DELTAPORT THIRD BERTH EXPANSION PROJECT

COMPREHENSIVE STUDY REPORT

With Respect to
The Requirements of a Comprehensive Study
Pursuant to the *Canadian Environmental Assessment Act, SC 1992, c. 37*

July 5, 2006

Prepared by

Fisheries and Oceans Canada
and
Environment Canada

Government of Canada | Gouvernement du Canada | Canada

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16. Cumulative Effects Assessment

16.1 GENERAL

Section 16(1) of CEAA requires any screening or comprehensive study to include consideration of "any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out". Cumulative environmental effects are changes to the biophysical environment or socio-economic setting (only from a biophysical change) caused by an activity in association with other, past, present and future human activities. Cumulative effects assessment (CEA) is done to ensure the incremental effects resulting from the combined influences of various actions are considered. These combined effects may be significant even though the effects of each action, when individually assessed, are considered insignificant. CEA includes effects that are likely to result from the Project in combination with other projects or activities that have been or will likely be present in a reasonable temporal and spatial scale.

Cumulative environmental effects occur when:

- impacts on the natural and social environments take place so frequently or densely that the combined individual effects cannot be assimilated into the environment; or when
- the impacts of one activity combine with those of another in a synergistic manner creating a cumulative effect that is equal or greater in intensity than the total of the individual effects.

The Proponent's original Application, submitted on February 14, 2005 included a chapter on CEA that was initially reviewed by agencies and the public. Following receipt of initial agency comments it was decided that the CEA chapter would be amended and resubmitted. Materials presented below, including tables and figures, were drawn from the amended version of the CEA chapter that was submitted in November 2005, and made available for agency, First Nations and public comment in December 2005 and January 2006.

16.2 BACKGROUND

Cumulative environmental effects are defined as residual effects that, when combined with the impacts of other past, existing or imminent projects and activities, may have a compounding or interactive effect.

The DP3 Project includes construction of approximately 22 ha of land for container operations and storage, a wharf to accommodate a new ship berth, dredging to accommodate marine traffic adjacent to the terminal and a new tug mooring area. The effect of this Project and the potential for interaction with other historical, existing or future projects or activities is the focus of this CEA.

The CEAA Project Scoping Document (PSD), issued on February 10, 2005 for the DP3 Project outlined the scope of factors to be considered for the CEA. This scope specifically requires consideration of the proposed future development of T2 at Roberts Bank and other proposed future projects in the study area. On February 2, 2006 the Proponent wrote to the EAO withdrawing their request to initiate a provincial review of the T2 Project. The reasons provided for the withdrawal included outstanding infrastructure requirements and the need for consultation with stakeholders in the development of the Project design.

16.2.1 Study Area for Potential Cumulative Effects

Spatial Boundaries:

Spatial boundaries used for CEA are normally based on the "zone-of-influence" beyond which the effects of the action have diminished to an acceptable or negligible state. This approach is taken for each effect on each environmental component examined (e.g., air, water, vegetation, wildlife),

therefore multiple boundaries are required rather than a single study area. Spatial bounds therefore expand and contract according to the unique ecological relationships encountered. The spatial boundaries used for environmental components examined as part of the CEA are described below.

Coastal Geomorphology:
The spatial boundaries of the coastal geomorphology study area are the tidal environments influencing and influenced by Deltaport. These are Roberts Bank from the top of the foreslope to high water, and Canoe Passage to the BC Ferries causeway.

Water Quality:
The study area for potential cumulative effects on water quality and particularly circumstances that might lead to marine eutrophication is a 5 to 7 km radius from the existing Roberts Bank port.

Ecology:
The study area for cumulative effects on ecology extends from Canoe Passage to the base of the BC Ferries causeway along the Brunswick and Tsawwassen marshes shoreline, seaward to the edge of the foreslope of Roberts Bank and along the edge of the foreslope to Canoe Passage. The boundary for the assessment of potential cumulative effects on marine mammals is the Strait of Georgia from a line approximately between Nanaimo (Vancouver Island) and Horseshoe Bay (West Vancouver) to south of the San Juan Islands (USA).

Noise:
The study area is the Deltaport facilities and causeway, residential communities adjacent to the BC Rail railway line east to 156th Street in Surrey, and residential areas in close proximity to the shoreline extending from the Roberts Bank causeway south to Tsawwassen Beach. Residential communities to the east (Panorama Ridge, Colebrook, Woodwards Hill and Sullivan) were included because they overlook the rail line, which serves Roberts Bank almost exclusively.

Traffic:
The study area is Deltaport Way, the Highway 17 corridor to the Highway 99 intersection, Highway 99 from Massey Tunnel to North Delta, River Road and rail lines leading to Deltaport.

Air Quality:
The study area is a 30 km^2 area that includes the communities of Tsawwassen, the TFN, Ladner, Boundary Bay, Beach Grove, Steveston (City of Richmond), and Point Roberts (USA).

Temporal Boundaries:
Temporal boundaries or "how far back in time" and "how far ahead in the future" to consider in an assessment depend on a number of factors. Comparison of incremental changes over time requires the use of historical records for establishing an environmental baseline. The possibility of new actions requires the need to look ahead into the future. However, the further back or ahead in time, the greater the dependence will be on qualitative analysis and conclusions due to lack of descriptive information and increasing uncertainty in predictions. In practice the historical boundary in the past often defaults to the year in which the baseline information for the assessment is collected and the future boundary extends no further than including known actions. For the review of this Project, consultation with federal and provincial agencies was conducted on the rationale for the spatial and temporal boundaries described below.

Historical Temporal Boundary:
All historical temporal boundaries were based on the current studies for the Deltaport Third Berth Project EA Application. Most of these were conducted between 2002 and 2004, however for standardization all are indicated as 2003. This is an appropriate baseline, because prior to this date there is a lack of data that is directly comparable to that obtained in the studies for the DP3 EA, which is the focus of this assessment. By definition, using 2003 as the temporal baseline for this CEA automatically includes the cumulative effects of historic and existing projects and

activities because the baseline environmental conditions are a result of the effects of all these projects and activities.

Future Temporal Boundary:
The future temporal boundaries for this assessment extend to 2011, when it is likely that two of the major proposed projects in the area, Deltaport Third Berth and the South Fraser Perimeter Road (SFPR), are scheduled to be operational. For the air quality assessment, the temporal boundary extends to 2021, when the proposed T2, should it proceed, would likely be fully operational.

