



AECOM

Chapter 3

**Environmental Review
Methodology**

Chapter Contents

3.	Environmental Review Methodology.....	3-1
3.1	Introduction	3-1
3.2	Scoping the Review	3-2
3.2.1	Project Components to be Reviewed	3-2
3.2.2	Environmental Components	3-4
3.2.3	Indicators	3-5
3.2.4	Geographical Extent (Spatial Boundaries).....	3-12
3.2.5	Temporal Boundaries.....	3-12
3.2.6	Guidelines and Threshold References	3-12
3.3	Characterization of Significance	3-13

List of Tables

Table 3-1:	Terminal and Off-Terminal Works.....	3-2
Table 3-2:	Project Interactions Matrix	3-5
Table 3-3:	Project Interactions Summary.....	3-6
Table 3-4:	Standards and Guidance Documents.....	3-13

3. Environmental Review Methodology

3.1 Introduction

As described in Section 1.5 the proposed Project is not a CEAA 2012 “designated project,” and is not listed in the *Regulations Designating Physical Activities*, and an EA pursuant to CEAA 2012 is not required. Under section 67 of CEAA 2012, the port authority, as a responsible federal authority, must determine whether any project carried out on federal land under its jurisdiction is likely to cause significant adverse environmental effects. To meet this requirement, the port authority will identify whether there are any adverse effects associated with the proposed Project that remain after mitigation measures are implemented (residual effects) and determine whether the proposed Project is likely to cause significant adverse effects on the environment. This review will be achieved by the port authority through the PER process. The environmental effects to be analyzed by the port authority under section 67 of CEAA 2012 are listed in section 5 of CEAA 2012. The port authority also reviews other potential impacts of projects pursuant to the port authority’s responsibilities under the *Canada Marine Act*, the *Port Authorities Operations Regulations* (SOR/2000-55), and port authority policy. This may include traffic and transportation impacts and community concerns such as views, noise, lighting, and other matters relevant to the application (PMV 2015h).

The characterization of environmental effects and other potential impacts in this Report has been designed to support the port authority in their review of and decision-making with respect to the proposed Project, including their determination pursuant to section 67 of CEAA 2012. This chapter describes the methodology used in this Report to characterize the environmental effects and other potential impacts of the proposed Project. While the methodology is informed by practices followed in EA processes, this Report does not comprise a formal EA. In particular, the methodology is designed to comply with the port authority’s PER guidelines and the Project Submission Requirements.

The methodology follows the five steps listed below, which are more fully described in the following sections.

1. Establishing the scope of the review; this involves determining the boundaries of the review by defining the:
 - components and activities (Project Components) of the proposed Project located on federal lands that will be part of the review
 - areas of environmental and other impact (Environmental Components) associated with the Project Components to be characterized
 - geographic extent (spatial boundaries) within which impacts will be considered
 - time period (temporal boundaries) for which impacts will be considered
2. Describing the existing conditions and the current state of each Environmental Component
3. Describing how Project Components may affect each Environment Component and identifying mitigation measures to address anticipated effects
4. Determining whether there are any residual effects remaining after proposed mitigation measures are applied
5. Providing a preliminary characterization of the significance of any residual effects

3.2 Scoping the Review

3.2.1 Project Components to be Reviewed

To effectively identify and characterize the effects of the proposed Project, it is necessary to clearly establish the scope of the review; this is an important part of the PER process.

The review focuses on environmental and other impacts directly produced as a result of the physical works and activities associated with the proposed Project.

The main function of the proposed Project is to handle the transshipment of containers to and from marine vessels and rail and truck transport. The proposed Project would increase the capacity and efficiency of existing container handling operations. The components of the proposed Project that will be reviewed are presented in Table 3-1.

