according to the proponent they did not

correspond with any plant communities that occur on the CDC tracking list or *Species At Risk Act* Schedule I.

4.2.2 Wildlife Study Results

A considerable amount of information on wildlife was available for the area of primary interest, namely Sea Island, comprising lands under the control of the Vancouver International Airport Authority (VIAA). These sources provided the bulk of useful information for the wildlife baseline input and impact assessment. The data were supplemented by field reconnaissance surveys. The sources described bird use by habitat type and seasonal and annual trends, and provided an account of those species that occur on Sea Island.

According to the proponent, there is no natural wildlife habitat remaining in the proposed RAVP corridor from downtown Vancouver, up to and including the north shore of the Fraser River. Remaining habitats along the corridor occur at the North Arm of the Fraser River (south shore), the Middle Arm (both shores), the eastern end of Sea Island, and east central Sea Island along Grant McConachie Way. Although even those habitats have been affected by land and water uses, they still retain some value as wildlife habitat, mostly for birds.

Bird habitats at Sea Island have been well documented by studies for the VIAA and by studies for preparation of the Sea Island Conservation Area (SICA) Management Plan. Other than the small riparian habitats and several foreshore marshes, much of the Sea Island area is actively managed by VIAA to reduce use by birds, so as to minimize the risk of bird-aircraft strikes. Overall, bird use of the Sea Island area along the RAVP corridor is very low according to the proponent.

In keeping with the recently enacted federal *Species at Risk Act* (SARA), a review of potentially occurring amphibious and terrestrial vertebrate wildlife that have been listed by the CDC was completed to assess the likelihood of these listed species occurring in the RAVP corridor. It was concluded that 17 provincially red-listed and blue-listed vertebrate wildlife species potentially occur in the study area, although several are unlikely to occur or would occur only infrequently. The total includes one reptile, 14 birds, and two mammals. No SARA Schedule I species were identified.

Areas of special conservation concern from a wildlife perspective include the same foreshore marshes that have been red-coded by the FREMP (see Application section 7.3.2). All other habitats along the RAVP line have been highly modified, and often intensively managed. There are no ecological reserves along the RAVP corridor.

4.2.3 Potential Impacts and Mitigation Measures

Potential impacts to terrestrial/biophysical resources associated with construction and operation of the proposed RAVP were assessed by the proponent with reference to a corridor, approximately 100 m in width. Although it is recognized that technological design elements of the project will not be finalized until the Concessionaire has completed the final design, the proponent anticipates that the RAVP alignment, and therefore all construction-related impacts, will be contained within the corridor defined during the EA review.

According to RAVCo, direct impacts to wildlife are not anticipated as a result of construction or operation of the Project. As the RAVP line will be located over mostly developed land that is already alienated for wildlife use, habitat displacement effects are considered to be negligible. Some disturbance of local or migrating bird populations may occur at the bridge crossing sites (i.e., foreshore marshes, riparian zone). Any such impacts, however, are expected to be short-term and would affect generally common wildlife species.

Overall, there is no indication that any particularly sensitive or listed species would be significantly affected by the project in the mid- or long term. According to the proponent and given the location

of the RAVP corridor and the state of existing habitat conditions, cumulative vegetation and wildlife impacts from development of the project are not expected.

4.3 COMMENTS AND PROPONENT'S RESPONSES

The VIAA concurred with the RAVCo's assignment of relative low value to most of the wildlife habitat affected by the project. However, the authority is concerned about loss of trees and requested confirmation that relocation and re-planting of trees displaced on Sea Island will be part of project commitments. RAVCo confirmed this intention and referred to Section 4.4.8.4 of the Application Supplement, showing that the RAVP line alignment on Sea Island was selected to provide the most direct and cost effective access to the main international and domestic terminals while considering the associated potential environmental impacts to the corridor. Re-landscaping, including tree replanting/replacement, will be an important component of the project and will be carried out according to Crime Prevention through Environmental Design (CPTED) principles, as well as input from the public and project stakeholders during the development of station designs. Any determination regarding the need to remove and/or replace trees along the alignment on Sea Island will be made in close consultation with VIAA.

EC raised a concern regarding construction activities and their impacts on estuarine marshes. The Application (section 7.4.5.1) does not provide detail as to how impacts would be prevented or mitigated). The recommended compensation measure under Section 19 of the Application (should impact occur), states that impacts can be offset through creation of replacement habitat and links such replacement to a *Fisheries Act* Authorization. As the fisheries impacts, and therefore required compensation, may be different from the wildlife and wildlife habitat impacts, EC suggested that the recommended compensation measure should read: "impacts to inter-tidal mudflat, inter-tidal marsh and riparian woodland habitats will be offset through creation of replacement habitats..." The proponent is responsible for complying with the requirements of the *Migratory Birds Convention Act* and the *Species at Risk Act*. RAVCo generally endorsed this position.

GVRD raised the potential impacts to Valued Ecosystem Components (VECs), discussed in section 7 of the Application, and to species at risk, including plants, vertebrates and invertebrates recognized through the B.C. Conservation Data Centre Red and Blue lists, and the Council on the Status of Endangered Wildlife in Canada (COSEWIC) list of species which are subject to the SARA. The Pacific Water Shrew is listed in the Application Appendix 7-I, but is not identified in the text or Appendix 7-J as potentially existing in the project area.

The Pacific Water Shrew has been excluded from the proponent's terrestrial biophysical assessment because it is not currently recognized as a species that is likely to occur within a significantly modified, highly impacted, dense inner urban setting through which the RAVP line traverses. Additionally, this is a species generally associated with small wetlands and streams, and not with large fast flowing water bodies such as the North and Middle Arms of the Fraser River at the locations where the RAVP line crosses. SEACOR, the terrestrial biophysical consultants who conducted the assessment, has determined through recent Pacific Water Shrew capture experience that this particular species does not favour the impacted and fragmented habitats normally associated with the RAVP line. This position is also supported by MWLAP.

The City of Richmond (COR) agrees that the four identified sites in Section 7 of the Application (Sites A-D) are the primary locations of potential habitat impacts within Richmond. However, the City has concerns that: the assessment did not include the City's most up-to-date biophysical information; that the City's most up-to-date assessment of Site D suggests that it has higher value than indicated in the Application; and that the VECs are narrowly defined and do not adequately reflect local values or place sufficient emphasis on biodiversity. These concerns are further described in COR's letter to the EAO of February 24, 2005.

In their responses, RAVCo confirmed that they considered all information available at the time

the environmental assessment studies were carried out in 2003/04. The work involved a detailed, objective assessment of the study sites and the development of independent findings regarding potential project impacts. RAVCO concurs with the findings of SEACOR, their consultants, with respect to all survey sites, including Site D.

SEACOR defined VECs as narrowly as was feasible for the assessment in order to focus on specific resources of value in the project area. In Richmond, and elsewhere along the RAVP corridor, the ability of an area to support a VEC or VECs is generally indicative of its importance in a broader ecological context. Local values and biodiversity aspects were considered during VEC definition and assessment.

RAVCO, through agreements with the Concessionaire, will continue to consult with COR to achieve “no net loss” in accordance with Richmond’s Official Community Plan. The Construction Environmental Management Plan (EMP) will describe mitigation measures to prevent or minimize impacts during construction.

4.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, the RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner’s Commitments and Assurances* as listed in *Appendix E* to this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse effects on terrestrial biophysical habitats.

5. Arboricultural Assessment

5.1 GENERAL

An arboricultural survey of 1,259 existing trees and stands of natural planted trees within the RAVP corridor was conducted in 2003. The survey addressed the number, size, health, species and location of the trees, described supporting soil conditions and provided AutoCAD survey referencing for each tree in the study area.

The key review material, pertaining to EA issues and review discussions, is covered in the following sections of the Application:

- 2.3 Project Description
- 2.7 Construction Scheduling and Sequencing
- 3.7 Geotechnical Studies Summary
- 8 Arboricultural Survey and Assessment of Existing Trees
- 9.6 Description and Summary of Impacts for Socio-economic Indicators
- 14.5 Results of Historical and Heritage Assessment
- 20 Construction EMP Outline and Component Plan Guidelines

The Application Supplement addressed arboricultural impact issues in section 7 and concluded that the findings described in section 8 of the Application continue to reflect the potential impacts associated with the Selected Project. In fact, it is possible that the Selected Project may have lower impacts on the trees along Cambie Street, as the selected alignment is along the northbound lane and not impacting on the boulevard as was possible with the reference Project ,

5.2 BACKGROUND INFORMATION

In Richmond, most trees within the RAVP corridor are situated within the central median of No. 3 Road. The median plantings are characterized by young trees planted approximately three years ago. These trees were found to be in good condition and suitable for either retention or transplant.

The Vancouver International Airport study area covers three types of landscapes. The mature trees in the eastern sections of Grant McConachie Way and the North Service Road are well established in open landscape environments. These trees are considered suitable for retention, but are too large for transplanting if they need to be removed from the RAVP alignment. With the exception of a few isolated, declining or dying trees, the bermed areas closer to the airport terminals that have been planted with a mix of mostly native conifers were found to be in good condition. A linear row of young maple trees that have been planted between the road and the airport parkade were found to be in good condition and are suitable for transplant should a conflict occur that would require their temporary removal during project construction.

In Vancouver, the boulevards on both the east and west sides of Cambie Street contain conventional rows of planted street trees, growing in narrow planted strips with poor soil conditions. These trees are generally young, developing and in fair condition. The Cambie Street median (i.e., Cambie Heritage Boulevard) averages 10 m. in width and contains a randomly spaced planting of various tree species. The boulevard trees range in age and structural class from newly planted saplings to mature form. Generally, these trees were observed to be in fair to good condition with some close to the end of their lifespan. Due primarily to poor soil conditions, young trees within the boulevard were consistently found to be in poor condition. The Cambie Heritage Boulevard trees are well suited for retention, but not for transplant.

The Application Supplement fully established that the cut-and-cover construction methodology for the Selected Project along Cambie Street would extend from 2nd Avenue to between 63rd and 64th Avenues (where the tunnel changes to an elevated guideway for crossing the North Arm of Fraser River³²). This is an extended construction section as compared to the Reference Project, but the construction will be largely along the northern lanes of Cambie Street and will have much less negative impacts on the planted trees than as assumed for the Reference Project.

5.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

The City of Richmond (COR) expressed concerns over the health of planted trees along the No. 3 Road, being located in the shade of the elevated guideway and also likely to be impacted during construction. While Section 8 of the Application recognizes the good health of the COR's trees, this section does not identify what the likely impacts may be (e.g., extent of tree loss) nor what commitments will be made to protect and/or compensate for existing assets. The COR has invested significant resources into beautifying the No. 3 Road corridor and has a "no-net-loss" policy. Landscape improvements include the trees as well as other assets.

COR recommends that a survey of the underground utilities be conducted prior to tree planting or transplanting. The COR notes that there are also other significant landscape features and assets such as turf areas, shrubs, irrigation system components and hardscape treatments which have value and should be identified and included in the protection zoning during the construction phase of the project or salvaged prior to construction.

Preliminary results of further assessment work undertaken by RAVCO's arboricultural specialist following the Application submission, indicates that all of the trees and other landscape assets (e.g., shrubs) located along the guideway construction zone down No. 3 Road will have to be removed. It is assessed that all of the affected trees and associated landscape vegetation are in good condition and of a size that should allow them to be transplanted out, temporarily stored in a nursery, and transplanted back into the green-space located adjacent to the guideway, upon completion of construction. The Concessionaire will be responsible for front-end road diversions and relocations and will, therefore, be required to coordinate salvage operations with COR, so that as much of the landscaped material as possible can be reused on the project, if COR chooses to do so. This position is reflected in *Appendix E* to this Assessment Report.

As a point of clarification, RAVCo informed COR in their letter March 9, 2005 that, as part of the project scope change approved by the TransLink Board, road restoration work, including landscaping, will be the responsibility of TransLink/City of Richmond, under the Major Road Network Program. The COR's interest in ensuring that there is no net loss in infrastructure investment along No. 3 Road and in particular, that the trees along No. 3 Road be managed in such a way to ensure that they can be re-planted effectively, is recognized in the project's EA review. This position is also reflected in *Appendix E* to this Assessment Report.

A considerable number of public comments focussed on the health of the Cambie Heritage Boulevard during construction of the cut-and-cover sections. The public open houses addressed many of these concerns and the proponent also provided further project construction details to the Cambie Heritage Boulevard Conservation Society. RAVCo received some verbal support for the change in the tunnel alignment along the boulevard, and the Society expects that the proponent and the Concessionaire will apply measures for maximum protection of the boulevard trees.

RAVCO committed to undertake a study of trees impacted by the RAVP alignment and to identify the trees to be removed and/or temporarily relocated throughout the RAV P corridor. This information is available in a letter to TC and EAO dated March 30, 2005.

³² Table 2.2 of the Application also defined proposed construction methodology along defined alignment sections for the Selected Project.

During detailed project design, it is recommended that suitable site trees be considered for retention and/or replacement. The specifications for replacement must take into account appropriate tree species, sizes and soil and site conditions capable of supporting the planted trees to maturity. Regardless of any defined future land use changes within the Cambie Heritage Boulevard, soil condition improvements will be necessary to reverse the ongoing decline of some trees and to address the limited ability of existing soils to support the establishment of replacement trees. Similar measures must also be implemented in Richmond and on Sea Island under VIAA guidance. This approach will be further discussed with the COV, the COR and the VIAA.