16.2.2 Existing Environment

For the purpose of this CEA, the contribution of, and the interactions between, specific historical and current development activities were explored to gauge the extent to which they have contributed to the existing environmental conditions. The following existing projects and ongoing activities have influenced existing baseline conditions:

- the existing Roberts Bank port facilities;
- BC Ferries Corporation ferry terminal;
- the Fraser River Port Authority's Fraser Surrey Docks;
- the dykes in the lower Fraser River floodplain;
- dredging of the Fraser River;
- the marine railway to Roberts Bank;
- Deltaport Way and other local roads;
- residential developments;
- adjacent land use including agriculture; and
- overhead utilities including power transmission lines.

Prior to intensive marine and coastal developments, Roberts Bank consisted of gently sloping, homogeneous sand and mud flats (including eelgrass areas) from near high water into and, beyond, low water. On the coastline were freshwater marsh and bog habitats. Construction of the causeways for the two terminals, introduction of non-indigenous species, dykes for agriculture and controls on the Fraser River have altered habitats at Roberts Bank, and the biota that depend on them. Historical trends and conditions for the relevant ecosystem components are described here.

Geomorphology:
Alteration in coastal processes governing tidal flat morphology and physical habitat such as tide direction and magnitude, waves and influx of the Fraser River sediment plume all caused by causeway development and dredging for the BC Ferries and Roberts Bank Port terminals has resulted in the development of drainage (dendritic) channels. The key actions leading to this were dredging the ship turning basin, which triggered head cutting and expansion of eelgrass over the flats, impeding water flow and concentrating water flow in the channels.

Marine Eutrophication:
For marine eutrophication to arise, a number of factors and conditions have to occur. There has to be a source of increased nutrients in the ecosystem, nitrogen and phosphorous being the most problematic. The second is an impediment to tidal flushing, which would otherwise mix and flush the system, and exchange of water/algal biomass accumulations with "new" marine water.

Municipal and industrial effluents from Vancouver are discharged into the Fraser River, and approximately 85% of the nutrients from the Fraser River end up on Roberts Bank. Discharges into the Fraser River have a long history of pollution, and include wastewater treatment plants and industrial effluent inputs, and agricultural and urban runoff. More recent surveys indicate the nutrient concentrations in the Fraser River meet relevant water quality objectives. Other existing sources of nutrients to the inter-causeway area include:

- the existing Deltaport container terminal with a secondary sewage treatment plant that discharges treated effluent into the ship berth area;
- the TFN wastewater treatment plant located in the inter-causeway area which provides secondary sewage treatment;
- the Brandrith pumping station on the north side of the BC Ferries causeway which drains about 1,000 ha of urban and agricultural land adjacent to Roberts Bank;
- non-point source surface water discharges from urban and agricultural land runoff (fertilizer and animal waste) which occur along the Roberts Bank foreshore;
- liquid discharges from container and bulk cargo ships sewage treatment plants which have the potential to release nutrient-laden effluent;
- nitrogen in air emissions that result from the burning of fossil fuels;
- decomposition of algal biomass in the inter-causeway area; and
- although no longer an existing discharge, the BC Ferries terminal, prior to 1993, discharged treated effluent onto Roberts Bank (now connected to the Delta municipal wastewater collection system).

Ambient water quality objectives are currently being met in the area. Decomposition of eelgrass leading to nutrient enrichment and the triggering of macroalgae growth does not appear to be occurring as the intertidal areas appear to have adequate tidal flushing and mixing. The high levels of tidal flushing along with the health and expansion of the eelgrass beds and the high species diversity in the inter-causeway area support the observation that marine eutrophication is unlikely to be presently occurring in the inter-causeway area.

Ecology – Marine Habitats:
The intertidal (brackish and salt) marshes at Roberts Bank have developed in the last 100 years after dykes were constructed to facilitate the conversion of marshes into agricultural land. Brackish marshes (exclusively around Brunswick Point) support a high diversity of vegetation, fish and birds. Macro-scale oceanographic factors – tides and winds – drive saline and sediment-laden fresh water interactions that, in turn, contribute to the biotic make up of this dynamic system. Species supported by this habitat include juvenile salmonids and waterfowl such as piscivorous and wading birds. Salt marshes are also relatively new at Roberts Bank, having been either formed against the causeways, or after dyke construction. Salt marshes are important for primary production, providing food for other parts of the Roberts Bank ecosystem. They are particularly important year round for the feeding, resting and roosting of dabbling ducks.

Intertidal sand and mud flats are distributed north of the Deltaport causeway, and in the inter-causeway area. They were the dominant habitat on Roberts Bank. However, intertidal sand and mud flats have decreased since dyke construction initiated salt and brackish marsh formation, and causeway developments began the process of eelgrass invasion, dendritic channel formation and tidal flat erosion. Some of this habitat is now covered in eelgrass; the remainder supports filamentous algae, bivalves, Dungeness crabs and other invertebrates and fishes such as sculpins, salmonids and flounder. Intertidal sand and mud flats have the highest diversity of invertebrates, with 120 species being found there. The combination of high primary productivity and a nursery habitat for juvenile fish and invertebrates (cockles and crabs) makes these areas valuable for adult stock recruitment and for providing resources to other parts of Roberts Bank. They are also important habitat for migrating shorebirds; herons and gulls use tide pools to forage on invertebrates.

Eelgrass (*Zostera marina*) has expanded approximately 33% in area, from 377 ha in 1967 to 500 ha in 2003, since the construction of the two causeways. This expansion has taken place at the expense of intertidal mudflat, and has been driven by the erosion of the intertidal mudflat, lowering the base level relative to tides, gradually creating an environment where desiccation intolerant biota (eelgrass) are favoured over other species. This has provided more habitat for fish and invertebrates, and feeding areas for dabbling ducks, geese and swans, piscivorous birds

and coastal seabirds. Some of the expansion of eelgrass has been due to invasion by the exotic eelgrass species, *Z. japonica*, which occupies a higher, and hence drier, position on the intertidal flats than the native *Z. marina*. Eelgrass elsewhere in North America is generally declining in extent.

Subtidal sand and mud have increased on Roberts Bank since causeway construction due to more areas of deeper water being created by dredging of ship basins and the creation of dendritic channels. These areas have limited amounts of eelgrass and seaweed (macrophytes) vegetation, and at greater depths macrophytes cease to be present. In shallow areas dabbling ducks and shorebirds forage among the macrophytes on macroinvertebrates. Dungeness crabs are present, especially in areas with finer sediments. Detritus in these areas provides food for crabs, clams and shrimp. English and Dover sole, flounder and lingcod are present here.

There were no areas of intertidal or subtidal rock on Roberts Bank prior to causeway construction or placement of marine protection devices. Rip rap and other hard substrate construction have provided man-made habitat for fish, including salmonids, lingcod, copper rockfish and many other smaller fishes that use it for refuge and foraging on the diverse algal cover. Piscivorous birds, diving ducks and shorebirds utilize this habitat, particularly terns, cormorants and gulls, feeding on the smaller fish living among the crest protection and rip rap structures.