Table 3-1: Terminal and Off-Terminal Works

Design Component	Summary
Terminal Works	
Western Expansion	<ul style="list-style-type: none"> ▪ Extending Berth 6 by installing a 78 m caisson extension to the existing wharf. ▪ Dredging under the caisson extension and perimeter dyke (235,000 m³). ▪ In-filling approximately 4.2 ha of Burrard Inlet to create an additional 2.9 ha of terminal surface (including perimeter rock dykes). ▪ Expanding the container and intermodal yards westward. ▪ Removing the existing mooring dolphin 76 m west of the existing berth limit.
Eastern Expansion	<ul style="list-style-type: none"> ▪ Removing the existing pulp shed (Shed 3), Ballantyne Pier pile and deck structure, and marginal wharf. ▪ Dredging under the east dyke footprint (155,000 m³). ▪ In-filling approximately 4 ha of the inlet between Ballantyne Pier and Burrard Slip to create an additional 2.0 ha of land for terminal operations. ▪ Constructing perimeter dykes to contain the in-fill required to create the extra 1.7 ha of land.
Intermodal Yard	<ul style="list-style-type: none"> ▪ Extending the four existing intermodal yard tracks to 914 m (3,000 ft). ▪ Adding a fifth 914 m track to provide a total of five parallel tracks, increasing the overall intermodal yard to a total of 4,570 m (15,000 ft) of track. ▪ Demolishing Heatley Avenue Overpass and adjacent Centennial Main Office to facilitate expanding the intermodal yard and associated container yard stacks and terminal gates.
Container Yard	<ul style="list-style-type: none"> ▪ Extending the rubber-tired gantry crane operated container sections (east and west to match intermodal yard). ▪ Relocating the reefer towers (refrigerated container stacks). ▪ Reconfiguring the north container yard (including operations equipment storage along Berth 4) into a layout to provide four parallel container sections (for empties and grounded containers for longer storage).

Design Component	Summary
Truck Gate	<ul style="list-style-type: none"> ▪ New truck gate and operations infrastructure comprising: <ul style="list-style-type: none"> ○ Pre-in gate: two lanes complete with optical character recognition portals plus an overwidth exceptions lane. Rejection capability included. ○ Main in gate: four lanes plus an overwidth exceptions lane. ○ Pre-out gate: three lanes complete with optical character recognition portals plus an overwidth exceptions lane. Rejection capability included. ○ Main out gate: two lanes plus an overwidth exceptions lane. ○ Initial Terminal staging (10 stalls) to handle short-term vehicle stoppages. ○ Trouble vehicle parking (6 stalls) to accommodate vehicles with outstanding issues to resolve. ▪ Stalls adjacent to the Container Operations Facility to accommodate up to 63 internal transfer vehicles (drive in/reverse out operations) and 72 terminal support vehicles (pickup trucks and vans). ▪ Off-Terminal parking adjacent to the Container Operations Facility with swipe card controlled access consisting of 520 stalls for employees and visitors. ▪ Expanding the existing parking lot serving the Container Site Servicing Facility to 100 stalls.
Terminal Buildings	<ul style="list-style-type: none"> ▪ Upgrading the existing Ballantyne Heritage Structure to create the Container Operations Facility, including seismic retrofit, foundation improvements, and building a 1,200 m² annex to the north, to provide 4,000 m² of floor space. ▪ Consolidating the existing terminal buildings into the Container Operations Facility. ▪ Replacing the existing Container Berth Lunchroom with a smaller structure.
Electrical, Security and Communications Infrastructure	<ul style="list-style-type: none"> ▪ Altering and expanding the existing terminal power, security, and communications systems to match the changes to the Terminal layout.
Utilities	<ul style="list-style-type: none"> ▪ Altering and expanding the existing terminal utilities to match the changes to the Terminal layout.
Terminal Outfitting	<ul style="list-style-type: none"> ▪ Upgrades by DPWV to control systems and yard equipment to complement the physical changes to the Terminal and commission new operational activities, including: <ul style="list-style-type: none"> ○ One new quay crane and one quay crane replacement, both electric. ○ Up to five new electrified rail-mounted gantry cranes to service the intermodal yard. ○ Up to 20 internal transfer vehicles and associated equipment to meet Tier 4 standards for diesel engines. ○ Redistribution of the existing rail-mounted gantry in the container yard to service container stacks feeding the intermodal yard. ○ Fit out of Container Operations Facility (reusing the Ballantyne Heritage Structure). ○ Installation of new terminal gate technology. ○ Installation of a new storage facility, the Container Maintenance Warehouse.
Navigational Turning Basin for Cruise Ship Berth	<ul style="list-style-type: none"> ▪ Dredging to enhance a navigational turning basin in the area between the westward expansion of Centerm and the SeaBus Terminal.
Off-Terminal Works	
Roadways	<ul style="list-style-type: none"> ▪ Extending the Waterfront Road east of Main Street, through the intersection with Dunlevy Avenue, paralleling the CNR support yard and connecting into Centennial Road. This will include the inclusion of a sidewalk to maintain pedestrian connectivity to Main Street. ▪ Building a new vehicle access control system gate on Waterfront Road east of the intersection with Main Street, replacing the gate removed as a result of the demolition of the Heatley Avenue Overpass.