Although not included in the project review under federal and provincial EA legislation, the review also acknowledged the Cambie Street Corridor Statement of Significance³³. RAVCo, at the request of, and in consultation with, the City of Vancouver, commissioned an assessment of the heritage value and character-defining elements that apply to the Cambie Heritage Boulevard, along with a Statement of Significance. The report concludes that the corridor is significant as an urban planning concept, realized over a period of time, and modified according to changing conditions. In addition to the importance of the corridor as a planning concept, there are contributing factors such as the adjacent plantings on the side boulevards. The corridor is important as one of the main variations in the regular street grid and pattern seen throughout the rest of the city. Although there is an overall value that can be assigned to the corridor, the relative value along its length varies. Some portions of the corridor may be considered to have greater Heritage, Landscape and Urban Design value than other portions.

5.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, the RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner's Commitments and Assurances* as listed in *Appendix E* to this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse effects on the arboricultural environment in the alignment corridor.

³³ *Cambie Street Corridor. Analysis, Assessment and Statement of Significance*. Richmond-Airport-Vancouver Rapid Transit Project. Donald Luxton & Associates and PWL Partnership Landscape Architects Inc., March 2005.

6. Socio-economic/Socio-community Assessment

6.1 GENERAL

Approximately 107,600 people reside within one kilometre of the RAVP corridor, including 28,500 in downtown Vancouver; 51,070 in Vancouver along Cambie Street; 27,265 in Richmond; and some 750 residents on Sea Island. The proponent has therefore recognized that the Project required a comprehensive socio-economic/socio-community impacts assessment. Once operational, RAVP will provide these residents with increased accessibility through a faster and more reliable transit service.

The key review material, pertaining to this sector's issues and review discussions, is covered in the following sections of the Application:

- 2.1 Project Need and Context
- 2.3 Project Description
- 3 Project Setting
- 4 Consultation and Communication
- 9 Socio-Economic/Socio-Community Assessment
- 11.4 Evaluation of Air Quality Impacts of Proposed Project
- 12.4 Potential Areas of Noise Impacts
- 14.5 Results of Historical and Heritage Assessment
- 16.4 Analysis of Potential Cumulative Effects Associated with the RAV Project
- 20 Construction EMP Outline and Component Plan Guidelines

Section 7.2.3 of the Application Supplement provides updated review material on socio-community effects. This additional material was required following the further definition and description of the Selected Project and its impact. The Application section 9 covered the Reference Project and its assessed impacts.

6.2 BACKGROUND INFORMATION

The socio-economic/socio-community impact assessment, conducted with reference to the proposed RAVP corridor, included an analysis of the types of socio-economic trade-offs that may be involved with various vertical alignment and rail technology options. While considering relevant aspects of the conceptual design and required performance standards, the assessment involved a detailed socio-economic/socio-community analysis that addressed the types of positive and negative tradeoffs typically associated with various vertical alignment and technology options of a rail rapid transit system located in a dense, highly altered, and rapidly changing urban environment. The analysis acknowledged that details of the vertical alignment, technology and systems, as well as work site requirements, would not be finalized until a Concessionaire had been selected and advanced the rail design.

Rather than duplicate earlier analyses that examined project costs and benefits, the intent of the assessment was to determine the expected socio-economic/socio-community impacts. Based on existing baseline information, the study identified the general categories and relative magnitudes of expected impacts. This information will be useful during the development of mitigation strategies for any perceived negative impacts.

The assessment acknowledged that the RAVP is a large scale construction project that will occur in a highly built up urban environment. In keeping with the scale of the project and its anticipated regional transportation benefits and planning objective achievements, it will have some significant negative community, social and economic impacts. Many of these potential negative impacts, however, appear to have been considered and mitigated during routing and selection of the

baseline system and vertical alignment, leaving a substantial positive balance of socio-community impacts.

Although the project will impose several types of socio-economic costs on adjacent communities, residents, businesses and property owners, in most cases, the proponent has assessed these costs to be modest, temporary and directly related to the effects of project construction. Moreover, many of those experiencing temporary negative influences from the project will also experience counterbalancing benefits in the final outcome.

Overall, the socio-economic/socio-community assessment concludes that RAVP will have significant positive impacts under any reasonable set of weighting assumptions. Significant and detailed impact assessment material is contained in Chapter 9 of the Application (114 pages).

In Section 7.2.3 of the Application Supplement, the proponent provides an assessment of any required amendment to the analyses and conclusions provided in Section 9 of the Application. According to RAVCo, the Selected Project, as described in SNC-Lavalin/SERCO's Base Case Proposal, is generally consistent with the 'Alternative B' examined in the Section 9 of the Application. The proposal and associated scope amendments deviate from 'Alternative B' with regard to tunnel construction methods along Cambie Street and in a portion of downtown Vancouver and with regard to the number of RAVP stations planned for Richmond. The Application Supplement also provides greater detail on the vertical and horizontal alignment of the Selected Project for the RAVP line within the corridor examined for the socio-economic/socio-community impact assessment.

The most notable impacts associated with differences between 'Alternative B' described in the Application and the Selected Project include:

- an increase in construction-related disturbance along Cambie Street and in downtown Vancouver; and,
- a decrease in construction and operations disturbance along No. 3 Road south of Westminster Highway.

According to RAVCo, the conclusions reached in the initial assessment, as described in Section 9 of the Application, remain valid for the Selected Project.

6.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

6.3.1 Description and Summary of Impacts for Socio-economic Indicators

The working groups addressed the park-and-ride (P&R) congestion. Under negative influences for property value impacts (i.e. residential, office, etc.), such congestion will be a major concern. Issues raised included: how many P&Rs are planned along the route; have additional property areas been set aside for possible acquisition if the competition, between residents and commuters, for parking becomes intense; can the "parking permit" system be enough to alleviate parking congestion.

According to RAVCo, the major demand for P&R facilities will likely be in Richmond, prior to the Fraser River crossing traffic congestion points identified in the socio-economic impact assessment, thus, a major facility is planned at Bridgeport Station to address this issue. While the project could lead to some additional P&R demand in South Cambie, any street-side parking congestion could likely be managed with permit parking or other regulations the City has available to control non-local parking in residential neighbourhoods. There are currently many areas of controlled parking around destination points near Cambie Street that are expected to deal with parking congestion such as Vancouver General Hospital, the Children's and Women's Health Centre of BC and Vancouver City Hall.

The Squamish Nation raised concerns with the Multi Attribute Impact Analysis included in the Application and the weightings assigned to negative and positive socio-community effects. In their letter to the Squamish Nation of March 16, 2005, RAVCo concluded that although other comparative models are available, the Trade Off analysis and associated Social Impact Index selected for the RAVP EA and the sensitivity analysis carried out by RAVCo's consultants, would support the conclusion in Table 9.12 of the Application that indicates that the overall index for the weighting scenario remains slightly positive. This conclusion is also supported by MSBED.

6.3.2 Second Avenue Station and Cut-and-Cover Construction along Cambie Street

At a TransLink Board meeting on February 16, 2005, it was decided to advance the construction of the 2nd Avenue station. This station was listed in all project review material as a "future station". The rationale for advancing the construction of this station is to take advantage of the excavation and construction of the twin-bored tunnel portal already planned at this location and the excavation and construction of the northern end of the Cambie Street cut-and-cover tunnel section. A number of public comments raised the issue that this station had not been adequately assessed in the EA review. However, all future stations, as defined in the Reference Project were included in the impact assessments carried out for the RAVP and the regulatory agencies and the COV were satisfied that the impacts have been satisfactorily addressed.

The majority of public comments focussed on the cut-and-cover construction methodology, its perceived negative effects and the attempts by RAVCo (according to the public) to "hide" the change in construction methodology from a twin-bored tunnel to a cut-and-cover tunnel from 2nd Avenue to 37th Avenue, ultimately all the way to 63rd Avenue. On the latter issue, it is acknowledged that cut-and-cover tunnel construction along Cambie Street was included as an option in the BAFO bid documents in September 2004.

The two consortia involved in the BAFO bidding process were given the opportunity to suggest the most technically and economically feasible project, including tunnelling options. The working groups and the public had access to the Cambie Street cut-and-cover construction details with the posting of the Application and Application Supplement on EAO's website mid December 2004 and therefore at least three weeks ahead of the start of the public comment period on January 10, 2005.

The proponent has responded to the public on their issues associated with the Cambie Street cut-and-cover tunnelling methodology. RAVCo is committed to, and will have the Concessionaire committing to further public consultation before and during construction. The proposal of a RAVCo/Concessionaire Community and Business Liaison Committee is further discussed in section 6.3.8 below.

Members of the working groups having a regulatory role are satisfied that the proposed mitigation measures reflected in *Appendix E* of this report and compliance with COV by-laws and regulations will not create significant adverse socio-economic/socio-community effects.

6.3.3 Public Health Effects

Many public comments focussed on the public health effects of RAVP, especially during the extended construction period. These concerns focused on toxic material releases from contaminated sites; noise impacts, air pollution; increased traffic; and annoyance. The Application covered public health impact assessments and the relevant issues are covered in the biophysical and socio-economic/socio-community chapters of the Application and the Application

Supplement. The review of public health aspects within the given sectors is covered in separate topic chapters of PART B of this Assessment Report. RAVCo responded to the public health issues raised, as demonstrated in Appendix D to this Assessment Report. It was also stressed during the EA review, and stated by the proponent, that any contaminated site project impact issues are covered under a strict regulatory process in British Columbia.

6.3.4 Cambie Street Commerce and Merchants' Concerns

Many shop owners and Cambie Street merchants raised concerns over connectivity and loss of business during the cut-and-cover operation. RAVCo presented the project and this tunnelling technology to a public open house at the Plaza 500 Hotel, at 12th and Cambie, on January 31, 2005. This information event was well attended by Cambie Street merchants and residents, with over 250 in attendance. RAVCo subsequently received a letter from the Cambie Street Merchant Association³⁴ expressing their appreciation for the technical issue clarification at the meeting.

The working group acknowledges the unavoidable impacts and connectivity problems along the commercial sections of Cambie Street. However, the mitigation measures contained in *Appendix E* to this report and the traffic management planning the Concessionaire, in consultation with the COV, will undertake, would positively influence the negative impacts. On balance, the project will not result in any significant worsening of construction impacts frequently encountered in a city environment and busy transportation corridor. Further consultation measures are discussed in section 6.3.8 below. The Do RAV Right Coalition's request for a three-week timeline extension to the public comment period and their subsequent Petition to the Supreme Court of BC are discussed in section 3 of PART A of this Assessment Report.

6.3.5 Public Safety

Without proper consideration to policing and safety matters, public safety will continue to be a concern at the RAVP stations. While the Application focuses more on public safety matters associated with the new transit system versus existing transit modes and motor vehicle use, there is minimal discussion about how to improve community safety at the stations or their vicinity.

Given the experiences with crime and drug occurrences in some of the existing SkyTrain stations (i.e. most notably Commercial Drive, Columbia Street (New Westminster) and the Surrey stations), there needs to be continued coordination, discussion and effort involving the RCMP/Vancouver Police/Translink Police, the business community and the public to ensure that the stations and vicinity remain relatively safe. The COR raised safety and security issues at the proposed Bridgeport Station.

RAVCo has discussed safety issues with the Concessionaire and their approach to design of the RAVP stations, including application of Crime Prevention through Environmental Design (CPTED) principles in station layout and architecture, is outlined in section 4.4.3 of the Application Supplement. Also as described in the Application Supplement, during project design, the Concessionaire will implement a Community Partnership approach that will involve discussions with municipal government representatives, as well as the public, to seek consensus regarding specific aspects of station design.

For the Bridgeport Station, the Socio-Economic/Socio-Community Assessment referred to potential safety and security concerns at the park-and-ride facility (i.e., potential for car-related theft/vandalism), based on experience at the Scott Road park-and-ride facility which serves the Expo Line's King George Station RAVCo anticipates that, in order to maximize the use of the Bridgeport park-and-ride facility and, in doing so, promote RAV line ridership, the Concessionaire will incorporate features into the design of this facility that effectively address public concerns regarding safety and security. This type of approach was recently and successfully been adopted for the Millennium Line and is supported by the working groups for the RAVP review. The public will have further input to station design issues during the next design phase public consultation events in September 2005.

³⁴ Letter from Stephen Kwok to Jane Bird of RAVCo dated February 2, 2005.

6.3.6 Vehicle and Pedestrian Mobility

This is an issue frequently raised by the public relating to the cut-and-cover tunnelling construction at Cambie Street and down-town Vancouver (see other sections of this Assessment Report). The COR also suggested that with the elevated alignment in Richmond, special design considerations need to be met to ensure that Richmond downtown and retail areas result in improvements in vehicle and pedestrian mobility. These considerations should not just focus on pedestrian entry/egress to RAVP, but also consider how further enhancements can be made to station areas and community links away from the stations. The working groups agreed that these issues should be consulted on during final design of the project.

6.3.7 Burkeville Residential Community

The Vancouver International Airport Authority (VIAA) suggested that the Burkeville residential community on Sea Island may be affected in terms of visual impacts as well as by noise, dust and vibration during construction.