Ecology – Birds:
Roberts Bank is an ecologically significant area where birds migrating seasonally on the Pacific flyway either overwinter, or stop on their way to other locations north or south. There are also resident coastal and terrestrial birds. The high biological productivity and diversity at Roberts Bank contributes to the value it offers to birds; it has received special designation as part of Western Hemisphere Shorebird Reserve Network (WHSRN) and as a proposed provincial Wildlife Management Area.

Dabbling ducks forage and rest in salt marsh, intertidal mudflats and eelgrass. Shorebirds forage rest and roost in salt marsh, intertidal mudflats and intertidal rocky habitat. Diving ducks forage rest and roost in deeper water habitats such as eelgrass (including in dendritic channels), intertidal mudflats and intertidal rock. Gulls scavenge (forage) opportunistically, rest and roost along the shorelines on salt marshes, intertidal mudflats, and in dendritic channels among eelgrass. Piscivorous (fish eating) diving birds forage and roost from intertidal rock, utilizing the deeper water areas of eelgrass, subtidal and intertidal mudflats and intertidal rock. Geese and swans forage rest and roost in salt and brackish marshes.

Changes to bird habitats on Roberts Bank, as a result of causeways and other developments, have created habitat diversity that may not have been present previously. The introduction of intertidal rock and deeper water foraging habitat may have benefited some bird species at the potential expense of others. Unfortunately there is no historical information available that would enable a quantitative comparison to be made.

Overhead powerlines and utility wires are on the causeway leading to the Deltaport facility, and along roads and railway rights of way on land adjacent to Roberts Bank. Overhead wires cause bird mortalities through collision. The risk to birds from these structures has been present since about 1970 on the causeway and before this on adjacent land.

Ecology – Marine Mammals:
Killer whales (southern resident and transient), harbour porpoises, and humpback, fin and grey whales are the most vulnerable in the study area because they have a combination of low population size, and vulnerability to anthropogenic disturbance or habitat disruption. In addition, many populations of these marine mammals are still recovering from earlier commercial hunting operations, or they have declining population numbers. All these species are identified as species at risk, either provincially (red- or blue-listed), federally (COSEWIC) or internationally (World Conservation Union, International Union for the Protection of Nature (IUCN), red book).

Trends of only those marine mammals that are either already at risk, or are likely to be affected by developments in the marine environment at Roberts Bank were considered as part of the CEA:

- *southern resident killer whale* – a small, declining red-listed population that is listed as Endangered on Schedule 1 of SARA;
- *transient killer whale* – red listed, occurring locally in small numbers;
- *grey whale* – frequent visitors to the southern Strait of Georgia;
- *fin and humpback whales* – usually seen offshore; and
- *harbour porpoise* – population under threat with declining numbers.

Ship movements in the Strait of Georgia associated with Deltaport, Westshore and BC Ferries terminals, Fraser Surrey Docks, ports in Washington State, USA (Seattle and Tacoma) as well as fishing and recreational vessels contribute to the potential for marine mammal collisions and increased marine noise levels.

Most marine mammal collisions occur in open waters, often when feeding areas and shipping lanes coincide. A number of collisions reported from the Strait of Georgia in 1999 were thought to be due to this cause. One incidence of injury to a marine mammal by a ferry has been reported; this incident severely injured a killer whale calf. The collision risk as a result of the existing Roberts Bank Port operations (Deltaport and Westshore) is considered to be low, though it is difficult to be definitive because of the limited data available for marine mammal collisions in the Strait of Georgia. Of the quantifiable vessel movements in the Strait of Georgia, 3.1 per day, or 4% of the total of 75, can be attributed to the existing Roberts Bank port.

Marine mammals employ sound, actively or passively, for a variety of purposes including navigation, communication, and foraging. Noise from human activities can affect marine mammal foraging, cause avoidance behaviours, and in extreme cases cause temporary and permanent losses in hearing. Existing underwater ambient noise conditions in the area around Deltaport, and in the Strait of Georgia, are unknown and there are no empirical measurements of ocean ambient noise conditions prior to the introduction of human generated noise to the marine environment. In the absence of both marine ambient noise levels and vessel noise profiles, the effects of existing vessel traffic could only be qualitatively assessed based on incremental increases of vessel numbers.

Noise:
Ambient noise levels were measured at several locations and were considered excessive by a number of residents. In these locations the noise is attributed to road and or rail traffic associated with residential, Deltaport, BC Ferries and commercial (transport and farming) activities. Numerous studies on noise in and around the Roberts Bank Port between 1978 and 2001 collectively indicate that noise in the study area has increased over the past 25 years. These ambient conditions have been increasing over the years since measurements have been undertaken; but noise analysis in 2000 showed no exceedances of COD bylaws and HC guidelines.

Traffic:
Vehicle traffic has increased in the study area since the ferry and Deltaport terminals were constructed, and due to residential, commercial and agricultural development in the area. Deltaport Way was constructed in 1995 to serve the Deltaport facility, which opened in 1997. During the morning and afternoon peaks northbound traffic on Highway 99 towards Massey Tunnel is congested and exceeds available capacity in the tunnel. Most roadways between intersections are relatively free flowing, while intersection delays are substantial.

Construction of Roberts Bank Port facility in 1970 resulted in a new rail line from Langley to Roberts Bank. Since that time, rail traffic has increased on the Port Subdivision rail line to approximately 18 trains per day (9 inbound and 9 outbound). This traffic is comprised of 12 coal trains and 6 container trains per day and can result in delays at many of the 30 at-grade

crossings that are located along the Port subdivision from Roberts Bank to the Township of Langley.

Air Quality:
Historical air quality studies have found air quality at Roberts Bank to meet all relevant regulatory standards for ambient air quality, with only one exception. Periods of high ozone (O_3) exceeding the applicable objectives occurred when a combination of meteorological conditions and high emissions from mobile (vehicle) sources coincided. Modeling undertaken for that study (Jacques Whitford Environmental Limited 2001) accounted for a worst-case scenario for "increased truck traffic on the causeway," and predicted that the "potential for the source emissions to cause adverse environmental effects, including cumulative environmental effects is negligible". Based on ambient air quality measurements in the study area, air quality is characterized as "Good" for the communities of Ladner, Tsawwassen, and North Delta. The recorded levels for air pollutants are within the relevant objectives and standards. The emissions inventory (2003) modeling (RWDI Air Inc. 2005) found that maximum concentrations for pollutants from all sources in the study area are within the most stringent federal, provincial and regional objectives and standards.