Design Component	Summary
Transportation Structures	<ul style="list-style-type: none"> ▪ A new overpass to the truck gate to replace connectivity as a result of the removal of the Heatley Avenue Overpass to facilitate terminal expansion. ▪ Centennial Road Overpass - A new road overpass between Clark Drive and Centerm, spanning multiple rail crossings along Centennial Road, including a roundabout at Clark Drive to accommodate access to/from Rogers Street. Additionally, the Vanterm West rail spur will be re-aligned to accommodate the Centennial Road Overpass. Alteration to the existing Clark Drive Overpass approach ramp (and associated infrastructure) will be needed to accommodate the proposed roundabout. The Centennial Road Overpass will also include pedestrian connectivity by connecting existing sidewalks on Centennial Road and Stewart Street with a new at-grade connection under the structure.
Rail	<ul style="list-style-type: none"> ▪ Altering the rail yard south of the Terminal to accommodate the southward expansion of the Terminal. ▪ Maintain usable 457 m (1,500 ft) track lengths within the support yard and maintain the existing overall track length in the support yard.
Electrical, Security and Communications Infrastructure	<ul style="list-style-type: none"> ▪ Altering street lighting, port authority security systems, and communications infrastructure.
Utilities	<ul style="list-style-type: none"> ▪ Altering existing utilities in the roadway corridor to accommodate the proposed Centennial Road Overpass.

3.2.2 Environmental Components

The second element of scoping is to focus the review on those Environmental Components that the Project Components may adversely affect and that therefore have the most relevance to the decision-making process. The areas of environmental effects and other impacts to be characterized are referred to as “Environmental Components” because they are the elements of the environment that have ecological, economic, social, or cultural importance. The port authority uses internal technical expertise and feedback from government agencies, Aboriginal groups, and the public to select the environmental effects and other impacts to be reviewed. These are established through the Project Submission Requirements, which determines the studies, reports, and plans that must be completed to support the PER Application.

Based on the Project Submission Requirements, the following Environmental Components were identified:

- Acoustic Environment
- Air Quality
- GHG Emissions
- Marine Water and Sediment Quality
- Marine Resources (Fish, Fish Habitat, Marine Birds, and Marine Mammals)
- Terrestrial Resources (Vegetation and Wildlife)
- Archaeological Resources
- Heritage Resources

Potential interactions between the proposed Project and Environmental Components are identified in Table 3-2.

Table 3-2: Project Interactions Matrix

Project Activity	Environmental Components								
	Acoustic Environment	Air Quality	GHG Emissions	Marine Water and Sediment Quality	Marine Resources: Fish, Fish Habitat, Marine Birds, and Marine Mammals	Terrestrial Resources: Vegetation	Terrestrial Resources: Wildlife	Archaeological Resources	Heritage Resources
Construction Phase Terminal and Off-Terminal									
Western Terminal Expansion	X	X	X	X	X	X	X		
Eastern Terminal Expansion	X	X	X	X	X	X	X		
Expansion of intermodal yard to extend existing track	X	X	X			X			
Removal of the Heatley Avenue Overpass	X	X	X			X			
Reconfiguration of Container Yard	X	X	X			X	X		
Container Operations Facility	X	X	X			X		X	X
Terminal Operations Parking	X	X	X			X			
Reconfiguration of truck gate area	X	X	X			X			
Introduction of new employee parking capacity	X	X	X			X			
Terminal Outfit Project	X	X	X			X		X	X
Roadways – Waterfront Road Extension and VACS Gates	X	X	X			X		X	X
Transportation Structures – Grade Separation (Centennial Road Overpass)	X	X	X			X		X	X
Rail Alteration	X	X	X			X			
Navigational Turning Basin for Cruise Ship Berth				X	X				
Operations Phase Terminal	X	X	X						
Operations Phase Off-Terminal	X	X	X						

3.2.3 Indicators

Indicators are the parameters, or a value derived from parameters, that are used to describe both the existing state of an Environmental Component and the potential change to the integrity of the Environmental Component that could occur as a result of project effects. Table 3-3 lists the indicators used in this Report to describe and characterize the change to the integrity of an Environmental Component.