RAVCo responded that the heritage status of Burkeville is described in Section 14.5.2.3 of the Application, which also notes that the community is located well south of the proposed RAVP alignment, is surrounded by airport operations and commercial developments and is bordered by Miller Road and Russ Baker Way. The northern boundary of Burkeville is located approximately 235 m from Grant Mc Conachie Way, an existing six-lane roadway along the north side of which will run the RAVP line. Given this distance, as well as the community's relative proximity to other significant sources of visual, noise, dust and vibration impacts³⁵, it is highly unlikely that RAVP line construction will measurably affect the community of Burkeville, beyond the day to day impacts that the Burkeville community already experiences.

6.3.8 Construction Issues and Economic Development. Community, Business and First Nations Liaison

RAVCo has been provided a mandate by the Funding Agencies to implement the project as it was approved in December 2004, including on schedule and within the budget. Within these constraints, RAVCo has committed to minimizing disruption and maximizing predictability for corridor residents, adjacent businesses and commuters wherever possible.

Wherever disruption cannot be avoided, RAVCo and its partners have committed to minimize the disruption and to provide corridor residents, adjacent businesses and commuters with regular, advance notice of construction activities and traffic diversions. RAVCo will also respond to inquiries, concerns or complaints from the public at large in a timely manner.

RAVCo's community liaison activities will be closely coordinated with those of its municipal and Concessionaire partners and be driven by project activities during each of the pre-construction, construction and post-construction phases to ensure that liaison and notification programs are customized to address the nature and timing of particular impacts.

A specific and important subset of the community liaison program will be the business liaison program. According to RAVCo, the first objective is to understand and record the needs of the diverse businesses along the corridor. Information collected from initial information sessions will lead to the creation of a detailed and customized business liaison program aimed at minimizing construction-related disruptions to adjacent businesses.

The profile of the RAVP line, and the disruption associated with construction, differs at various places and at various points in time along the route. For example, while much of the guideway and stations in Vancouver will be built underground, construction methods differ along the length

³⁵ Including the airport runways, parking lots, and commercial and air cargo facilities, including the new WestJet facility, as well as the highway and cloverleaf system that provides vehicle access between Richmond and Vancouver, and to the south terminal and the main terminal complex.

of the line. In Richmond, the guideway and stations are being built above ground. Given this differential impact, liaison and notification activities will be customized to reflect the particular nature of the construction program and schedule for various particular “segments” along the line.

In addition to customizing liaison activities by geographic segment, it will be important to design a program that recognizes the particular issues of different groups or “constituencies” within or across geographic segments. For example, RAVCo and its partners will need to customize liaison activities to address the concerns of businesses adjacent to the line. A number of activities have begun, such as visits to individual businesses to begin a direct dialogue about interests and concerns. While this activity continues, RAVCo is also meeting with business associations. These initial meetings will help RAVCo determine appropriate methods of involving and informing business stakeholders and provide feedback and questions that will guide the next steps in the development of this business liaison program.

RAVCo has confirmed to the working groups and EAO that they are actively working with its partners to fully develop the community liaison plan, but anticipates that the primary focus of information and liaison activities prior to and throughout the construction period will be:

1. Careful Coordination of Programs, Resources and Information
2. Emphasis on E-Notification
3. Emphasis on Traffic Access and Diversion Reporting
4. Construction Signage and Advertising program
5. Mobile Information and Learning Tools

Most of the First Nations providing EA review comments, stressed the need for a fair share of economic developments associated with RAVP. The Squamish Nation noted that over the years they have been marginalized and prevented from meaningful involvement in the economic development within their traditional territory. In response, they seek to gain employment and economic benefits from the project. This position was also stressed by the Tsleil-Waututh First Nations. The project review established that there is a process in place for such participation and defined in the “Owner’s Commitments and Assurances” included as *Appendix E* to this Assessment Report. It is stated that RAVCo and their Concessionaire have committed to engaging First Nations in discussions regarding ways to provide contracting, employment, training and apprenticeship opportunities on the project.

6.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, the RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner’s Commitments and Assurances* as listed in *Appendix E* to this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse socio-economic/socio-community effects.

7. Contaminated Sites Assessment

7.1 GENERAL

The purpose of the screening level contaminated sites assessment for the project was to evaluate the risk of encountering soil and groundwater contamination along the proposed RAVP corridor. Risk rankings (low, moderate and high) were assigned to sections of the project corridor.

The key review material, pertaining to EA issues and review discussions, is covered in the following sections of the Application:

- 2.3 Project Description
- 2.9 Construction Scheduling and Sequencing
- 3 Project Setting
- 10 Screening Level Contaminated Sites Assessment
- 14.5 Results of Historical and Heritage Assessment
- 20 Construction EMP Outline and Component Plan Guidelines

The Application Supplement addressed site contamination in section 7 and concluded that the findings described in section 10 of the Application continue to accurately reflect the potential impacts associated with the Selected Project.

7.2 BACKGROUND INFORMATION

The overall objective of the screening level contaminated sites assessment was to provide a useful planning tool for multiple users working on the project. Specific objectives of the assessment include:

- To rank areas or sites with high, moderate or low risks of contamination;
- To identify contaminant parameters of concern; and,
- To determine the need for mitigation prior to and during construction.

The risk rankings assigned to each site were assessed and those assigned to sections of the transit corridor serve as findings. In general, the three areas of the corridor were classified by the proponent as follows:

- Downtown Vancouver – there is a moderate risk of encountering contaminants at surface along most of this section of the corridor, with six high risk areas³⁶;
- Vancouver South – there is a low risk of encountering contaminants at the surface along large sections of this portion of the corridor; however, there are several dispersed zones of moderate and high risk sites along False Creek, the Fraser River and major intersections³⁷; and,
- Richmond – there is a low to moderate risk of encountering contamination at the surface with five localized high risk areas³⁸.

These findings and the assigned risks are consistent with what would be expected of virtually any alignment from Downtown Vancouver to Richmond. Environmental risks at crossings along False Creek and the Fraser River are to be expected due to extensive historical industrial and high risk

³⁶ See Application Table 10.4

³⁷ See Application Table 10.5

³⁸ See Application Table 10.6

commercial use of these areas.

The proponent concludes that while it is likely that some contamination will need to be managed, none of the identified sites are especially large or likely to be problematic. Where site-specific work is planned in moderate or high risk areas or where property transaction negotiations require more detailed assessment of contaminant risk, more comprehensive environmental assessments or soil/groundwater investigation may be necessary.

Once the detailed design configuration is determined, a contaminated soil/water management plan should be prepared by the Concessionaire³⁹ for areas where contamination is likely. Soil management options could include *in situ* management or segregation and off-site disposal. Water treatment and disposal under permit may be required to address construction dewatering. These measures are reflected in the proposed conditions for project certification, as discussed in PART C of this report.

7.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

The working group took notice of public concerns raised during the public comment period (see PART A, section 3.4 of this report), pertaining to public health issues as a consequence of perceived release of toxic material during construction. Such public concerns were mostly focused on the cut-and-cover sections along Cambie Street, but were also raised as an impact issue for the twin-bored tunnel and transport of excavated material.

The Screening Level Assessment identifies and categorizes potentially contaminated sites along the proposed alignment of the RAVP line as having high, moderate or low risk. It is noted by EC that three of the sites identified in Table 10.3 of the Application (WLAP Contaminated Sites Registry – Richmond) are located on Sea Island and were not discussed in Section 10.3.9.2 of the Application. According to EC, VIAA staff would not have commented on the three referenced sites, as although they are on Sea Island, they are not on VIAA leased land. The proponent should consider any site investigation or remediation information pertaining to these sites and revise their assessment of risk if any changes to their analyses are warranted.

RAVCo informed the working group that the properties referred to above were considered during research conducted for the project Screening Level Contaminated Sites Assessment, but were not further examined because it is unlikely that these areas will be affected during construction of the RAVP line. This assumption was based on the fact that the VIAA Environmental Department would probably be better placed to provide information regarding risk sites on airport property than may be available through the normal avenues. RAVCo and/or the Concessionaire will consult further with VIAA on this issue to ensure that any site contamination issues applicable to the project on Sea Island are addressed.

The working group has studied the review material presented in section 10 of the Application. It is to be expected that some contaminated sites will be encountered within the RAVP corridor during construction. However, there are stringent permitting measures associated with the removal of contaminated soil and other excavated material, complying with the "Contaminated Sites Regulation", BC Reg 375/96 and the "Hazardous Waste Regulation", BC Reg 63/88 under the British Columbia *Environmental Management Act*, SBC 2003, ch. 53. RAVCo must ensure that the Concessionaire complies with all relevant permit requirements as well as conditions of project certification under the Act.

As RAVCO acquires fee simple properties needed for the right-of-way, operations and maintenance centre, stations, and pre-cast yard, Stage 1 and, where appropriate, Stage 2 investigations are being undertaken, If and when necessary, further Stage 1 or Stage 2

³⁹ An outline EMP is included in section 20.4 of the Application, as requested in the Application ATOR.

investigation and site remediation will be conducted by RAVCo and the Concessionaire in accordance with applicable legislation and regulations.

7.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, the RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner's Commitments and Assurances* as listed in *Appendix E* enclosed this report, the EAO and the RAs are satisfied that the RAVP will not result in significant contaminated site effects and impact issues.

8. Air Quality Assessment

8.1 GENERAL

Current air quality in the Lower Fraser Valley, potential impacts of the RAVP on local and regional air quality, and greenhouse gas (GHG) emissions are reviewed in the Application. In addition, measures for mitigating common air contaminant emissions during the project construction and operation are outlined.

The key review material, pertaining to EA issues and review discussions, is covered in the following sections of the Application:

- 2.2 Project Description
- 2.9 Construction Scheduling and Sequencing
- 3 Project Setting
- 11 Air Quality Assessment
- 16.4 Analysis of Potential Cumulative Effects Associated with RAVP
- 20 Construction EMP Outline and Component Plan Guidelines

In the Application Supplement, section 7.2.4 describes amendments to the Application section 11 material

8.2 BACKGROUND INFORMATION

8.2.1 RAVP Impacts on Local Air Quality

According to the proponent, the principal air quality impacts of the project are expected to occur in the immediate vicinity of the transportation corridor through which the proposed rail rapid transit line will run, namely the Cambie Street corridor, starting at the downtown Vancouver waterfront. During the construction phase, the potential exists for short-term air quality impacts along this corridor.

The two major sources of emissions possible from the RAVP development are dust emissions from non-combustion sources and exhaust emissions from construction vehicles and stationary combustion sources. Although the potential for localized air quality impacts of these activities may be significant, the proponent stresses that they will be temporary and localized.

Taking into account the emissions from electrical power generation, the proponent expects that RAVP operation will reduce emissions overall by between 168 and 235 tonnes per year of common air contaminants in 2010, and between 33 and 40 tonnes per year in 2025. These reductions arise from the expected displacement of both diesel buses and private vehicles. Reductions in fine particulate matter and oxides of nitrogen are expected to be particularly significant on the local scale, especially along the Cambie Street corridor.

8.2.2 RAVP Impacts on Greenhouse Gas (GHG) Emissions

Due to the displacement removal of diesel buses on Granville south of False Creek and along Seymour and Howe in the downtown and the reduction in the level of increase in automobiles due to RAVP ridership, the proponent expects significant amounts of GHG emissions will be avoided during the operational phase of the project. These reductions are expected to far outweigh any short-term, temporary increase of GHG emissions during the construction phase. During the construction phase, direct and indirect GHG emissions are expected to be consistent with those of other urban projects of this scale. The direct major source of GHG emissions is expected to be fossil-fuelled construction equipment.

During RAVP line operation, reductions of between 16 and 21 kilo tonnes of carbon dioxide- (CO₂) equivalent GHG emissions per year by 2021 are expected by the proponent and noted in the Application. These numbers take into account the anticipated increase in GHG emissions from electrical power generation to supply the energy demand of the RAVP line.

8.2.3 RAVP Impacts on Regional Air Quality

According to the proponent, RAVP will reduce air pollutant emissions in the Lower Fraser Valley through the displacement of diesel buses and the reduction in use of personal vehicles. The only significant source of emissions attributable to RAVP operation will be electricity generation. This reduction of regional air emissions will, according to the proponent, contribute to modest improvements in air quality, with corresponding reductions in health impacts throughout the region. Like other mass transit projects, the RAVP will provide an alternative to the use of private motor vehicles.

8.2.4 Mitigation of Air Quality Impacts and GHG Emissions During Construction

This assessment, included in section 11.5.2 of the Application, recommends best management practices to be adopted during construction to minimize dust and combustion exhaust emissions. Significant recommendations include the use of electrically-powered equipment rather than gas- or diesel-powered equipment, wherever possible, including the anticipated tunnel boring machines.

These best practice recommendations have been applied in similar projects in Vancouver (e.g., Millennium Line SkyTrain extension) and other recent large-scale infrastructure construction projects in British Columbia, as requirements for contractors, typically as defined in environmental specifications released with requests for proposals. This will be the approach taken by the proponent on the project.

8.2.5 Modification to Air Quality Assessment with Selected Project

In the Application Supplement, section 7.2.4 includes an analysis of changes and potential modification to the air quality impact assessment included in the Application for the Reference Project as a result of the BAFO process and the advancement of the Selected Project.

RAVCo concludes, in section 7.2.4.3 of the Application Supplement that since the Selected Project will be associated with more at-surface construction work than the Reference Project would have been, it will result in a greater incidence of temporary and localized impacts to air quality due to dust and exhaust emissions. Measures to reduce these impacts, according to the proponent, will be described in the Air Quality and Dust Control Plan as part of the project's EMP. RAVCo also concluded that there will be no difference in air quality impacts during operation between the Reference Project and the Selected Project.