16.2.3 Proponent's Assessment of Impacts

Methodology
The CEA of the DP3 Project carried out by the Proponent used the following steps in its methodology:

1. Scoping to identify:
   - VECs, with ecosystem receptors for each;
   - past, present and future projects; and
   - spatial and temporal boundaries for each VEC.

2. Analysis of effects on the ecosystem:
   - historic trends and existing conditions for each ecosystem receptor;
   - contribution of Deltaport Third Berth and other projects;
   - mitigation of effects on each ecosystem receptor; and
   - significance of effects on the VEC.

3. Evaluation of overall significance of cumulative effects.

Scoping
It is commonly accepted practice to only consider VECs in a CEA if there will be residual adverse environmental effects on them in spite of the implementation of appropriate mitigation measures. For this CEA, VECs were included based upon: an investigation of environmental issues raised in the published literature, environmental assessment documents, regional and local planning documents and consultation with experts knowledgeable about the issues at Roberts Bank.

For each VEC under consideration, one or more ecosystem receptors were identified (see Table 35). Ecosystem receptors are environmental characteristics of the VEC that are affected by projects and activities. Ecosystem receptors are more specific than VECs, and often can be analyzed using information that is, and has been, regularly collected in the appropriate study area. They are measurable and therefore quantifiable, and where possible, this allowed predictive analyses to be undertaken.

Table 35 VEC and ecosystem receptors scoped for the cumulative effects assessment of the Deltaport Third Berth Project.

VEC	Ecosystem Receptor
Coastal Geomorphology	marine habitat types
Water Quality	marine eutrophication
Ecology	marine habitats (fish / crabs / others) birds (especially Pacific flyway) marine mammals
Noise	residents' perceptions
Traffic	traffic delays
Air Quality	human health

The CEA of the Project included consideration of existing projects described in section 16.2.2 of this report as part of the existing environment, and future projects and activities that have a high level of certainty of proceeding as listed below:

- the Roberts Bank Container Expansion Program development of T2;
- BC Ferries addition of three new Super C-class ferries;
- Fraser Surrey Docks upgrade to its facilities;
- T2 Project and Deltaport footprint expansion;
- the additional rail infrastructure, including storage tracks at Roberts Bank and mainline improvements required as part of the potential T2 Project;
- dredging activities that will continue to enable navigation of the Fraser River;
- the proposed South Fraser Perimeter Road (SFPR) Project plus any projected increases in traffic on the rest of the road network; and
- planned residential developments in the area.

Analysis of Effects
In the CEA the contribution of, and the interactions between, specific historical and current development activities, were explored to gauge the extent to which they have contributed to the existing environmental conditions. This assessment was undertaken for those VECs where residual effects were expected to occur as a result of the Project. Any ongoing trend in environmental change or effects was explored in the analysis of effects. This is important for effects that have yet to reach equilibrium in the environment, and or when the effect is continuous.

Other activities where effects occur on the VECs within the temporal and spatial boundaries were outlined and their effects noted. The cumulative effects were then discussed and their magnitude evaluated. The interactions of potential effects of the Project with each of the other activities that were considered were compared with ecosystem receptors in Table 36. These interactions defined the separate effects analyses that were conducted for each ecosystem receptor associated with the VEC.

An assessment of the Project related effects, and the effects of all projects and activities, on the ecosystem receptors was conducted and presented in the Application. Analysis of the cumulative effects was completed by comparing them against available thresholds, standards, trends or objectives relevant to the ecological receptors.

16.2.4 Proponent's Detailed Assessment of Impacts

The following sections describe the analysis of the potential effects, and the interactions identified in the scoping of historic and existing and future projects and activities, for each ecosystem receptor.

The requirement for an analysis of any particular potential cumulative effect was established using a matrix of the ecosystem receptors on one axis, and the interactions of the proposed

Project with each of the other (historic, existing and future) activities that were considered, on the other axis. Any cell with a "yes" indicates the potential for effects on the ecosystem receptor from the interaction of the DP3 Project with other projects, and this defined the need for a separate effects analysis. Other VECs were not considered in this CEA because the environmental impact assessment for the Project assessed them as having no residual environmental impact after mitigation measures were applied.

Table 36 Interactions of effects from Deltaport Third Berth with other projects, and the ecosystem receptors

VEC	Ecosystem Receptor \ Other Projects	Sea terminals	Coastal riparian modification	Railways	Roads	Residential developments	Adjacent land uses	Overhead utilities
Coastal Geomorphology	Change in marine habitat types	yes	yes	-	-	-	-	-
Water Quality	Inter-causeway marine eutrophication	yes	-	-	-	yes	yes	-
Ecology	Change in marine habitats	yes	yes	-	-	-	-	-
	Alteration to bird habitat	yes	yes	-	-	-	-	yes
	Marine mammal population effect	yes	-	-	-	-	-	-
Noise	Increase in highly annoyed by noise	yes	-	yes	yes	-	-	-
Traffic	Increased traffic delays	yes	-	yes	yes	yes	-	-
Air Quality	Increase in air contaminant levels	yes	-	yes	yes	-	-	-

Where there are interactions between ecosystem receptors for each VEC, and past, present or future projects, there is potential for cumulative environmental effects. The following sections are the analysis of these potential effects, and the significance of any of the interactions identified in the scoping of historic, existing and future projects and activities, for each ecosystem receptor.

Coastal Geomorphology:
Changes will continue to occur as a result of earlier developments, but the impact assessment showed no increase in the magnitude or extent of these after the introduction of the Project. While this would generally dictate that no cumulative effects assessment on coastal geomorphology processes was required, the role of these processes in shaping habitat for biota was deemed important enough to justify undertaking a cumulative effects assessment.

The distribution of marine habitat was the ecosystem receptor assessed for cumulative effects on coastal geomorphology. Alterations to the coastal environment are reflected in changes in the distribution of habitat for particular biota.

Of the projects and activities outlined in this assessment, the existing terminals, the proposed Deltaport Third Berth and T2 developments, and dredging activities in the Fraser River affect marine habitats in the CEA study area.

The Project is not expected to initiate any new tidal channels because the planned excavation will be in relatively deep water, well below the low tide line. As a result, there will not be further tidal flat erosion or triggering of head cutting. Furthermore, the main structures associated with the Project are not expected to affect tidal current patterns or waves sufficiently to initiate scour or erosion.

As noted in section 16.2, the T2 Project plan has not been finalized, and as a result an assessment of any potential effects on sediment distribution patterns, currents and waves could not be included in the Application. However, an assessment of any interacting effects on tides, currents and sedimentation, between the Deltaport Third Berth and a conceptual location for the proposed T2 development on the west side of the existing Roberts Bank Port facility has shown that there is unlikely to be a synergistic interaction between the two project locations.