Table 3-3: Project Interactions Summary

Environmental Component	Project Interaction	Potential Effects of the Proposed Project	Study Area	Indicators	Guidelines and Threshold References
<p>Acoustic Environment</p>	<p>Construction:</p> <ul style="list-style-type: none"> ▪ Noise will be generated due to construction activities and from equipment <p>Operation:</p> <ul style="list-style-type: none"> ▪ Road traffic, rail operations, and marine vessels ▪ Use of mobile equipment on-site to move containers 	<p>Increased noise in the surrounding community</p> <p>Construction noise mitigation measures are listed in the CEMP (AECOM 2016a)</p>	<p>Sensitive receptors up to 1.5 km away from proposed Project</p>	<ul style="list-style-type: none"> ▪ Sound levels ▪ Increase in percentage of highly annoyed individuals 	<ul style="list-style-type: none"> ▪ Port Authority <i>Environmental Noise Assessment Guidelines</i> (PMV 2015c) ▪ ISO/R 1996-1:2003 Guidelines
<p>Air Quality</p>	<p>Construction:</p> <ul style="list-style-type: none"> ▪ Emissions will be generated due to construction activities and from equipment <p>Operation:</p> <ul style="list-style-type: none"> ▪ Road traffic, rail operations, and marine vessels ▪ Use of mobile equipment on-site to move containers ▪ Diesel power generation 	<p>Deterioration of air quality through emissions of criteria air contaminants (CACs) and volatile organic compounds (VOCs)</p> <p>Construction air quality mitigation measures are listed in the CEMP (AECOM 2016a)</p>	<p>10 km by 10 km area centred on the Project site; emissions included Terminal operations, shipping, and rail and truck emissions</p>	<ul style="list-style-type: none"> ▪ Carbon monoxide (CO) ▪ Nitrogen oxides (NO_x including NO₂) ▪ Sulphur oxides (SO_x, including SO₂) ▪ Particulate matter 10 micrometres or less in diameter (PM₁₀) ▪ Particulate matter 2.5 micrometres or less in diameter (PM_{2.5}) ▪ Diesel particulate matter (DPM) ▪ Black carbon ▪ Concentrations of VOCs 	<ul style="list-style-type: none"> ▪ Port Authority <i>Environmental Air Assessment Guidelines</i> (PMV 2015d) ▪ National Ambient Air Quality Objectives (NAAQO) ▪ British Columbia Ambient Air Quality Objectives (BCAAQO) ▪ Metro Vancouver's Ambient Air Quality Objectives (MVAAQO)

Environmental Component	Project Interaction	Potential Effects of the Proposed Project	Study Area	Indicators	Guidelines and Threshold References
GHGs	Operation: <ul style="list-style-type: none"> ▪ Road traffic, rail operations, and marine vessels ▪ Use of mobile equipment on-site to move containers ▪ Diesel power generation (marine) ▪ Air conditioning/ refrigeration leakage 	Increase in atmospheric GHGs	Project emissions from sources within the Site. Supply chain emissions from marine activity in the Inner Harbour to the western boundary of the port authority's jurisdiction for Burrard Inlet; truck transportation to Highway 1; and rail transportation to Coquitlam	Carbon dioxide equivalents (CO ₂ e)	Comparison of Project GHG levels to provincial, national, and global levels of CO ₂ e
Marine Water Quality	Construction: <ul style="list-style-type: none"> ▪ Sediment dredging may temporarily increase water column turbidity by increasing total suspended solids (TSS), which may also be potentially contaminated ▪ Expulsion of potentially contaminated pore water by preloading and infilling of sediment bed 	Deterioration of marine water quality in the vicinity of the dredge area	The marine environment within 250 m of the boundary of in-water works	Measured (baseline) and modelled (future) water column concentrations of TSS, metals and poly aromatic hydrocarbons	CCME <i>Water Quality Guidelines for Protection of Marine Aquatic Life</i> . In the absence of CCME values, <i>BC Ambient Water Quality Guidelines</i> for marine waters were used. CCME <i>Guidelines for Canadian Recreational Water Quality</i> were used to evaluate human health effects
	Operation: <ul style="list-style-type: none"> ▪ Influence of expanded western land footprint on tidal circulation regime in embayment between Centerm and the cruise ship terminal including CRAB Park 	Increased flushing time of the embayment by local tidal currents	The embayment between the western end of Centerm and the cruise ship terminal to the west	Embayment flushing dynamics (i.e., flushing time of the embayment)	Referenced to baseline conditions