8.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

The working group raised the issue of localized air quality impacts due to the expected increase in vehicle-related pollution originating from construction induced slowing of traffic. RAVCo referenced the discussion on page 11-21 of the Application to indicate that there is insufficient information available regarding construction activities in the Lower Mainland to be able to quantitatively estimate emissions due to construction. Furthermore, changes to traffic patterns due to construction are as yet unknown, will be influenced by municipal traffic management plans and may alter continually during the duration of project construction. Nonetheless, one can anticipate that increased traffic congestion may result in temporary and localized air quality impacts.

The COV commented that the reductions in particulate matter will be most noticeable on the Granville Street corridor as it will be the express diesel buses on Granville that will be replaced with RAVP. As well, a local electric trolley bus will remain even with RAVP.

In their comments on the Application to EAO on January 5, 2005, HC referred to the Application coverage of ozone and particulate matter (PM) and the reference to potential public health risks. In their response RAVCo referred to a British Columbia Lung Association (BCLA) report⁴⁰ (quoted on page 11-7 of the Application), summarizing the results from recent scientific studies indicating that health impacts from air pollution can occur at levels below ambient air quality objectives and standards. Such conclusions and the reference to risk management are also covered in other studies referenced in the BCLA report⁴¹. These issues continue to receive extensive study within British Columbia and RAVCo will, wherever appropriate and within the context of applicability to the RAVP, adhere to the regulatory structure currently in place.

A number of public comments focused on the use of construction machinery and equipment in the Vancouver Lower Mainland (VLM) and the impact on air quality. EC also raised this issue and the Application statement (section 11.4.1.1) that construction equipment will likely be sourced from other parts of the VLM and that consequently there should be no net increase in regional air quality impacts. EC suggested, however, that emissions and associated regional air quality effects from the use of RAVP construction equipment should be directly attributed to the project. In addition, there are a large number of other large construction projects planned for the Vancouver Lower Mainland at the same time as the RAV Project, thus, construction equipment availability may not be as accessible as predicted.

RAVCo responded that it is not possible to determine if other projects will be shelved or delayed as a result of construction equipment being deployed for use on the project. However, unlike large natural resource projects that may be located in remote areas of British Columbia that have not yet been accessed, where the equipment deployed to those sites may be used specifically and exclusively for that site, the project is contained within existing transportation corridors in a dense, highly impacted urban setting that supports a population of over 2.5 million people. As a result, it is highly likely that any construction equipment used by the contractors for RAVP will be sourced from elsewhere in the VLM and moved to the RAVP sites. The decision of whether or not to use new or additional equipment for RAVP is strictly the responsibility of the contractors and will be governed by market forces. Thus, it is difficult, if not impossible, to predict whether existing or new construction equipment will be employed.

RAVCo also stated that they believe that there will be an overall net increase in construction activity within the air shed. However, RAVCo does not believe that a quantifiable, useful or valuable association can be drawn between construction activity and vehicle emissions within the Lower Fraser Valley air shed. RAVCo is prepared to accept that this correlation may be a possibility. The project is predicted to reduce net GHG emissions within the regional air-shed by roughly 14,000 tonnes/per year. Given that the largest single contributor to GHG emissions in British Columbia is from gasoline and diesel powered vehicles, and most of this occurs within the Lower Mainland Region, this is a significant contribution to improving local air quality.

EC also questioned the emission reductions described in the Application as a result of future displacement of vehicles and the transfer of ridership to RAVP. It was suggested that an uncertainty analysis would be beneficial for addressing the sensitivity of the results of the various assumptions made in the Application. In their response to EC on February 11, 2005, RAVCo concluded that such an analysis would not alter the main conclusion of the air quality impact

⁴⁰ Bates, David V., Jane Koenig, Michael Brauer, and Robert Caton, 2003. Health and Air Quality 2002 – Phase 1: Methods for Estimating and Applying Relationships between Air Pollution and Health Effects. Prepared for the British Columbia Lung Association.

⁴¹ RWDI West Inc. 2003. Clean Air Issues in British Columbia. Waste Management Act Review Discussion Paper. Prepared for the Ministry of Water, Land and Air Protection. Thomson, Bruce. 2004. Characterization of the Georgia Basin/Puget Sound Airshed. Pacific and Yukon Region, Environment Canada. Co-published by the United States Environmental Protection Agency.

assessment. According to RAVCo the purpose of the emissions calculations in the air quality assessment was to determine whether or not construction of the project would result in a net benefit in terms of air emission reductions. Due to the type of project design/build/finance/operate//maintain – DBFOM) the assessment was conducted during the planning stages of the project, which is typically when most of the technical environmental assessment studies are conducted. Therefore, the study was based on numerous assumptions, and the resultant emission estimates are general values. In their referenced response letter to EC RAVCo discusses some of the uncertainty associated with the assumptions included in the Application material. There is not sufficient information to conduct a detailed, quantitative uncertainty analysis.

GVRD suggested that appropriate definition of Best Management Practice (BMP) pertaining to air quality mitigation measures should defined in the *Owner's Commitments and Assurances*. This was subsequently agreed to as defined by GVRD in their letter to RAVCo of March 22, 2005 and confirmed by RAVCo's letter response to GVRD on March 23, 2005.

8.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner's Commitments and Assurances* as listed in *Appendix E* enclosed this report, the EAO and the RAs are satisfied that the local and regional air quality impacts of RAVP will be adequately mitigated through the actions described in *Appendix E*.

9. Noise Assessment

9.1 GENERAL

Fundamental to the assessment of noise impact on a community is knowledge of the existing noise exposure. The objective of the baseline noise study, presented in section 12 of the Application (VOLUME 2), was to measure the existing ambient conditions at a number of representative sensitive sites along the RAVP corridor and to recommend acceptable levels of noise emissions from the RAVP system, based on the collected data and municipal by-laws.

The key review material, pertaining to EA issues and review discussions, is covered in the following sections of the Application:

- 2.2 Project Description
- 2.9 Construction Scheduling and Sequencing
- 3 Project Setting
- 9.6 Description and Summary of Impacts for Socio-Economic Indicators
- 12 Noise Assessment
- 16.4 Analysis of Potential Cumulative Effects Associated with RAVP
- 20 Construction EMP Outline and Component Plan Guidelines

The Application Supplement addressed the relative changes to the noise impact assessment covered in the Application and presented this material, for the Selected Project, in section 7.2.5 on page 91.

9.2 BACKGROUND INFORMATION

Noise data were collected at 16 sites along the proposed RAVP corridor to document existing conditions at representative locations in the community. The measurements consisted of monitoring noise continuously for 48 hours at a given location and sampling for every second of the measurement. These data provide adequate detail to allow comparison with the range of assessment criteria that may be chosen once a particular and final train technology has been selected.

In addition to noise monitoring results, this section of the Application outlines the noise requirements of by-laws and guidelines in effect in the municipalities and authorities presiding along the corridor. It also outlines the guidelines put forward by the Canadian federal government and the World Health Organization. In addition, the Application section documents a procedure successfully employed in the assessment of noise from Vancouver's SkyTrain Millennium Line and the proponent proposes that the same procedure be adopted for the project.

Working within the existing project parameters (i.e. the Reference Project) and selecting a rapid transit electric train technology, the proponent expects minimal noise impact from the project along much of the corridor. Most of the alignment will either be carried underground or on streets with substantial existing traffic and high existing ambient noise levels. Thus, for most types of electric train technology and for most of the alignment, the additional noise contribution will be "minimal", according to the proponent.

The assessment included in the Application discusses areas where there is the potential for noise impact, depending on the final train technology selected, including noise during construction and operation, noise associated with tunnels and stations, collateral noise effects and noise that may occur due to road alignment changes. It also proposes general mitigation measures that could be considered in situations where the noise impact is determined to be excessive compared to

municipal noise by-laws. Such mitigation measures are summarized in section 19 of the Application.

In the Application Supplement, section 7.2.5, the proponent addressed the relative noise impact issues, comparing the Reference Project and the Selected Project. The increase in the amount of cut-and-cover construction associated with the Selected Project will result in additional short-term (three-to-four months) increases in noise levels as construction progresses along the length of the alignment. The Concessionaire will describe measures to address noise impacts in the Noise Management component of the EMP, as reflected in section 20.4.7 of the Application. This plan, covering the entire alignment, is to be prepared for RAVCo review and approval prior to construction, with regulatory and by-law input from the municipalities of Vancouver and Richmond and the VIAA.

During operation, since more of the RAVP line is underground in the Selected Project than in the Reference Project, noise associated with train pass-bys will be further minimized, according to RAVCo. In addition, the elimination of the Westminster Highway Station in Richmond will reduce noise levels associated with train movements and station operations along this section of No. 3 Road.

9.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

9.3.1 Noise Issues Raised During Review of Application Draft Material

During the working groups' preliminary review of draft Application material in October/November 2004, a number of noise impact issues were raised. Many of the preliminary comments provided were reflected in the Application, as submitted to the EAO for formal review in November 2004 (and accepted for formal review, with condition of a supplement on December 2, 2004). The noise impact issue discussions are reflected in RAVCo's *Responses to Environmental Assessment Certificate Application Agency Pre-screening Comments* December 16, 2004.

The Vancouver Coastal Health Authority (VCHA) expressed concerns due to their experience with the EXPO line noise forecasts and subsequent mitigation. VCHA suggested that the use of Vancouver or Richmond Noise By-law limits for the design of the RAVP line may not be the best approach. It was suggested that reliance on criteria based on 24-hour noise levels will not provide an accurate or complete picture of noise impacts. The most acceptable indicator of operational noise impacts, according to VCHA, would be the comparison of maximum pass-by noise levels at the point of reception (building façade of residential or other sensitive uses) to the ambient noise levels.

In their response to this position, the proponent agreed that comparison with other noise events that occur with a similar frequency and duration at the fringe hours (early morning and late evening) is a reasonable approach. RAVCo reminded VCHA that the reference to the EXPO line noise impact assessments must be seen in the light of later assessment of the Millennium project. The noise impact criteria used on the Millennium line have never been applied to the EXPO line. RAVCo is satisfied that, if these criteria had been applied, they would have identified areas along the EXPO line where the impact was deemed to be significant and where the treatment that was ultimately installed would have been required.

VCHA also suggested that the analysis of the station impacts tends to downplay the potential from (especially at night) station announcements, door signal bells and the characteristic acceleration sound from SkyTrain-type systems. VCHA agrees that the impacts of the "kiss-and-ride" and bus loop arrangements, especially when ambient noise levels drop, need careful study and possible mitigation. In their response to this comment on the draft Application material, RAVCo agreed that station announcements and other signalling noises should be restricted to the platform where they occur. This was identified as a problem on the EXPO line and guidelines for the Millennium line specifically addressed this issue and in a large part were responsible for the greater extent of glazing used on the Millennium station platforms when compared to the EXPO

platforms. For the RAVP line, the majority of the stations are either underground or well away from residential areas (apart from the Marine Drive Station) and with reasonable controls signalling noise should not be an issue.

During the review of draft Application material Health Canada also raised a number of technical issues, resulting in a significant discussion of construction and operational noise and likely public health impacts. Health Canada suggested that for each noise monitoring site, RAVCo should provide annoyance estimates for baseline, construction and project-noise environments in terms of percentage highly annoyed. The suggested reference document was the federal *Highway Noise Guide* (Bly, Sept 2004 DRAFT). These criteria are based on (i) ISO 1996-1:2003, (ii) a 1995 report by HMMH and (iii) U.S. EPA Levels document approach (1974).

In their response, RAVCo suggested that for RAVP it is not appropriate to provide a statement of annoyance estimates for the baseline condition using the ISO 1996 -1:2003 Annex D. Regarding the construction noise environment, RAVCo notes that the ISO standard does not recommend the use for short term environmental sounds such as construction noise, or the short term effects that the construction might have on traffic noise. The ISO standard considers the relationship only applicable to long-term environmental sounds such as the yearly average. RAVCo also questioned the use of “percentage highly annoyed” when quantifying existing conditions in a community. It should also be noted that the VCHA does not agree with the use of the “percentage highly annoyed” approach recommended by Health Canada.

9.3.2 Construction Noise

Public comments focussed on the possible increase in noise level during the cut-and-cover tunnelling along Cambie Street. These concerns, also shared by working group members, centred around actual construction noise (excavation, piling, rigging etc.) and the extra transportation and trucking of excavated material. The extent and duration of construction noise through primarily residential areas (25th Avenue south to 63rd Avenue) introduce combined machinery/equipment noise impacts on the closest residential properties that may require further mitigation measures to reduce these impacts.

RAVCo carried out an assessment of construction machinery noise generation during the project review, responding to construction noise concerns⁴². The report concludes that during the overall project length of two years, traffic will be dramatically reduced on Cambie Street. Thus, for most of the two year period, the noise level exposure to the residences on either side of Cambie Street will drop. When this reduced level is averaged with the relatively brief periods that the noise level will increase due to the proximity of the construction, the overall average level for the two years is lower than the existing noise level on Cambie Street. Calculations show that overall, noise in the community during the two years that traffic will be restricted during construction, will average to an equivalent sound level of 63.2 dBA on the east side of Cambie Street and 65.2 dBA on the west side of Cambie Street, including the noise produced from the typical cut and cover construction. In other words, the average sound level will decrease by 2.7 dBA on the east side of Cambie Street and by 0.7 dBA on the west side of Cambie Street during the two years of construction. RAVCo expects the original level to be restored once construction is completed and the traffic patterns stabilize. The working groups acknowledged this additional review input and had no further concerns.