Water Quality:
No residual effects on water quality were identified in the assessment conducted for the EA. However, concern has been raised over the potential for marine eutrophication in the inter-causeway area (between the Roberts Bank Port and BC Ferries terminal) due to the cumulative environmental effect of these structures and associated activities increasing the input of contaminants and nutrients, and limiting mixing and dilution of organic material.

Construction and operation of the Project will generate a small increase in anthropogenic nutrients in effluents, which the existing sewage treatment facility can adequately process. The Proponent has stated that the proposed Project is not expected to alter the tidal flushing that would result in hydrodynamic conditions that would trigger the eutrophication process.

There is potential for increases in nutrient loadings from the Brandrith pumping station, the TFN wastewater treatment facility and non-point sources, as land uses change and population increases in the future. Any increase in population, particularly if the TFN seeks to develop more residential use on its land, is at present unknown. Any such developments should be addressed by Project-specific environmental impact assessments and an increase in the capacity of associated sewage treatment facilities if necessary. The proposed T2 Project, if it proceeds, is likely to have a separate tertiary treatment facility for sewage, or will be connected to the municipal system. Thus, the chance of an increase in eutrophication due to increased nutrient inputs is considered low. The Project, in conjunction with other projects and activities is not expected to alter any factors that could trigger the eutrophication process.

Ecology – Marine Habitats:
The marine habitats on Roberts Bank continue to change as a result of the cumulative effects of the causeway developments, dredging on the Fraser River and coastal protection structures (dykes and stop banks). Associated changes to marine habitats and species that utilize these habitats have also not yet reached equilibrium. Eelgrass continues to expand at the expense of intertidal mud flats, intertidal mudflats are eroding and becoming deeper relative to sea level, and salt marshes may continue to develop against the causeways. The construction of the Project is not predicted to contribute further to these evolving changes as the Project will not result in any alterations to waves and currents that manifest in changes to sediment movement or distribution.

There will be effects on marine habitats as a result of the construction of the DP3 because the footprint will remove intertidal and subtidal mud flat habitat. These losses are not expected to have a serious effect on mobile species such as fish and crabs, as they will likely relocate. In addition, disturbance will only take place during non-critical times in the life cycles of these species. Salt marsh and eelgrass/mudflat habitat will be recreated as compensation for that lost

under the footprint. Habitat compensation proposed ensures no net loss of productive capacity. Intertidal rock habitat will be temporarily lost, but it will be replaced following construction.

The exact footprint and location for the proposed T2 has not been determined, so the effects on marine habitats as a result of the construction of this 80 to 100 ha terminal is somewhat hypothetical. However, for any practical location of T2 the direct footprint effects will mostly be on intertidal sand and mudflats, with some proportion of eelgrass and salt marsh habitats also affected. Under the *Policy for the Management of Fish Habitat* pursuant to the *Fisheries Act,* loss of this habitat would have to be compensated for at the time of T2 development to meet DFO's national no net loss guiding principle in order for the Project to proceed. As was noted earlier there is no predicted tidal, current and sedimentation interactions between the existing Roberts Bank Port facility and the Deltaport Third Berth, and the proposed T2 based on a conceptual design and location on the west side of the existing port facility. Therefore there are no additive or synergistic cumulative effects expected between this Project and the proposed T2 Project.

Although the Project does not contribute to additive or synergistic cumulative effects with the existing structures, the dendritic channel formation in the inter-causeway area that has occurred as the result of previous projects has resulted in a substantial area of unvegetated substrate in the midst of dense eelgrass. The proposed DP3 habitat compensation plan includes stabilization of the sandbars that would then provide habitat for invertebrates and/or eelgrass colonization and further increase the habitat productivity of the inter-causeway area.

Ecology – Birds:
The potential impacts of the Project footprint on birds are expected to be addressed through the HCP and AMS.

Concern has been raised over the potential for marine eutrophication in the inter-causeway area due to the cumulative environmental effect of the Project and associated activities, potentially increasing the concentration of nutrients and contaminants. A eutrophication event in the inter-causeway area, affecting bird habitat, though determined to be highly unlikely, would have a high potential to affect bird use. The AMS proposed by VPA is designed to detect and mitigate any emerging trends toward eutrophication.

Other effects of the DP3 Project and T2 include construction noise, light and impacts on foraging (turbid water decreasing visibility) outside the footprint. These construction impacts would be temporary, and after completion of the Project, birds are expected to once again fully utilize these habitats. Many birds are likely to continue using the area during construction in spite of the additional effects. When in operation, the impacts from noise, light and other disturbances are predicted to be only marginally greater than those from the existing facility.

Collision risk with overhead wires and other aerial structures has been raised as a potential cumulative effect. Past studies have indicated that the overhead power lines that were constructed as part of the original Roberts Bank Port development have impacted birds. Studies conducted between April and November 1983 identified 88 dead or injured birds on the Roberts Bank causeway; 61 birds (70%) showed conclusive evidence of wire collisions; cause of death for the remainder was inconclusive. Western sandpiper, a shorebird, was most susceptible (80% of observed mortalities). These mortalities were small in proportion to the birds observed utilizing habitat on Roberts Bank at that time. In a year-long survey from 1994 to 1995, approximately 710 birds were killed due to the overhead power lines on the Roberts Bank causeway, with the top wire presenting the greatest risk.

In 1996, a section of the upper overhead wire, on the Roberts Bank causeway was marked with spiral vibration dampers (or diverters) to make them more conspicuous to birds. It appeared the markers were effective, as there were fewer collisions on marked sections compared to unmarked (control) sections. Fewer mortalities and less severe impacts were attributed to birds being able to see the dampers and react earlier, possibly avoiding collision risk. Diverters were

installed along the entire length of the Roberts Bank causeway on the upper overhead wires. VPA and EC are currently assessing their effectiveness in reducing bird mortality. Field observers have documented that for all weather conditions to date (May-October 2004), the diverters cause birds to cross the power lines higher above the upper wire. The latest survey results (2005) show birds appear to be noticing and avoiding the wires, and there are weak trends indicating the dampers are reducing the risk of collision for all birds. The Project will not require additional overhead lines and it is possible that if T2 were to proceed, with the widening of the causeway, any new transmission lines would be buried.

Ecology – Marine Mammals:
Marine mammals were considered in this CEA because their presence was considered an indicator of a viable ecosystem with abundant resources ranging from plankton utilized by baleen whales to fish used as killer whale prey.

The main effects of construction of the Project and operation of the expanded facilities on marine mammals are additional noise, the potential release of environmental contaminants from dredging and the increased potential for collisions with vessels. These effects are already present at Roberts Bank; construction will temporarily increase noise, and operations will permanently raise potential for noise and collision risk impacts.