Environmental Component	Project Interaction	Potential Effects of the Proposed Project	Study Area	Indicators	Guidelines and Threshold References
	Construction and Operation: <ul style="list-style-type: none"> ▪ Discharge of Project stormwater to the marine environment 	Deterioration of marine water quality in the vicinity of the Project	The marine environment within 250 m of the boundary of the Centerm Terminal, including the expansion	Concentrations of contaminants including TSS, metals, and poly aromatic hydrocarbons	CCME <i>Water Quality Guideline Criteria for Protection of Marine Aquatic Life</i> . In the absence of CCME values, BC <i>Ambient Water Quality Guidelines</i> for marine waters were used
Marine Sediment Quality	Construction: <ul style="list-style-type: none"> ▪ Dredging of sediments may result in local fugitive dispersion of potentially contaminated sediments to the nearfield existing sediment bed 	Deterioration of marine sediment quality in the vicinity of the dredge area	The marine environment within 250 m of in-water works	Concentrations of contaminants (e.g., metals and poly aromatic hydrocarbons)	CCME <i>Sediment Quality Guideline Criteria for Protection of Marine Aquatic Life</i>

Environmental Component	Project Interaction	Potential Effects of the Proposed Project	Study Area	Indicators	Guidelines and Threshold References
<p style="text-align: center;">Marine Resources</p> <p>Fish and Fish Habitat</p>	<p>Construction:</p> <ul style="list-style-type: none"> ▪ Footprint of terminal expansion on existing fish habitat ▪ Debris and other products entering the marine environment for the demolition and rehabilitation of Ballantyne Pier ▪ Dredging and infilling activities affecting fish and fish habitat ▪ Stormwater discharges affecting fish habitat ▪ Light from construction activities affecting fish behaviour ▪ Underwater noise from in-water construction activities affecting fish behaviour <p>Operation:</p> <ul style="list-style-type: none"> ▪ Light and noise from terminal activity ▪ Stormwater discharge 	<ul style="list-style-type: none"> ▪ Loss of fish habitat ▪ Serious harm to fish ▪ Deterioration of habitat quality from increased noise, degraded water quality, increased light levels, and deposition of contaminated sediment 	<p>The marine environment within 250 m of the boundary of in-water works</p>	<ul style="list-style-type: none"> ▪ Concentration of contaminants in water and sediment ▪ Presence of species of conservation concern¹ ▪ Quality and quantity of the habitat within the study area 	<ul style="list-style-type: none"> ▪ CCME <i>Sediment and Water Quality Guideline Criteria for Protection of Marine Aquatic Life</i> ▪ <i>Fisheries Act</i> ▪ <i>Species at Risk Act</i>

¹ Regulators, Aboriginal groups, and other stakeholders are particularly concerned about species of conservation concern. For the purposes of this report, they are considered BC species: listed on Schedule 1 of SARA assessed by COSEWIC as endangered, threatened, or special concern provincially listed in British Columbia as Red or Blue