RAVCo, through the Concessionaire, accepts that, if required by the relevant authorities, a noise monitoring protocol will be developed for these situations, such as for night work, and the affected community will be advised. The Concessionaire recognizes that communication with the public regarding work procedures and proposed schedule changes will be important in maintaining positive community support throughout construction.

⁴² *Richmond Airport Vancouver Project. Cut and Cover Tunnel Construction Noise Assessment.* BKL Consultants Ltd., March 29, 2005

RAVCo now proposes to undertake about 70 percent of the tunnel construction by cut-and-cover construction methodology. While it is understood that noise bylaws will be adhered to during construction, this method of construction will require excavated material to be removed by trucks along a trucking corridor. The additional noise of trucking waste material along traffic corridors is a concern to the public and to the working groups.

Traffic noise related to surplus excavated materials being put to beneficial use (e.g., used as engineering fill on other projects), deposited in an approved landfill, or disposed of at sea under federal disposal at sea permits, will be addressed by having excavated material transported through the Lower Mainland along designated truck routes, or routes otherwise approved by the applicable municipalities and the Concessionaire and its agents, through contractual arrangements with RAVCo. The Proponent must comply with all applicable municipal bylaws and provincial and federal regulations. In addition, the Concessionaire will work with each of the two municipalities (Vancouver and Richmond) develop an acceptable Traffic Management Plan and a Construction Management Plan..

Should disposal at sea be approved by Environment Canada, then the material will be trucked to one of two existing barge facilities in the City of Vancouver. Material removed from the cut-and-cover excavation between SW Marine Drive and Queen Elizabeth Park and destined for disposal at sea would be trucked to a barge facility located in an industrial area on the North Arm of the Fraser River at the foot of Laurel Street. Material removed from the cut-and-cover excavation in downtown Vancouver and along Cambie Street between 2nd Avenue and Queen Elizabeth Park, as well as from the bored tunnel, would be trucked to a barge facility on the south shore of False Creek, immediately east of the Cambie Street Bridge. RAVCo estimates that at the peak of construction, 100 to 150 trucks/day will be involved in the project.

Designated truck routes within the City of Vancouver are described in the City of Vancouver Street and Traffic By-Law No. 2849, Schedule B and include most of the major arterial roads within the project area, including Cambie Street, from SW Marine Drive to Pacific Boulevard and the Cambie Bridge, and Marine Drive from Granville Street to Boundary Road. At present, approximately 200 heavy trucks per day travel along Cambie Street between SW Marine Drive and downtown Vancouver, while approximately 600 trucks per day travel along Southwest Marine Drive. RAVCo estimates that at the peak of construction, 100 to 150 trucks/day will be involved in the project.

As described in section 7.2.5.3 of the Application Supplement, the increase in the amount of cut-and-cover construction associated with the Selected Project will result in additional short-term increases in noise levels as construction progresses along the length of the alignment. The additional truck traffic associated with RAVP cut-and-cover construction will also result in an incremental increase in daytime noise levels associated with truck pass-bys along the Cambie Street corridor. As noted above, the Concessionaire will be required to comply with the City of Vancouver traffic bylaws and will prepare a Traffic Management Plan describing measures to be used to mitigate trucking impacts, and a Construction Management Plan describing methods of excavation and material hauling. The Concessionaire will describe measures to address noise impacts associated with heavy truck traffic in its Noise Management component of the Environmental Management Plan (EMP) to be prepared for RAVCo review and approval prior to construction. The development of mitigation measures and compliance with regulations and municipal by-laws are reflected in this Assessment Report, to the satisfaction of the regulatory agencies.

9.3.3 Operational Noise

In their conclusion from assessing the noise impacts of the Selected Project⁴³, RAVCo writes that “no significant noise impacts are anticipated as a result of construction or operation of the Selected Project proposed by the Concessionaire.

The proponent provided further responses to Health Canada on February 8, 2004 reiterating the point that most of the alignment will either be carried underground or on streets with “significant existing traffic and high existing ambient noise levels”. Thus, for most types of electric train technology and for most of the alignment, the additional noise contribution will be “minimal” or indistinguishable from background noise.

RAVCo further concluded that (i) because the study and impact area is primarily industrial, commercial or on airport lands, there is negligible potential for operations noise impact south of Kent Street; (ii) because the alignment is underground, in either a cut-and-cover or bored configuration, there is negligible potential for operational noise impacts to occur north of 63rd Street; (iii) because the alignment runs through a heavily traveled main city artery at the intersection of Marine Drive and Cambie Street, there is minimal potential for additional operations noise impacts to occur in the vicinity of this location; and (iv) there is an identified potential for operational noise impact on Cambie Street immediately south of Marine Drive on the west side.

This last conclusion was questioned by the review team and technical agencies, as the proposed alignment is in close proximity to residential areas close to Marine Drive⁴⁴, in the section leaving the tunnel and entering the elevated gateway and crossing the Fraser River. RAVCo provided a detailed analysis of Study Site #6⁴⁵, detailing the positioning of the noise monitoring equipment and the recordings of ambient noise levels. Based on SkyTrain technology, the rapid transit system will produce a 24 hour average sound level at the residence of 54.1 dBA, which when combined with the existing ambient level will result in an overall increase of 0.8 dBA. However, it will produce a typical maximum pass-by noise level of 72.7 dBA at the exposed facade of the referenced monitoring residence. This level is up to 12 dBA above the night time L1 levels. Subjectively, based on the maximum pass-by levels, the noise impact may be determined to be “significant” and RAVCo has proposed the installation of noise barrier at the south side of Marine Drive Station. Such measures will also address concerns raised by the VCHA associated with station-related noise sources. The VCHA also requested that RAVCo further evaluate and address noise impacts on the basis of signal to noise ratio for residential properties along the alignment for this portion of the alignment through South Vancouver and Richmond, up to and including mitigation measures to negate any noise levels exceeding the night-time criteria proposed by the proponent’s noise consultant⁴⁶.

RAVCo and the Concessionaire will be required to mitigate any noise impacts associated with operations. In addition, regulatory project requirements will stipulate adherence to any City of Vancouver or City of Richmond noise bylaws at all times and all locations on the alignment. Fixed facilities, such as tunnel ventilation shafts and other applicable stationary facilities must also meet Municipal noise bylaw requirements. Commitments, Assurances and Responsibilities applicable to noise impacts are further outlined in Section 21 of the Application. In order to comply with noise level criteria set by City of Vancouver and City of Richmond bylaws, RAVCo and the Concessionaire will be required to evaluate noise levels associated with RAVP line operation and, in the event that these criteria are exceeded, to take appropriate mitigation measures. It is anticipated that the focus of these efforts will be along portions of the alignment that run through

⁴³ Application Supplement, section 7.2.5.3 – page 93.

⁴⁴ Units 8453 and 8457 of Cambie Street.

⁴⁵ Posted on EAO’s project website on February 14, 2005.

⁴⁶ See Application Supplement section 7.2.5.

existing residential areas. As described in the Application Supplement, section 4.4.6.1, ambient noise sensing will be used to help control noise levels in open air, above-ground stations.

9.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner's Commitments and Assurances* as listed in *Appendix E* to this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse noise effects in the vicinity of the RAVP corridor.

10. Archaeological Impact Assessment

10.1 GENERAL

Section 13 of the Application presents the results of an Archaeological Impact Assessment (AIA) of the project. The objectives of the assessment were to identify and evaluate the extent and significance of archaeological deposits within the RAVP corridor and impact area, if any, and to propose management recommendations that could be used to avoid, minimize or mitigate impacts from the development.

The key review material, pertaining to EA issues and review discussions, is covered in the following sections of the Application:

- 2.2 Project Description
- 2.9 Construction Scheduling and Sequencing
- 3 Project Setting
- 4 Consultation and Communication
- 9.6 Description and Summary of Impacts for Socio-Economic Indicators
- 13 Archaeological Impact Assessment
- 16.4 Analysis of Potential Cumulative Effects Associated with RAVP
- 20 Construction EMP Outline and Component Plan Guidelines

The Application Supplement addressed archaeological impacts in section 7 and concluded that the findings described in section 13 of the Application continue to accurately reflect the potential impacts associated with the Selected Project.

10.2 BACKGROUND INFORMATION

The AIA was conducted under the terms and conditions of the British Columbia *Heritage Conservation Act* and with permits from the Musqueam Indian Band, the Squamish Nation and the Sto:lo Nation. The study area is located within the asserted traditional territories of the Musqueam Indian Band, the Squamish Nation, the Sto:Lo Nation, the Tsawwassen First Nation and the Tsleil-Waututh Nation. The Katzie First Nation, has also expressed an interest in the project to the proponent and to EAO, although their Statement of Intent area identified in the BC Treaty Commission Process does not show a land claim close to the RAVP corridor.

Field work for the assessment was completed during September 2003. The AIA involved a field survey conducted on foot and from vehicles, as well as an examination of geotechnical samples. No cultural deposits were identified in either the field survey or the core sample examination. The assessment results generally support the “Low/Moderate” potential rankings presented in earlier Archaeological Overview Assessments (AOAs), referred to in the Application. It should be noted, however, that some areas with potential for deeply buried deposits could not be tested and core logs and core samples cannot be used as the sole means of site detection. Therefore, and according to the proponent, there is a small possibility that archaeological sites may be present but undiscovered within the RAVP development zone.

The assessment indicated that there are no known archaeological sites that could be affected by the project and no further archaeological work was recommended in the application. Additional investigative work will be required, when contract negotiations with a Concessionaire are proceeding and final designs are known. These investigations, which will proceed prior to construction, will be conducted at the following approximate locations:

- South side of False Creek, near Cambie and 2nd Avenue, close to the former shoreline; and,
- North and south shores of the Fraser River at the site of the proposed North Arm crossing.

These investigations must take place once the alignment has been finalized and detail project planning completed, but well in advance of construction, so as to provide sufficient time for mitigation of any archaeological remains found. Further direction regarding the need to monitor construction excavation in these areas may result from this work and will be addressed in the Concessionaire's Archaeological Monitoring Plan (as part of project certification commitments, see *Appendix E* to this report).

Prior to construction, the Concessionaire will be required to provide the proponent with an Archaeological Monitoring Plan that addresses the entire RAVP alignment. This plan will likely be based on similar plans developed for the VIAA's International Terminal Building Third Runway Expansion Project, as well as for the Millennium Line SkyTrain Project. In addition to the locations listed above, the Plan should describe archaeological monitoring to be conducted on Lulu Island near old slough channels and at the Middle Arm (Moray Channel) crossing. All monitoring should be conducted by a professional consulting archaeologist accompanied by First Nations representatives, as appropriate. These individuals should be present during construction if the grade is to be excavated below the level of modern fill. Further monitoring and commitments are discussed in the Application's sections 13.1 and 13.7 respectively.

10.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

With the exception of the False Creek segment, the north bank of the North Arm of the Fraser River, and the just recently identified OMC property, the Archaeology and Registry Services Branch (ARSB) of MSRM is satisfied that the potential for significant impacts to archaeological sites is generally very low.

To address the inadvertent exposure of archaeological remains during project development, however, ARSB is recommending that the required *sec. 14 Inspection Permit* application to assess these localities also include adequate provision for both monitoring and mitigating any unanticipated impacts as part of that permit. Incorporating the monitoring program with the ability for some data recovery into the permit for the life of the project would streamline the process somewhat and avoid potentially costly construction delays if contractors otherwise had to go to a *sec. 12 Alteration Permit*.

Areas warranting full-time monitoring for the initial stages of construction should be identified in the permit application with the ability to revise or modify based on the assessment findings at the above noted locations. Some locations may only warrant on-call monitoring. By including these provisions in the permit, the proponent will have the ability to react quickly to resolve any identified conflicts. Alterations to archaeological deposits that have not been fully recovered would otherwise require a Heritage Alteration Permit pursuant to *sec. 14* of the *Heritage Conservation Act*.

RAVCo agrees with this suggestion and the *Sec.14* permit has already been issued. The Katzie First Nation raised concerns regarding potential disturbances of archaeological resources not previously identified and the approach described above will attend to such concerns.

10.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner's*

Commitments and Assurances as listed in *Appendix E* enclosed this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse archaeological effects.

11. Historical and Heritage Assessment

11.1 GENERAL

The purpose of the assessment was to identify possible historical remains, extant or archaeological, that may sustain impacts due to the construction of the RAVP line. The assessment addressed historical and heritage features not considered by the Archaeological Impact Assessment (AIA) (see Application section 13) and discussed above, and is intended to complement that assessment.

The key review material, pertaining to EA issues and review discussions, is covered in the following sections of the Application:

- 2.2 Project Description
- 2.9 Construction Scheduling and Sequencing
- 3 Project Setting
- 9.6 Description and Summary of Impacts for Socio-Economic Indicators
- 13 Archaeological Impact Assessment
- 14 Historical and Heritage Assessment
- 16.4 Analysis of Potential Cumulative Effects Associated with RAVP
- 20 Construction EMP Outline and Component Plan Guidelines

The Application Supplement presented additional review material in section 7.2.2 and reflected on additional exposure to historical and heritage sites by the Selected Project's cut-and-tunnelling sections.