Sounds from dredging and construction are likely to be audible to some marine mammals up to 25 km away, and these could elicit behavioural and physiological responses at closer distances. The theoretical zone of audibility for killer whales has been estimated to be approximately 7.5 km until an underwater noise inventory has been completed. Other ongoing activities in the area (dredging in the Fraser River and movement of vessels) are likely to have similar effects, and the additional effects are likely to be incremental. However, the effects of these construction activities on marine mammals would be temporary and reversible.

Disturbance and re-suspension of marine sediments through dredging and disposal at sea has the potential of releasing contaminants into the environment where they may make their way into the food chain. The potential for environmental contaminants, which can be concentrated in marine mammals at the upper end of the food chain, to be present in the sediments of Roberts Bank is not fully known. However, test results on indicator contaminants such as mercury, cadmium and PAHs are within the maximum allowable levels in the *Disposal at Sea Regulations, 2001*.

The potential cumulative effects of additional vessels visiting Deltaport is likely to be negligible, because predicted additional DP3 and T2 ship numbers are low by comparison with other vessel traffic in the study area. While estimates for Deltaport and T2 operations in the future have been made, there is no corresponding information for future vessel movements to and from other bulk, container and ferry terminals. For this analysis a conservative comparison of the projected DP3 and T2 operations with the quantifiable existing (2003) ship movements in the Strait of Georgia from other operations (no future increase in ship movements) was made.

The Project will introduce some additional residual effects of noise and collision risk from additional ship visits. At Deltaport, ship movements are projected to increase from an average of 3.1 per day to 3.4 per day with the proposed Third Berth in operation. Additional ferry movements are also likely, though the magnitude of the increase from the conservative estimate of 45 ferry movements per day is unknown. T2 in operation at 2021 would also increase Deltaport ship movements to approximately 5.3 per day. It is difficult to project container ship numbers into the future, however, recent trends in container cargo point to more, larger vessels being used in the future.

Projected vessel movements to and from the Deltaport facility with the proposed Project (3.4 per day) are much lower than those from the existing BC Ferries terminal (greater than 45 per day), Fraser Surrey Docks (4.2 per day, but projected to increase after expansions), other VPA

terminals (11.4 per day), Seattle and Tacoma ports (11.1 per day) and an unknown number of fishing and pleasure craft. With the proposed T2 Project the number of visits (5.3 per day) is still lower than the existing ferry movements alone. Vessels traveling to and from the Roberts Bank facility exceed the 80 m length criteria for increased risk of collision with marine mammals, but as they approach the Roberts Bank terminal they are generally traveling below 14 knots. Given the low quantity of vessels and the slow speed (generally under 14 knots when approaching Roberts Bank) from existing and projected future vessels visiting Deltaport, compared to other vessels in the Strait of Georgia, the collision and noise risk to marine mammals is considered to be negligible.

Noise Analysis:
The noise analysis undertaken by the Proponent for the impact assessment also takes into account ambient noise from existing projects and activities in the study area. The anticipated addition of noise associated with the Project is predicted, but the likely addition of other proposed projects, which have yet to be assessed using a rigourous methodology (T2 and South Fraser Perimeter Road), has not been included. In addition the viability of T2 depends on improvements to the road and rail network, and until these are planned, and alignments chosen, a detailed quantitative cumulative effects assessment of noise is not feasible.

The percentage of people that would be highly annoyed (% HA) by noise is the quantitative value that was used to assess potential cumulative effects of noise as a result of the Project. The % HA is calculated using the predicted increase in average day and night noise level (dBA L_{dn}), normalized using a rating for particular types of noise associated with the Project (dBA L_{Rdn}). Some residents already consider ambient noise levels in the study area to be excessive. This included the noise from other projects and activities such as rail and road traffic, and BC Ferries terminal operation, for this reason noise is included in the CEA.

The noise expected from both night and day construction activities for the Project is not predicted to increase enough that the changes will be evident to the human ear, therefore impacts on residents in the study area should be minimal. The majority of the material imported to the site of the proposed Project, such as sand, gravel and crushed rock, will be transported by barge, instead of by truck, so the degree of construction traffic, and its noise contribution, is anticipated to be low.

Trains, road traffic (traffic on Deltaport Way associated with Deltaport only), ships (including tugs) and container handling equipment likely to be used in the operation of Deltaport after the Third Berth is complete (2011) are predicted to make a minimal contribution to ambient noise levels at local receptors. For all modeled locations there were insignificant (imperceptible to the human ear) increases, except one which had minimal (>1 dBA) impact. However, some residents already consider the ambient noise levels at many locations excessive. The major source of this excessive noise is from rail operations (trains and whistles). Other sources such as trucks serving the container terminal would have no significant impact (any change is inaudible) on residents in the study area. Alarms for the additional ship-to-shore gantry cranes may be perceptible at locations on the shoreline, but this increase in noise is considered minimal.

The introduction of other proposed projects that may also contribute to noise, such as the South Fraser Perimeter Road and T2, has the potential to further increase noise levels at these and other locations. Assessment of the potential cumulative effects for these other projects cannot be conducted because parameters required for modeling, such as the precise location and operating characteristics (route location, queuing data, volumes of road and rail traffic), for these future projects has either not been determined (T2), or is not yet detailed enough (South Fraser Perimeter Road). Both projects are likely to increase ambient noise levels further in the study area. Based on previous noise assessments, noise level increases associated with T2 could range from 1 to 3 dBA based on historical noise assessments. Both T2 and the South Fraser Perimeter Road will be subject to separate environmental assessments as required by BCEAA and CEAA, which will likely include a noise impact assessment.

Traffic Analysis:
Future car and truck traffic volumes in 2011 were examined to assess the impact of the Project. Traffic volumes in 2011 without the Project were compared with 2011 traffic volumes that included the Project to illustrate any cumulative effect.

The difference between the predicted future traffic volumes with and without DP3 in operation is considered relatively small. For all intersection movements the Project is predicted to increase traffic by less than 10%, and for most movements the increase is estimated at 1 to 4%. The majority of the traffic volume is expected to be as a result of background commuter traffic from residential and agricultural communities and traffic associated with the BC Ferries terminal (approximately 7% increase by 2011). The potential increase in residential population in the area, and the potential for increased ferry sailings is likely to continue to keep the contribution of these activities to traffic volumes in the area high.