Environmental Component		Project Interaction	Potential Effects of the Proposed Project	Study Area	Indicators	Guidelines and Threshold References
	Marine Birds	Construction: <ul style="list-style-type: none"> On-water construction activity Operation: <ul style="list-style-type: none"> Marine shipping activities 	<ul style="list-style-type: none"> Disrupting feeding Disrupting nesting 	Inner Harbour	<ul style="list-style-type: none"> The diversity of marine birds present in the study area including Species of Conservation Concern Habitat use in the study area 	<ul style="list-style-type: none"> <i>Migratory Birds Convention Act</i> <i>Species at Risk Act</i>
	Marine Mammals	Construction: <ul style="list-style-type: none"> Underwater noise from in-water construction activities Operation: <ul style="list-style-type: none"> Marine shipping activities 	Deterioration of habitat quality from increased project activities, such as increases in vessel movement causing changes in the acoustic environment and potential collisions with ships	Inner Harbour and out to the port authority's western boundary for Burrard Inlet	<ul style="list-style-type: none"> Marine mammal presence including Species of Conservation Concern Relative abundance of marine mammals in the study area 	<ul style="list-style-type: none"> <i>Marine Mammal Regulations</i> under the <i>Fisheries Act</i> <i>Species at Risk Act</i>
Terrestrial Resources	Vegetation	Construction: <ul style="list-style-type: none"> Clearing and site preparation of the terrestrial Project footprint 	<ul style="list-style-type: none"> Vegetation removal or disturbance Introduction of invasive plants and noxious weeds 	The terrestrial within and immediately adjacent to the proposed Project footprint	Plant species present on-site including any Species of Conservation Concern and invasive species	<ul style="list-style-type: none"> <i>Species at Risk Act</i>
	Wildlife	Construction: <ul style="list-style-type: none"> Clearing and site preparation of the terrestrial Project footprint Lighting Operation: <ul style="list-style-type: none"> Lighting New buildings 	<ul style="list-style-type: none"> Loss of wildlife habitat Nest destruction or disruption/ abandonment during construction Lighting effects Bird strikes with windows of new buildings 	Within 250 m of the proposed Project footprint	Presence and distribution of habitats that support wildlife including habitat used by nesting birds and Species of Conservation Concern	<ul style="list-style-type: none"> <i>Species at Risk Act</i> <i>Migratory Birds Convention Act</i>

Environmental Component	Project Interaction	Potential Effects of the Proposed Project	Study Area	Indicators	Guidelines and Threshold References
Archaeological Resources	Construction: <ul style="list-style-type: none"> ▪ Clearing and site preparation of the Project footprint 	<ul style="list-style-type: none"> ▪ Potential for disturbance of known archaeological sites and the potential for disturbance to sites that are present but have not yet been recorded 	Project footprint	<ul style="list-style-type: none"> ▪ Presence of known or potential archaeological sites within the Project footprint 	<ul style="list-style-type: none"> ▪ <i>Standards and Guidelines for the Conservation of Historic Places in Canada</i> (Parks Canada 2010)
Heritage Resources	Construction: <ul style="list-style-type: none"> ▪ Alteration of lands adjacent to historic buildings 	<ul style="list-style-type: none"> ▪ Potential for direct physical effects on or changes to, the environment surrounding Shed One on the Ballantyne Pier, Rogers Sugar building, and Mission to Seafarers building 	Historic places that are adjacent to the Project footprint	<ul style="list-style-type: none"> ▪ Physical alteration to historic places and their immediate surroundings 	<ul style="list-style-type: none"> ▪ <i>Standards and Guidelines for the Conservation of Historic Places in Canada</i> (Parks Canada 2010)

3.2.4 Geographical Extent (Spatial Boundaries)

The process of scoping the review of environmental effects and other impacts requires defining the geographical extent of the studies that need to be conducted (Study Area) as well as the boundaries of the review. The spatial boundaries of the Study Area need to consider the geographic range of the Environmental Component and the geographic extent of the direct project effects. This means that the spatial boundaries may extend beyond the proposed Project Site or jurisdictional boundaries of the port authority. For example, spatial boundaries for air quality take into account that, regardless of jurisdictional boundaries, air contaminants can be carried into the atmosphere far from the source of the emission. This also means that spatial boundaries are specific to, and vary depending on, the Environmental Component.

Table 3-3 lists the Study Areas used in this Report.

3.2.5 Temporal Boundaries

Following guidance of the port authority, the review will consider the environmental effects and other impacts associated with the Project Components from the date construction is initiated to the time the proposed Project is expected to achieve full operating capacity.

Construction is expected take two years and the proposed Project is expected to reach full operating capacity within five years of starting operations. The operating life of the Project is expected to be in excess of 20 years. DPWV has a long-term lease for the Terminal and this lease may be extended. The environmental effects and other impacts occurring at the time the Project reaches full operating capacity are expected to continue throughout the operating life of the Project.

3.2.6 Guidelines and Threshold References

The characterization of environmental effects presented in this Report relies on determining the degree of change to an Environmental Component from existing conditions to predicted conditions as a result of effects from the proposed Project after mitigation measures are put into place. Determining the severity of that change will normally rely on comparison against accepted thresholds or limits. This Report took into consideration thresholds or limits drawn from guidelines and performance standards from multiple sources even though they may not be legally binding on federal lands. The Report draws on guidelines from the CCME, provincial regulations, and local bylaws.