11.2 BACKGROUND INFORMATION

The heritage and historical impact assessment involved a review of several archival and historical references and a sample of historical maps. The location of the RAVP corridor and of the underground stations was cross-referenced against heritage registries, historical maps and documents to identify historically significant areas.

With one exception, no potential impacts to known historical archaeological resources were identified in the Application, based on the literature review. The exception is the Cambie Heritage Boulevard (the median) between King Edward Avenue and SW Marine Drive, which was designated as a municipal heritage site by the City of Vancouver in 1993 under Municipal By-law 4837. With the selected conceptual design of the project at this alignment section, impacts to the Heritage Boulevard will be short-term and reversible.

The assessment indicated that there are some areas along the RAVP corridor with the potential to contain sub-surface deposits of heritage and historical significance. Since an impact assessment is not a viable option for these areas due to their current inaccessibility, monitoring is recommended during the construction stage.

These areas include:

- Downtown Vancouver station locations;
- The intersection of Cambie and Broadway;
- The area near Richmond Centre; and,
- Much of the proposed RAVP corridor on Sea Island.

As described in section 13.7 of the Application, the Concessionaire will be required to provide the

proponent with an Archaeological Monitoring Plan for construction. This monitoring plan can also be used for heritage and historical sites and the monitoring plan should specifically address the areas noted above.

As described in the Application, the Reference Project was anticipated to be constructed using a twin-bored tunnel between downtown Vancouver and the intersection of Cambie Street and 37th Avenue, and it was to be underground in cut-and-cover tunnels, at-grade or elevated through South Vancouver. Since most of the underground segments of the project were anticipated to be constructed using a bored tunnel, RAVCo predicted that surface disturbance would be limited to the immediate vicinity of station locations, particularly in the bored tunnel section between downtown Vancouver and King Edward Avenue. In the Selected Project, cut-and-cover methods will be used to construct the tunnels in the area midway between Georgia and Dunsmuir streets and Waterfront Station, and along Cambie Street from 2nd Avenue to 63rd Avenue.

Although several heritage buildings are present along Granville Street between Georgia Street and Waterfront Station, like those described in the assessment, they are unlikely to be physically affected by project construction. In any case, RAVCo and the Concessionaire will continue to engage in consultation with the City of Vancouver during the final design process to ensure that any potential unforeseen impacts to these buildings are identified and appropriate action taken.

As described in section 4.4.8 of the Application Supplement, cut-and-cover construction along Cambie Street will proceed in the existing northbound traffic lanes, with two-way traffic diverted to the southbound lanes. There will be temporary impacts to the west side of the Cambie Heritage Boulevard (the median) during construction due to the need to widen the southbound roadbed by approximately 1.5 m to accommodate four lanes of traffic. The Concessionaire will apply for a Heritage Alteration Permit under City of Vancouver By-Law No. 4837 prior to any disturbance of the boulevard. Restoration and re-landscaping of the boulevard will proceed, in consultation with the City of Vancouver, upon completion of construction works. According to RAVCo, the project is therefore not expected to adversely affect this heritage feature

11.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

No member of the working groups raised any concerns with the project's impacts on historic or heritage resources and/or sites, recognizing that any infringements or disturbances of such resources and/or sites are regulated by municipal by-laws.

However, members of the public, through their written comments on the Application and Application Supplement questioned the adequacy of studies of potential underground resources along the alignment. The working groups are satisfied that such sites and/or resources are properly researched and established for the project, in a largely urban and disturbed corridor, and that proper mitigation and monitoring will be provided during project construction and operation.

11.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, RAs and the working groups have considered: the Application; THE Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner's Commitments and Assurances* as listed in *Appendix E* enclosed this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse effects on historical and heritage resources.

12. Electric and Magnetic Fields (EMF) Assessment

12.1 GENERAL

Magnetic fields from electric transportation systems are generally more complex than those produced by power lines. Fields in the frequency range from 0 to 3000 Hertz (Hz) are typically generated. Electric transportation systems also generate electric and magnetic fields above 3000 Hz. The review of high frequency emission levels and electromagnetic compatibility (EMC) from various transportation systems is beyond the scope of the EA of this project. However, a general discussion on electric and magnetic fields generated by the project and on electromagnetic compatibility of the proposed electric rail rapid transit rail system and public health issues related to EMF are included in the project review and covered in section 15 of the Application.

The key review material, pertaining to EA issues and EMF review discussions, is covered in the following sections of the Application:

- 2.2 Project Description
- 3 Project Setting
- 15 Electric and Magnetic Fields Assessment
- 16.4 Analysis of Potential Cumulative Effects Associated with RAVP

The Application Supplement addressed EMF impacts in section 7 and concluded that the findings described in section 15 of the Application continue to accurately reflect the potential impacts associated with the Selected Project

12.2 BACKGROUND INFORMATION

12.2.1 Electric Field Generation (0 to 3,000 Hz)

The expected electric fields from the new rapid transit system will likely be similar to those measured and calculated for urban mass transit systems in the U.S. Department of Transportation (U.S. DOT) studies and to International Electrotechnical Commission (IEC) standards. With this assumption, the proponent expects that static (Direct Current (DC) (0 Hz) and extreme low frequencies (ELF) (5 to 3000 Hz) electric field levels from the new rapid transit system will be below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 24-hour electric field general public exposure guidelines.

Electric fields are easily attenuated by most common materials, especially conductive materials, and do not penetrate significantly into the passenger vehicles. Structures like buildings, platform overhangs, and vegetation provide varying degrees of shielding of electric field generation in station buildings, on station platforms, and at the wayside.

12.2.2 Magnetic Field Generation (0 to 3,000 Hz)

In addition to the power frequency, the RAVP rapid transit system will produce magnetic fields of other frequencies, mostly from 0 to 3000 Hz. The magnetic fields will have complex frequency spectra, and will be highly variable in space and time.

The expected magnetic fields from the new rapid transit system will likely be similar to those measured and calculated for urban mass transit systems, such as for the SkyTrain in Vancouver, in U.S. DOT studies, and in IEC standards. With this assumption, proposed by the proponent, the expected average static and ELF magnetic field levels from the project will be below the ICNIRP 24-hour general public magnetic field exposure guidelines. However, it must be noted that the

maximum fields at some locations in the vehicles (e.g., near the traction control equipment), or on station platforms could exceed the ICNIRP guidelines.

Average power frequency (60 Hz) magnetic fields in the RAVP vehicles will likely be in the range of 10 milligauss (mG), a level comparable to those found directly under overhead power distribution lines. Exposure to magnetic fields is a common occurrence in an urban environment. Power frequency fields near common household appliances range from less than 1 to about 150 mG at a distance of one foot from the field source. It should be noted that the field characteristics associated with household appliances and the RAVP rapid transit system are different (e.g., field levels drop off more rapidly with separation distance from household appliances than do those from the RAVP line).

Like any substations of a power grid, the strength of EMF from equipment within the substations of the project will decrease rapidly with increasing distance from the equipment. Beyond the substation fence or wall, the EMF produced by the substation equipment is typically indistinguishable from background levels, and the strongest EMF source outside the substation is the overhead and underground power lines entering or leaving the substation. The characteristics of these power lines will be similar to the main distribution lines found in residential or commercial areas.

12.2.3 Electromagnetic Compatibility

Based on a preliminary review of the EMC literature and assuming that the RAVP transit system will produce electromagnetic emission levels meeting the IEC1 emission requirements, and at the same time will be comparable to those described in the United Kingdom study by University of York (2002), the proponent concludes that it is unlikely that electromagnetic emissions from the RAVP line will interfere with commercial AM (amplitude-modulated) and FM (frequency-modulated) radio services in most installations. The probability of interference with cable services, such as cable TV, will be even more remote, according to the proponent's assessment.

To minimize the potential interference impacts of electromagnetic fields associated with the new rapid transit system and to ensure electromagnetic compatibility within the proposed RAVP system and the surrounding environment, the RAVP system contract specifications will contain provisions to control and monitor stray currents and electromagnetic interference (EMI), specifically electromagnetic compatibility.

12.3 REVIEW COMMENTS AND PROPONENT'S RESPONSES

In their review of draft Application material, Health Canada raised the issue of use of appropriate standards for the EMF assessment. It was suggested that IEEE C95.6 2002 and ACGIH standards should have been applied in addition to the ICNIRP guidelines.

In their response of December 16, 2004 (responses to agencies pre-application draft Application review comments), RAVCo stated that the Application is submitted for a project in British Columbia. It has been stated in Application section 15.6 (EMF Exposure Guidelines) that the Radiation Protection Services (RPS) of the BC Centre for Disease Control provides guidance on addressing EMF exposure. In the absence of a national ELF guideline on EMF, the current position of the RPS is to follow the ICNIRP exposure guidelines for the general public in the 0 to 3 kHz range. Therefore, it is unnecessary to include other guidelines or standards in this Application and the project review. ACGIH static field limit has been added as a footnote under Table 15.8. in the Application.

Health Canada also suggested that RAVCo should conduct EMF measurements at selected locations along the proposed route(s) prior to construction. These locations may include residential dwellings, school premises, hospitals and children's playgrounds. The information obtained should be useful for future comparison with corresponding EMF levels after the construction. A commitment to carry out EMF measurements before and after installation of the

rapid transit system would help alleviate fears of the general public and might be helpful in dealing with possible public opposition. The commitment should, according to Health Canada, be reflected in the Application and made available to any interested parties.

In their response of January 13, 2005 to Health Canada, RAVCo disagreed with this requirement. and pointed out that the project will be underground from Waterfront Station to 63rd Avenue, elevated across industrial lands bounding the North and Middle Arms of the Fraser River, elevated along the commercial district of No. 3 Road in Richmond, and elevated on Sea Island adjacent to Grant McConachie Way. The combination of underground system, and elevated alignment along a commercial avenue and over airport lands, means that there are no school premises, hospitals or children's playgrounds close to the guideway, and very few, if any, residences that could be exposed to EMF.

Therefore, RAVCo does not intend to conduct any EMF measurements or further EMF studies. In addition, since the technology selected by the Concessionaire will be very similar to the technology being employed for the existing Expo Line and Millennium Line electric rapid transit systems in Vancouver, where EMF has not proven to be an issue, further measurements and monitoring are considered by the proponent to be unnecessary.

EMF measurements are normally conducted for new power line projects and the results, according to RAVCo, continue to be inconclusive. This has been recently stated (2004) in studies conducted for the now cancelled Sumas 2 Power Project in Washington State USA and the Fraser Valley in British Columbia. Largely because of the difficulty in providing conclusive information in the hydro-electric power transmission industry, it is not standard practice within the transportation industry to conduct EMF measurements for electric train systems to determine any potential positive or negative health effects. This was identified, assessed, analyzed and concluded within the RAVCO EMF assessment that is included in the Application and generally accepted by the working groups.

12.4 CONCLUSIONS AND RECOMMENDATIONS

During this cooperative environmental assessment the EAO, RAs and the working groups have considered: the Application; the Application Supplement; additional project review material listed in *Appendix A*; government, First Nations and public comments on the potential effects of the project; responses by the proponent; and the discussions of the working groups. Based on this information and provided that the proponent implements the actions described in the *Owner's Commitments and Assurances* as listed in *Appendix E* to this report, the EAO and the RAs are satisfied that the RAVP will not result in significant adverse public health effects as a result of EMF generation.

13. Federal Review Issues

13.1 INTRODUCTION

In a joint harmonized EA review under federal and provincial EA legislation, the Assessment Report prepared pursuant to the Act and the Order issued for the project review will also reflect federal review requirements under CEAA. This Assessment Report is used as a basis for the federal project determination pursuant to CEAA. This Assessment Report will therefore briefly discuss the following federal review issues:

- A cumulative impact assessment;
- Environmental Effects of Accidents and Malfunctions; and
- The effects of the environment on the project.

13.2 CUMMULATIVE IMPACT ASSESSMENT

13.2.1 General

The cumulative environmental effects assessment considers the interaction between residual effects of the project under consideration, (i.e., those impacts expected to occur during construction and/or operation despite implementation of mitigation measures) and those associated with other identified past, present or future projects or activities. The analysis is undertaken with reference to defined temporal and spatial boundaries and typically focuses on key environmental components. Cumulative effects assessment methodology is described in the Cumulative Effects Assessment Practitioners Guide (Hegmann *et al.* 1999) and the CEAA Reference Guide: Addressing Cumulative Environmental Effects (CEA Agency 2003).

The Approved Terms of Reference (ATOR) for the Application directs that the scope of the cumulative environmental effects assessment for the project consider other projects that:

- Are located within or that intersect with the RAV corridor;
- Are known to have received or are in the process of acquiring permits and authorizations that would allow them to proceed to implementation;
- Have secured funding, and,
- Have schedules and timelines that are known to be imminent in their commencement, up to the submission of the Application.

In addition to the ATOR and the guidance documents noted above, the cumulative effects assessment presented in the Application was guided by discussions with the Canadian Environmental Assessment Agency (CEA Agency).