By 2021 it is predicted that both the South Fraser Perimeter Road and T2 projects will be operational, increasing traffic volumes in the study area. T2 is predicted to add 1,860 service and delivery vehicles, 1,034 container trucks and 10 container trains per day. BC Ferries predicts a 42% increase in traffic by 2020. Other increases in traffic volumes (residential, commercial and agricultural) are unknown. No quantitative analysis of traffic delays for 2021 has been undertaken. As such, an analysis is dependent on the details of the future road network, which is likely to be profoundly different from the existing network as a result of the proposed South Fraser Perimeter Road Project.

Air Quality Analysis:
The human health risk assessment identified potential impacts on human health associated with emissions and air quality. Two separate, but complementary analyses were undertaken to establish the potential cumulative effects of existing and future projects on human health. Air quality emissions and dispersion modeling to establish contaminant concentrations (for comparison with ambient air quality objectives) and an associated human health assessment were undertaken up to 2011 for the proposed Project.

T2 (which is not expected to be fully operational until 2021) and the South Fraser Perimeter Road lack this detailed design information, and as a consequence, the T2 air quality analysis is limited to an emissions inventory only. Analyses that attempt to assess contaminant concentrations or human health risk beyond air quality predictions for 2011 cannot be completed until more detailed emission information on T2 and the South Fraser Perimeter Road is available.

The air quality predictions for 2011 were based on a conservative (worst-case) estimate of ship visits to Deltaport in 2011 with the Project. For that analysis, the number of ship visits was assumed to be 393 per year. However, there is a trend toward the use of larger container vessels, which means fewer ship visits may be required for the same volume of cargo. However, there would be similar emissions from ancillary port-related sources (trains and dockside equipment) to service the same cargo volume.

In 2011, with the Project in full operation, there is predicted to be either a slight increase (between 5 and 11% for scenario 1 over 2003 emissions for the pollutants modeled, or a slight decrease (between 0% and – 11% for scenario 2 due to the Project. Impacts to projected ambient air quality for 2011 as a direct result of the Project are therefore predicted to be either a minor increase, or a decrease over the existing situation. All maximum predicted concentrations for the 2011 scenario meet the most stringent ambient air quality guidelines or standards.

By 2021 improvements in technology are predicted to reduce emissions from many of the Deltaport-related sources, and as a result, under either 2021 scenario the emissions are predicted to be similar to the existing situation, or reduced by as much as 44%.

Design details, including location, area and operational procedures for the proposed T2 Project have not, as mentioned in section 16.2, been finalized. As a result, predictions of the potential emissions associated with that Project have limitations. The estimates are conservative, and do not take into account emission reduction measures such as dockside power supplies, and sulphur reduction technologies and procedures that would considerably reduce emissions.

Regarding the potential emissions related to the proposed T2 at full operation in 2021, 3 scenarios relating to the mix of vessel sizes that could be expected to deliver the targeted 1.7 million TEU of cargo per year were modeled. The scenarios range from a high of 462 annual ship calls to a low of 237 annual ship calls. T2, when in full operation is predicted to emit slightly more contaminants than the Deltaport (with or without the proposed Third Berth) operation, depending on the contaminants and the mix of vessel sizes that visit. When the predicted T2 emissions are added to the predicted Deltaport emissions (with the proposed Third Berth) there is approximately 50% more emissions for the low estimate of ship visits compared to the existing situation. For the high estimate of ship visits there is an approximate doubling of predicted emissions.

When emissions for all other modeled projects and activities in the area (Highway 17 and the proposed SFPR Project, the BC Ferries terminal, and Westshore coal terminal) are added to the Deltaport-related activities (DP3 and T2), the following results are predicted by the Proponent:

- for the low scenario in 2011 (fewer larger ships visiting Deltaport, no increase in Westshore emissions, 20% increase in ferry emissions and SFPR relocated Highway 17 option) all contaminants decrease (by 2 to 47%) compared to existing emissions;
- for the high scenario in 2011 (more smaller ships visiting Deltaport, 10% increase in Westshore emissions, 20% increase in ferry emissions, and SFPR relocated Highway 17 option), NO_X, CO and VOC are either the same or decrease (0% to 46%) and SO_2, particulate matter (PM) and total suspended particulate (TSP) increase by 2 to 8% compared to existing emissions;
- for the low scenario in 2021 (fewer larger ships visiting Deltaport and T2, no increase in Westshore emissions, 20% increase in ferry emissions and SFPR relocated Highway 17 option) most contaminants increase, but CO and volatile organic compounds (VOC) decrease compared to existing emissions; and
- for the high scenario in 2021 (more smaller ships visiting Deltaport and T2, 10% increase in Westshore emissions, 20% increase in ferry emissions and SFPR relocated Highway 17 option) most contaminants increase, but as with the low scenario, CO and VOC decrease compared to existing emissions.

Emissions of all gaseous pollutants and particulate matter in the area are similar or less under any 2011 scenario compared with the existing situation. While some pollutants (CO and VOC) decrease in 2021 compared to the existing situation, most air pollutant levels increase. It needs to be stressed that the 2021 predictions suffer from limitations, particularly due to no terminal design elements and operational information for the proposed T2 Project.

On the basis of the air quality impact assessments, the contribution of emissions and impact of the Project on ambient air quality is considered to be either negligible, or to decrease relative to the existing situation. This takes into consideration changes in emissions that have a high probability of occurring by 2011, such as increases in background traffic due to population growth and the implementation of legislation regarding improved engine efficiency and fuel quality. Dispersion modeling for 2021 would be required to compare the predicted emissions from T2 against ambient air quality guidelines and standards, but this is premature until uncertainties with future projects (particularly SFPR and T2) are resolved.

A precautionary approach to human health risk estimates indicates an absence of potential acute or chronic health risks for all 2003 and 2011 scenarios (existing 2003 conditions, and predicted 2011 conditions with and without the Project). Health risks of acute and chronic inhalation and ingestion of food grown in the area were negligible for all contaminants, and at all selected

receptor locations; including the TFN community as the closest receptor in the area. There are no particulate matter (PM) guidelines; however these emissions were characterized as low. No assessment of potential human health impacts was conducted beyond 2011 because there is not enough detailed information available for such an analysis at this time.

16.3 ANALYSIS

The RAs considered the information provided by the Proponent, including the Proponent's conclusions on potential effects and the method used to reach those conclusions as outlined above in sections 1 and 2 of this chapter. The RAs then conducted their own analysis of the potential effects and proposed mitigation measures before independently reaching conclusions on the residual effects.

16.3.1 Potential Effects

The Proponent's amended application chapter on CEA took into consideration the comments of the harmonized environmental assessment working group and the public, so potential environmental effects that were not addressed in the original chapter were included in the revised analysis. Thus, there are no additional potential environmental effects other than those that have been previously described in this chapter.