The guidelines and standards used for characterizing effects are summarized in Table 3-4 and are described in further detail in relation to the environmental studies in Chapters 4 through 11.

Table 3-4: Standards and Guidance Documents

Environmental Component	Standards and Guidance Documents
Acoustic Environment	<ul style="list-style-type: none"> ▪ Port authority's Environmental Noise Assessment Guidelines (PMV 2015c) ▪ Health Canada document <i>Useful Information for Environmental Assessments</i> (2010b) ▪ ISO/R 1996-1:2003 guidelines
Air Quality	<ul style="list-style-type: none"> ▪ Port authority's Guidelines for Environmental Air Assessment (PMV 2015d) ▪ <i>Guidelines for Air Quality Dispersion Modelling in British Columbia</i> (BC MOE 2008) ▪ United States Environmental Protection Agency (USEPA) <i>Guideline on Air Quality Models</i> (USEPA 2005)
GHG Emissions	<ul style="list-style-type: none"> ▪ <i>British Columbia Best Practices Methodology for Quantifying Greenhouse Gas Emissions</i> (BC MOE 2014a) ▪ <i>Fuel Efficiency Benchmarking in Canada's Trucking Industry</i> (Natural Resources Canada 2015) ▪ Rail Trends 2015 (Railway Association of Canada 2015) ▪ Canada's Greenhouse Gas Inventory 1999-2002 (ECCC 2004) ▪ <i>BC Ocean Going Vessel Emissions Inventory</i> (BC Chamber of Shipping 2007) ▪ The Climate Registry Default Emission Factors (The Climate Registry 2015)
Marine Water and Sediment Quality	<ul style="list-style-type: none"> ▪ CCME <i>Water Quality Guidelines for the Protection of Marine Aquatic Life</i> (CCME 2003) ▪ CCME <i>Sediment Quality Guidelines for Protection of Marine Aquatic Life</i> ▪ BC <i>Approved Ambient Water Quality Guidelines for Protection of Marine Aquatic Life</i>
Marine Resources: Fish, Fish Habitat, Marine Birds, and Marine Mammals	<ul style="list-style-type: none"> ▪ CCME <i>Sediment and Water Quality Guidelines for Protection of Marine Aquatic Life</i> ▪ <i>Fisheries Act</i> ▪ <i>Migratory Birds Convention Act</i> ▪ Schedule 1 of the <i>Species at Risk Act</i> ▪ <i>Marine Mammal Regulations</i>
Terrestrial Resources: Vegetation and Wildlife	<ul style="list-style-type: none"> ▪ Schedule 1 of the <i>Species at Risk Act</i> ▪ <i>Migratory Birds Convention Act</i>
Archaeological Resources	<ul style="list-style-type: none"> ▪ Parks Canada's <i>Standards and Guidelines for the Conservation of Historic Places in Canada</i> (2010)
Heritage Resources	<ul style="list-style-type: none"> ▪ Parks Canada's <i>Standards and Guidelines for the Conservation of Historic Places in Canada</i> (2010)

3.3 Characterization of Significance

Pursuant to section 67 of CEEA 2012, the port authority has the responsibility for determining whether the proposed Project is likely to result in significant adverse environmental effects. The assessment of adverse environmental effects and other impacts culminates in a determination about whether there are any adverse residual effects and if so whether those adverse residual effects are significant. Residual effects are those effects that remain after technically and economically feasible measures to mitigate the potential effect are applied. The characterization of the significance of residual effects presented in this Report is a summary of factors that the port authority can consider in making their determination.

The criteria used for characterizing significance are based on the overall risk of the residual effect to the Environment Component based on:

- the severity of the effect on the Environmental Component in relation to an established threshold such as a regulatory limit or the size or percentage of the population or resource affected
- the size of the area affected
- the length of time the residual effect is expected to last
- the frequency the residual effect is expected to occur
- the extent to which the Environmental Component can recover from the effect
- the vulnerability of the Environmental Component such as whether it is unique or endangered

These factors must be considered as a whole in characterizing significance, since for example a residual effect could be severe in magnitude but limited in geographic extent, infrequent, short lived, and the Environmental Component could easily recover. The characterization of the significance of residual effects presented in this Report is based on the results of environmental studies combined with professional judgement.