The determination of residual effects was based on the scientific information presented in the project-specific environmental assessments included in the Application. As described in the Socio-economic/Socio-community Assessment, the project is likely to act as a catalyst for future residential, commercial and/or industrial development along the RAVP corridor, particularly in proximity to RAVP stations. The extent to which this demand can be accommodated will vary along the corridor, depending on existing land use, property availability, zoned development capacity, and the receptiveness of neighbourhoods and city planners to zoning or land use changes. Since the nature, scope and extent of development, the timeframe over which it may occur, and the impacts that may be associated with it are unknown and cannot be predicted with reasonable certainty, it is not possible to determine whether or how such future induced development may interact with the project to produce cumulative effects. Consequently, no attempt was made to assess the cumulative effects of potential RAVP induced development in the vicinity of the project corridor.

The approach to the cumulative impact assessment is described in section 16.2 of the Application and the potential residual effects are listed in Table 16.1.

13.2.2 Results

The conclusions of the cumulative effects assessment, as made by RAVCo, are as follows:

Aquatic Environment

As described in the Fisheries and Aquatic Habitat Assessment (Application section 6), due to the limited nature of in-river works, residual impacts to fish habitat are not anticipated in association with the conceptual design, construction or operation of the North Arm or Middle Arm crossings. In the long term, habitat compensation required by regulatory agencies to ensure “no net loss” of fish habitat due to the project may, result in net positive effects due to upland rehabilitation and the creation of fisheries compensation habitats in the lower Fraser River where no habitat presently exists, or in areas of very low habitat value. Potential changes in local hydraulic conditions associated with different pier designs and configurations will be assessed by the Concessionaire during final design to avoid long-term residual effects due to bridge operation. Since most of the RAVP line will be built in areas that are currently paved, there will be little or no increase in impervious surface area and impacts on water quality are anticipated to be negligible to potentially positive, depending on the effect of the project on vehicle use in the Cambie Street corridor.

Since potential residual effects to aquatic environments associated with the project will be addressed by mitigation and habitat compensation, as required by Section 35(2) Authorizations under the federal *Fisheries Act*, no adverse cumulative effects to the aquatic environment within the RAVP corridor are anticipated. In addition, the project is not expected to result in cumulative effects with respect to the parameters of key regional concern – water quality, impervious surface area and environmentally sensitive areas.

Terrestrial Environment

In the absence of residual impacts, and given the highly developed urban setting of the RAVP corridor and the limited or degraded state of much of the habitat along the corridor, the project is not expected to result in adverse cumulative effects on the terrestrial environment. Given the highly disturbed nature of the riparian zone on the Fraser River foreshore within the RAVP corridor, it is anticipated that habitat restoration and compensation will improve both the amount and quality of this habitat type, to the benefit of the estuarine environment of the Lower Fraser River.

Air Quality

The project will provide a means to help maintain the recent trend toward improved air quality (i.e., reduced emissions of smog-forming contaminants) in the GVRD. By providing an alternative to private vehicle use, it will also help to address projected increases in emissions of fine particulate matter. Diesel particulate matter, in particular, is considered to be one of the region’s major air quality related health concerns. The RAVP is compatible with the GVRD’s Liveable Regional Strategic Plan (LRSP) and the overall strategy to address growth and transportation issues in the Lower Fraser Valley, while maintaining a high quality of life, including the protection of air quality.

Noise

While certain components of the project may result in a localized increase in noise levels during system operation, given the project’s urban setting and existing vehicle traffic levels along the length of the corridor, the overall effect of this increase on the ambient noise environment is expected to be negligible. No adverse cumulative effects to ambient noise levels are anticipated in conjunction with the project.

Electric and Magnetic Fields

Since the frequencies and levels of both electrical and magnetic fields produced during RAVP operations are unlikely to pose undue risks to human health beyond those typically encountered in daily life, the incremental increase in electric and magnetic field exposure due to the project is unlikely to result in adverse cumulative effects.

Archaeological Resources

No known archaeological sites occur along the RAVP corridor. When detailed design plans have been developed, archaeological investigations will be conducted within the project footprint at the 2nd Avenue Station and construction staging area, and on the north shore of the Fraser River between 64th Avenue and the rail line, north of the Doman Industries site. Prior to commencement of any further archaeological investigative work, RAVCo will determine in association with regulators, the specific locations where this work will occur. Standard mitigation measures and monitoring will be implemented by the Concessionaire during construction to protect any archaeological resources encountered. No cumulative effects to archaeological resources are anticipated.

Historical and Heritage Resources

The only designated heritage resource in the project area is the Cambie Heritage Boulevard in the City of Vancouver. The boulevard will be restored and re-landscaped following construction, as per the terms and conditions of the City of Vancouver Heritage Site Alteration Permit, to be acquired by the Concessionaire prior to construction. Since no other imminent projects were identified by the City of Vancouver that may adversely affect the boulevard, no residual effects or cumulative impacts are anticipated with respect to this heritage feature.

Traditional Use

Based on communications with involved First Nations the only key issue of concern related to traditional use in the RAVP corridor is the potential for temporary disturbance of fishing activities during bridge crossing construction and potential constraint of the driftnet fishery, particularly in the vicinity of the Middle Arm piers. With completion of construction, continuing constraints on the driftnet fishery are expected to be minimal. The federal agencies will further address a potential cumulative effects issue under CEAA in their project determination.

13.2.3 Review Comments

In their written comments on the Application, the Squamish Nation stressed that extensive cumulative effects have impacted on their ability to practice traditional cultural activities, caused by past, current and planned future development in the Vancouver Lower Mainland. They noted that 150 years of Euro-Canadian development has dramatically transformed the environment of the Vancouver-Richmond corridor, effectively eliminating First Nations' ability to harvest resources or access culturally important sites. The Squamish Nation recognizes, however, that there are no residual environmental effects from the RAVP that will have either positive or negative influence on this existing and continuing cumulative effect.

During the EA review federal agencies addressed the cumulative effects assessment and generally agreed with RAVCo that the project does not create any significant adverse cumulative effects.

13.3 ENVIRONMENTAL EFFECTS OF ACCIDENTS AND MALFUNCTIONS

The project will incorporate appropriate design requirements to address catastrophic events such as floods and earthquakes. The propulsion system for the RAVP line will be electric-powered and the Concessionaire will adopt many of the operational procedures and practices developed during almost 20 years of SkyTrain operation on both the Expo and Millennium lines. The SkyTrain system uses an electric-powered linear induction propulsion system that involves no rotating

motors or gearboxes, virtually eliminating waste products typically associated with other forms of transportation that use mechanical motors and require motive fuel storage and transfer.

The operation of the electric-powered trains does not result in any emissions that adversely affect air quality. Continued improvements in SkyTrain operations have minimized noise impacts. Adverse effects to soil and water quality have been limited to insignificant releases of small amounts of potential contaminants. These impacts have been minimized through improvements and refinement of operational procedures, policies and guidelines. Application of similar procedures by the Concessionaire during operation of the RAVP line is expected to minimize the potential for accidents and malfunctions.

Practices and procedures to be outlined in the Construction Specifications and described in the Concessionaire's EMP will minimize the potential for accidents and malfunctions during the construction phase of the project.

Federal agencies generally concurred with this assessment by RAVCo as discussed in section 17 of the Application. It is therefore anticipated that any environmental effects resulting from accidents and malfunctions that cannot be mitigated will be minor and localized.

13.4 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Where possible, the RAV line will be designed to mitigate any potential effects of the environment on the project. Mitigation measures to be incorporated into project design include:

- Withstand maximum wind conditions for the Project area;
- Avoid or stabilize areas that could fail due to saturated soil conditions;
- Stabilization of fill slopes, if necessary, and only at column locations;
- Accommodate a 1 in 475 year return period earthquake; and,
- Withstand a 1 in 200 year flood event on the Fraser River.

The detailed assessment of these environmental effects is covered in section 18 of the Application. Federal agencies are satisfied that the effects of the environment on the project have been adequately addressed and had no comments on the presented material.

PART C

Review Conclusions

1. GENERAL

The conclusions from the RAVP review pursuant to the federal⁴⁷ and provincial environmental assessment legislation, summarized in this Assessment Report, are based on the following documents and review process:

- The proponent's Application and Application Supplement for an environmental assessment certificate pursuant to the Act;
- All review material and documents submitted by the proponent and listed in *Appendix A*;
- The *Owner's Commitments and Assurances*, defined in *Appendix E*;
- The review process defined in the Section 11 Order; and,
- The assessment collectively carried out by government agencies, members of the working groups discussed in PART A, section 1.4.1, First Nations and input from the public regarding review issues outlined in *Appendix C* and *Appendix D* respectively.

It should be noted that the working groups above acted in an advisory capacity to EAO during the review of the project and for the formulation of appropriate project mitigation measures and recommended conditions for project certification pursuant to the Act. PART B discusses the major review issues and includes statements that the "working groups" generally agree on the review of individual impact issues. Not all members of the working groups have studied and formulated opinions on all review comments, on the proponent's responses to those comments and on the conclusions drawn. However if members of the working groups presented different opinions or conclusions, noteworthy for the EA review of the project, they are recorded in the individual sections of PART B.

In the following sections, the above defined project review material and other concluding input obtained through the EA review process are collectively referred to as "Final Documentation".

Both the proponent and EAO have made good-faith efforts to engage First Nations prior to and during the review process and to identify and appropriately address potential impacts on asserted aboriginal rights and resource uses. The proponent and EAO have consulted with the First Nations over the period of February 2003 until April 2005; submitted all relevant EA review material to the First Nations; and invited their participation in the EAO organized working groups. However, not all First Nations decided to be part of the project review.

The First Nations consultation is described in section 3.3.3 of PART A of this Assessment Report and issues raised by the First Nations are described in the relevant sections of PART B. This consolidated input is reflected in the conclusions and recommendations described in this Assessment Report.

The public also raised a number of potential adverse impacts as a result of RAVP. Most of these comments, discussed in section 3 of PART A and in relevant sections of PART B focused on the impacts during construction along Cambie Street and the change to the cut-and-cover tunnelling construction method from the Reference Project to the Selected Project. Again the public input is reflected in the conclusions and recommendations described in this Assessment Report.

2. PROJECT NEED AND CONTEXT, PROJECT BUDGET/COST, CONSTRUCTION AND SCHEDULING

Long-term plans to address population growth, while maintaining liveability at the regional level and in areas serviced by the Richmond/Airport/Vancouver corridor, include those set out in a

⁴⁷ The project was subject to a federal/provincial harmonized review process as the project also triggered a review under the *Canadian Environmental Assessment Act* (CEAA).

number of studies referenced in section 2.1 of the Application. Each of these documents envisions a rapid transit corridor, generally consistent with the proposed RAVP alignment, as a viable means of addressing the challenges associated with increasing commuter traffic (i.e., the need to reduce reliance on and use of single-occupant vehicles). TransLink's most recent amendment to its *Strategic Transportation Plan*, the 2005 – 2007 Three-Year Plan and Ten-Year Outlook (see Application section 2.1.5), briefly describes the social and economic impacts associated with increasing transportation demand, identifies the completion of the GVRD's rapid transit network as a high priority in the next decade, and specifically refers to the RAVP as the next component of this network to be constructed.

The working groups are generally satisfied that the need for the project and the resulting foot-print within a highly developed urban corridor are properly established through studies and regional transportation master-planning. There is therefore no need – under EA pursuant to the Act – to recommend further studies of project rationale or horizontal alignment. The vertical alignment is a result of the Selected Project, developed through the BAFO tendering process of the Public-Private-Partnership (P3) project and the EA has focused on the task of reviewing RAVP – as developed and presented in EA documentation. The EA process under the Act does not call for review of land use or transportation infrastructure planning.

The working groups are satisfied that the break down of capital cost will be available at the P3 Financial Close in July 2005 and that the project budget is a reflection of TransLink board approval. The working groups are further satisfied that a reasonable construction schedule has been developed for the project as reflected in this Assessment Report.

3. FISHERIES AND AQUATIC HABITAT

The elevated RAVP guideway crosses the Fraser River at the North Arm and at the Middle Arm. The design of the bridges and their foundations were developed in close contact with regulatory authorities and in discussion with commercial marine operators using the Fraser River navigation channels. The proponent also contacted the Musqueam Indian Band to obtain their input to the bridge alignment and foundations. However, this approach was not successful and the proponent subsequently informed the Musqueam Indian Band on the modifications to the bridge structures.

Span arrangements and pier locations for the North Arm crossing, as described in the Application Section 6.3.1.1, were determined in consultation with Transport Canada Navigable Waters Protection Division (NWPD) and the Council of Marine Carriers, to ensure navigational clearance requirements in Mitchell Island Channel (45 m wide) and Main Channel (60 m wide). In particular, the location of Pier NA2, approximately 30 m west of the high water level mark of the downstream tip of Mitchell Island, was chosen in an effort to minimize interference with ship movements as well as fishing activity in the North Arm. The bridge opening and height will be designed to meet *Navigable Waters Protection Act* (NWPA) criteria and ship collision works will be designed and installed at the Middle Arm bridge crossing where they are deemed necessary by the NWPD. The bridge configuration for the Middle Arm of the Fraser River is also dictated by minimum clearance to the legislated flight path for approaches to Vancouver International Airport.

Section 6 of the Application discussed the potential impact of bridge crossings on fish and aquatic habitat. During the project review considerable discussions ensued regarding the degree of fish habitat deterioration or loss. At the end of the review DFO accepted the conceptual fish habitat compensation plan developed by RAVCo.

Other potential effects of the project on fish and fish habitat include: discharge of storm water, discharge of water contaminated by sediment, contaminated soils, concrete fines or low pH water. It is concluded that such potential impacts can be adequately mitigated or avoided if the mitigation measures set out in the Final Documentation are adhered to.