Potential cumulative environmental effects associated with the Deltaport Third Berth Project in relation to existing and future projects and activities identified during the CEA are summarized in Table 37. For these effects the contribution of Deltaport Third Berth Project is low, or low to moderate, and for two (traffic and noise), the effects are considered reversible.

Table 37 Identified potential cumulative effects on each ecosystem receptor

Potential Cumulative Effect	Extent	Magnitude	Duration	Reversibility	Probability	Frequency	Third Berth Contribution
Change in marine habitat types	local	moderate	long	Irreversible	high	continuous	low
Inter-causeway marine eutrophication	local	low	long	reversible	high	periodic	negligible
Change in marine habitats	local	low	long	irreversible	high	continuous	low
Alteration to bird habitat	local	low	long	irreversible	moderate	continuous	low
Marine mammal population effect	regional	low	long	reversible	low	isolated	low
Increase in highly annoyed by noise	regional	high	long	reversible	high	continuous	low
Increased traffic delays	regional	moderate	long	reversible	moderate	periodic	low-moderate
Increased risk to human health	municipal	negligible	long	reversible	moderate	continuous	negligible

16.3.2 Issues

The Proponent's amended Application chapter on CEA (Chapter 23) took into consideration the comments of the harmonized EA working group and the public, so germane issues that were not addressed in the original chapter were included in the revised analysis of the amended chapter.

The amended Application chapter was subject to agency and public review. Comments on the amended CEA chapter are briefly summarized as follows:

- The scope of the cumulative effects assessment was felt to be too narrow by some members of the public.
- Some members of the public felt the assessment of the T2 Project was not adequate.

- COD commented that the assessment should include land uses associated with industrial development in response to port expansion.
- Some members of the public suggested that issues raised by some review agencies such as EC and the public during the review of the Application were not adequately addressed in the amended CEA.

The Proponent responded to all issues raised by the public, First Nations and reviewing agencies.

16.3.3 Mitigation

Where possible, mitigation for the effects of the identified cumulative effects on ecosystem receptors was identified and is summarized below.

An AMS has been developed by the Proponent with input from regulatory and science-based agencies and technical experts. Its purpose is to monitor key environmental variables and provide practical advance warning of potential negative ecosystem trends emerging in the inter-causeway area during Project construction and operation. Monitoring results will be evaluated and compared against action thresholds, and a Scientific Advisory Committee will review those results, their interpretation, advise on recommendations for any required mitigation, and advise on the effectiveness of the AMS.

Coastal Geomorphology – Mitigation of Effects

- Specific mitigation measures associated with coastal geomorphology and marine habitats are described in Chapter 2 – *Coastal Geomorphology;* and
- Proposed AMS to monitor trends and respond to detected changes through the application of mitigation.

Marine Eutrophication – Mitigation of Effects

- Existing treatment facilities and procedures appear to be adequate for the current level of anthropogenic nutrient inputs; and
- Proposed AMS to monitor trends and respond to detected changes with appropriate mitigation.

Marine Habitats – Mitigation of Effects

- Specific mitigation measures associated with marine habitats are described in Chapter 5 – *Marine Environment*;
- Compensation for the loss of habitat will be undertaken in adherence to DFO's no net loss guiding principle. Monitoring will be used to assess the performance of the compensation habitat designs and to ensure there is no net loss of the productive capacity of fish habitat. If the compensation habitat is not functioning to DFO's satisfaction, by the end of the monitoring period specified in the section 35(2) *Fisheries Act* authorization, additional works and monitoring will be required to ensure the compensation habitat functions as designed, or, if appropriate, additional habitat compensation will be provided; and
- Proposed AMS to monitor trends and respond to detected changes and respond with appropriate mitigation.

Birds – Mitigation of Effects

- Specific mitigation measures associated with marine habitats are described in Chapter 6 – *Waterfowl and Coastal Seabirds*;
- Development of inter-causeway habitat compensation to increase feeding areas and resting areas for birds;
- No additional overhead power lines, nor any modifications to the existing power lines, are required for the Project; and
- Proposed AMS to monitor trends and respond to detected changes with appropriate mitigation.

Marine Mammals – Mitigation of Effects

- Avoid construction activity above the noise thresholds for particular species when they are observed close enough for susceptibility;
- Develop an ambient underwater noise inventory for Roberts Bank that the Proponent will share with regulators and researchers;
- The Proponent will work with the BC Pilots Association to develop an education and awareness program about marine mammals and have pilots of vessels transiting to Roberts Bank steer away from observed pods when vessel safety is not compromised; and
- Mitigation for potential underwater noise effects to marine mammals include adjusting vessel speeds to 10 knots or less when approaching the port area and encouraging proper maintenance of ship propellers.

Noise – Mitigation of Effects

- Specific mitigation measures associated with noise are described in Chapter 9 – *Noise Impacts*; and
- Formation of a Roberts Bank Noise Management Committee with representatives of the VPA, terminal and railway operators, municipality and residents.

Traffic – Mitigation of Effects

- Specific mitigation measures associated with traffic delays are described in Chapter 12 – *Socio-community Issues and Economics*;
- To resolve the long-term transportation requirements, a regional plan is currently being prepared by the BC Gateway Program. This plan is examining a number of projects including the proposed SFPR, which ultimately could reduce congestion in Delta; and
- A detailed rail assessment for T2 will be completed in 2006 and the results of this study will be reviewed with COD, the City of Surrey, and the Township and City of Langley. A coordinated road and rail plan will be prepared with input from the rail companies.

Human Health – Mitigation of Effects

- Specific mitigation measures associated with air quality and human health are described in Chapter 8 – *Air Quality*;
- The Proponent will continue to actively work with other ports, industry, regulators and other organizations to create a sulphur emission control area (SECA) where vessels must use <1.5% sulphur fuel oil or use equivalent emission control technology by 2009;
- Continuous improvements in operational efficiencies for the existing Deltaport Terminal and the Project such as new and improved machinery (possible use of diesel-electric hybrid terminal equipment) and procedures (use of ultra-low-sulphur diesel fuel in equipment, fuel catalysts);
- Providing for the possibility of shore based power at Deltaport for ship auxiliary power when ships are at berth;
- Coordinating air quality improvement efforts with railways;
- Introduction of the proposed South Fraser Perimeter Road is predicted to improve traffic flow, thereby reducing vehicle idling time and emissions; and
- With respect to the proposed T2 Project, the Proponent has indicated it believes substantial emissions mitigation will be necessary for it to proceed.

16.4 CONCLUSIONS ON SIGNIFICANCE OF EFFECTS

During the harmonized environmental assessment, the EAO and the RAs and the working groups have considered: the Application; comments from the government agencies, First Nations and the public on the potential effects of the Project; responses by the Proponent; and the discussions of the working groups.