The proponent's mitigation measures are designed for "No Net Loss" of the productive capacity fish habitat of the productive capacity at the bridge construction sites. To achieve this, new fish habitat to replace lost habitat will be created using an inter-tidal Marsh Fish Habit at Mitchell Island, as designed by Envirowest Environmental Consultants Ltd. This conceptual fish compensation plan will be further refined for the required Section 35(2) Authorization pursuant to the *Fisheries Act*.

The asserted rights of the Musqueam Indian Band to fish in the areas of the two Fraser River bridge crossings are acknowledged. Although the exact nature and extent of these aboriginal fisheries are yet not fully known, it is recognized that a process is in place, through commitments by the proponent, to continue to seek clarification of these fisheries and to agree on appropriate accommodation by RAVCo for any determined adverse impacts and infringements on such aboriginal rights.

If the construction and operation of the RAVP proceeds as described in the Application and in the Application Supplement, and adheres to the mitigation and monitoring commitments identified in the Final Documentation, the construction and operation of the project is not anticipated to result in significant adverse environmental effects on fish or fish habitat.

4. TERRESTRIAL BIOPHYSICAL EFFECTS

The terrestrial biophysical study area consists of the RAVP corridor from downtown Vancouver to Richmond, and to the Vancouver International Airport. Considering the highly urbanized nature of the study area, the terrestrial biophysical assessment focused on those locations that supported remnants of natural habitat; this was limited to the shoreline of the North Arm and Middle Arm of the Fraser River and land on Sea Island approaching the airport terminals (mostly highly modified habitat).

Overall, there is no indication that any particularly sensitive or listed species would be significantly affected by the project in the mid-or long term. According to the proponent and given the location of the RAVP corridor and the state of existing habitat conditions, cumulative vegetation and wildlife impacts from development of the project are not expected.

Apart from further discussions on the project's likely impacts on estuarine marshes, the working groups were generally satisfied with review material presented in the Application. It was agreed that the impacts to inter-tidal mudflat, inter-tidal marsh and riparian woodland habitats will be offset through creation of replacement habitats. The proponent is responsible for complying with the requirements of the *Migratory Birds Convention Act* and the *Species at Risk Act*. RAVCo generally endorsed this position.

If the construction and operation of the RAVP proceeds as described in the Application and in the Application Supplement, and adheres to the mitigation and monitoring commitments identified in the Final Documentation, the construction and operation of the project is not anticipated to result in significant adverse environmental effects on vegetation and wildlife.

5. ARBORICULTURAL EFFECTS

An arboricultural survey of 1,259 existing trees and stands of natural planted trees within the RAVP corridor was conducted in 2003. The survey addressed the number, size, health, species and location of the trees, described supporting soil conditions and provided AutoCAD survey referencing for each tree in the study area. Along Cambie Street the Reference Project's horizontal and vertical alignment would have impacted some trees and bushes along the Cambie Heritage Boulevard.

However, the Selected Project results in a more benign impact along Cambie Street, as the cut-and-cover tunnel foresees a stacked rail solution for most of this section that will avoid impacts on the Cambie Heritage Boulevard. RAVCo will provide an assessment of likely trees that may

be seriously impacted and will provide such details prior to start of construction. There are also potential tree losses in Richmond along No.3 Road and along the Vancouver Airport sections. Re-planting is introduced as a mitigation measure and as a condition for project certification under the Act.

If the construction and operation of the RAVP proceeds as described in the Application and in the Application Supplement, and adheres to the mitigation and monitoring commitments identified in the Final Documentation, the construction and operation of the project is not anticipated to result in significant adverse arboricultural effects.

6. SOCIO-ECONOMIC/SOCIO-COMMUNITY ISSUES

The key socio-economic and socio-community issues identified as a concern in the Application, in the Application Supplement and during the review of these RAVP documents include: the potential effects of noise on residents and workers in the project area; impacts associated with transportation and traffic and accessibility and safety as a result of the project.

With respect to noise, the project corridor is within an area that is already highly developed and has noise levels consistent with an urban centre. The operational noise from the project is largely restricted to station access and ventilation noise in the tunnel sections of RAVP. Along the elevated guideway sections of the project, the operational noise is similar to the Millennium Line and the EXPO Line. Noise abatement measures are committed to by RAVCo at the Marine Drive station, the only location where noise is likely to be of concern.

The construction noise cannot be deemed to be temporary in nature as the cut-and-cover tunnelling construction along Cambie Street will take about two years, albeit in increments of 3-4 months per three-block segment. This was the key issue raised by the public, combined with accessibility in this alignment sections and impact on commerce and business. The mitigation measures outlined in the Application, and in the Application Supplement in addition to mitigation that emerged, as a result of dialogue between the proponent, HC and the VCHA, are deemed sufficient to mitigate potential noise impacts associated with construction of the RAVP. Details are provided in the Final Documentation.

With respect to traffic issues, the proponent has committed to mitigate traffic issues resulting from the RAVP construction to the satisfaction of the City of Vancouver's City Engineer and the City of Richmond's City Engineer and will develop traffic management plans for the construction and operation phase of the RAVP development.

The public also raised public health issues, in particular those associated with perceived release of toxic material as a result of construction within determined contaminated sites. The working groups do not share this concern as the study, investigation and disposal of contaminated soil and excavated material is well regulated in British Columbia.

Other issues discussed in PART B of this report included public safety; economic development and opportunities for First Nations participation; public liaison and disruption to business/commerce along Cambie Street and in Richmond.

Overall, socio-economic/socio-community issues are dominated by concerns over noise, particularly noise during Cambie Street cut-and-cover construction. If the construction and operation of the proposed project proceeds as described in the Application, and adheres to the mitigation and monitoring commitments identified in the Final Documentation, the construction and operation of the RAVP is not anticipated to result in significant adverse effects on socio-economic and socio-community conditions.

7. CONTAMINATED SITE ISSUES

The RAVP rails will run in a tunnel from the Waterfront Station in downtown Vancouver almost to Marine Drive, before the guideways are elevated for the rest of the sections to Richmond and the Vancouver International Airport. The elevated sections will have support columns requiring extensive excavations for proper reinforced concrete foundations. The tunnel section, whether by twin-bored tunnelling or cut-and-cover construction methodology, will include the exposure and transportation of soils and other excavated material from an urban corridor with known contaminated sites.

The Application includes the result of a Screening Level Contaminated Site assessment. The overall objective of such an assessment is to provide a useful planning tool for multiple users working on the project. Specific objectives of the assessment include:

- To rank areas or sites with high, moderate or low risks of contamination;
- To identify contaminant parameters of concern; and,
- To determine the need for mitigation prior to and during construction.

A number of public comments focussed on concerns over the potential release of toxic material from tunnelling in contaminated site areas. RAVCo has demonstrated an acceptable identification of potential contaminated sites along the full length of the RAVP alignment and committed to further study potential sites during construction and seek appropriate regulatory approvals.

If the construction and operation of the RAVP proceeds as described in the Application and in the Application Supplement, and adheres to the mitigation and monitoring commitments identified in the Final Documentation, the construction and operation of the project is not anticipated to result in significant adverse public health effects resulting from exposure of contaminated soil or other excavated material.

8. AIR QUALITY EFFECTS

Current air quality in the Lower Fraser Valley, potential impacts of the RAVP on local and regional air quality, and greenhouse gas (GHG) emissions are reviewed in the Application. In addition, measures for mitigating common air contaminant emissions during the project construction and operation are outlined

The potential negative environmental effects on air quality associated with RAVP include those resulting from construction-related sources of air emissions, such as construction equipment and construction related dust associated with site preparation and transportation activities. Such impacts will be temporary in nature, (i.e. 3-4 months per section), albeit for more than two years in certain alignment sections. Operational related air quality impacts are largely limited to those associated with train operation and maintenance. With the ridership projected with the introduction of the RAVP service, there will be an appreciable lowering of GHG emissions. Based on project documentation, it is reasonable to expect that RAVP construction and operation activities are not expected to lead to adverse impacts on applicable air quality standards in the downtown core.

If the construction and operation of the RAVP proceeds as described in the Application and in the Application Supplement, and adheres to the mitigation and monitoring commitments identified in the Final Documentation, the construction and operation of the project is not anticipated to result in significant adverse local or regional air quality and emission effects.

9. NOISE ASSESSMENT

Some of the noise issues related to the project, in the context of public health effects, are covered in section 6 above. The public and some government agencies raised noise effects as a result of construction and operation.

RAVCo has recorded ambient noise level along the full length of the proposed alignment. The Application also included an assessment of construction and operational noise, with the Selected Project being covered in the Application Supplement.

With the tunnel section of the project extending almost to Marine Drive, operational noise is restricted to ventilation noise and station noise and some limited pass-by noise at the Waterfront Station. The operational noise along the elevated sections of the project is expected to be well within municipal noise by-laws

A considerable number of public comments focussed on the perceived increase in noise level during the cut-and-cover tunnelling along Cambie Street. These concerns, also shared by working group members, centred around actual construction noise (excavation, piling, rigging etc.) and the extra transportation and trucking of excavated material. The proponent carried out a construction noise assessment, reflecting the use of relevant construction equipment and applying the cut-and-cover tunnelling method. This study was carried out for a section of Cambie Street, south of King Edward. The assessment concludes there will be reduced noise impacts due to the restriction of traffic along Cambie Street during RAVP construction. Further noise mitigation is committed to by the proponent and as reflected in the Final Documentation.

RAVCo has committed to comply with municipal noise by-laws during the construction of the project. It is anticipated that some night-time work will be necessary; the proponent will ensure that the Concessionaire seeks approval for any exceedences of noise by-law levels from the City of Vancouver and the City of Richmond.

If the construction and operation of the RAVP proceeds as described in the Application and in the Application Supplement, and adheres to the mitigation and monitoring commitments identified in the Final Documentation, the construction and operation of the project is not anticipated to result in significant adverse noise effects.

10. ARCHAEOLOGICAL IMPACTS, EFFECTS ON HISTORICAL AND HERITAGE RESOURCES AND ELECTRIC AND MAGNETIC FIELD ASSESSMENT

The Application and the Application Supplement discuss the project's potential archaeological impacts; the project's potential effects on historical and heritage resources, and potential electric and magnetic field (EMF) effects of the project.

Some discussions ensued on the extent of potential archaeological impacts. However, the potential impacts will be further addressed during construction and compliance with regulatory approvals and permitting under the British Columbia Heritage Conservation Act. Potential EMF impact issues were raised by Health Canada, but the working groups at large were satisfied that the EA review material adequately described the predicted benign impact from the project.

If the construction and operation of the RAVP proceeds as described in the Application and in the Application Supplement, and adheres to the mitigation and monitoring commitments identified in the Final Documentation, the construction and operation of the project is not anticipated to result in significant adverse archaeological and EMF effects or negatively impact historical and heritage resources with the project's urban corridor.

11. ENVIRONMENTAL MANAGEMENT PLAN

In the Application the proponent proposes a number of mitigation measures that will address potential environmental impacts that could occur as a result of the RAVP construction and operation. In addition, other mitigation measures have emerged during the review period, as a result of discussions between the proponent, government agencies and the City of Vancouver, the City of Richmond and the Vancouver International Airport Authority. These mitigation measures, also reflecting First Nations issues, are summarized and presented in the "Owner's Commitments and Assurances" (*Appendix E*).

Complementing the general mitigation measures summarized in Appendix E, the proponent will develop an Environmental Management Plan prior to the start of construction that provides a more detailed description of how various environmental impacts will be avoided, managed and mitigated.

In addition to specific mitigation commitments, the proponent has agreed to monitoring activities to identify environmental impacts that may occur and to ensure that the implementation of mitigation measures are having the intended results and adequately mitigating potential impacts.

Collectively, the environmental mitigation, management and monitoring activities identified in the Final Documentation are considered adequate for ensuring that potential environmental impacts associated with construction and operation of RAVP are addressed and that no significant adverse effects will occur.

12. FEDERAL REVIEW ISSUES

In a harmonized EA review under federal and provincial EA legislation, the defined CEAA topics of cumulative effects; environmental effects of accidents and malfunctions; and the environment's impacts on the project were also assessed. It was concluded, based on review documentation and agency comments that there were no residual environmental effects resulting from the project's construction and operation as described in the Final Documentation. The same conclusion was reached on any adverse environmental effects of accidents and malfunctions or the environment's effects on the proposed project.

13. OVERALL CONCLUSION

Based on the cooperative cooperative environmental assessment, the Environmental Assessment Office and federal Responsible Authorities are satisfied that:

- The Final Documentation, as defined in the Assessment Report, adequately identifies and assesses the potential adverse environmental, economic, social, heritage, health and First Nations effects of the RAVP;
- Public and First Nations consultation, and the distribution of information about the project have been adequate;
- Issues identified by the public, First Nations, and federal, provincial and local government agencies, that are within the scope of the environmental assessment, were adequately addressed by the proponent during the review of the Application and the Application Supplement;
- First Nations comments on the project and its review have been reflected in the Final Documentation and in this Assessment Report and the proponent has agreed to continue consultation with identified First Nations on specific aboriginal impacts issues defined in the Final Documentation; and,
- Practical means have been identified to prevent or reduce to an acceptable level any potential adverse effects of the Richmond-Airport-Vancouver Rapid Transit Project.

APPENDICES