EAO | Environmental Assessment Office

Draft Assessment Report for Vopak Pacific Canada Project

With respect to the application by Vopak Development Canada Inc. for an Environmental Assessment Certificate pursuant to the *Environmental Assessment Act*, S.B.C. 2002, c. 43

XX XX, 2021

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ACRONYM LIST

°C	degree Celsius
µg/L	micrograms per litre
µg/m³	micrograms per cubic metre
µm	micrometres
AAQO	Ambient Air Quality Objective
Act	*Environmental Assessment Act*
AIA	Archaeological Impact Assessment
AIA	Archaeological Impact Assessment
AIR	Application Information Requirements
AMP	Adaptive Management Plan
AOA	Archaeological Overview Assessment
Application	Application for an Environmental Assessment Certificate
ASL	Ambient Sound Level
BAT	best achievable technology
BC	British Columbia
BC OGC	BC Oil and Gas Commission
BC	British Columbia
BMP	Best Management Practices
C&E	Compliance and Enforcement
CAC	criteria air contaminants
CAD	Canadian dollar
CCG	Canadian Coast Guard
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
CEMP	Construction Environmental Management Plan
CH_4	methane
CMT	Culturally Modified Trees
CMT	Culturally-modified tree
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COC	Contaminants of Concern
COPC	constituent of potential concern
CPD	Certified Project Description
dB	decibel
dBA	A-weighted decibel
DFO	Department of Fisheries and Oceans Canada
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office

ECCC	Environment and Climate Change Canada
EMA	*Environmental Management Act*
EMLI	Ministry of Energy, Mines and Petroleum Resources
EMP	Environmental Management Plan
ENV	Ministry of Environment and Climate Change Strategy
EPIC	EAO Project Information Centre
EPP	Environmental Protection Plan
ESL	estimated sound levels
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
FTE	full time equivalent
GBPU	Grizzly Bear Population Unit
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GHG	greenhouse gas
Gitga'at	Gitga'at First Nation
Gitxaała	Gitxaała Nation
ha	hectare
HA	Highly Annoyed
HC	Health Canada
HCA	*Heritage Conservation Act*
HHRA	Human Health Risk Assessment
hr	hour
Kg	kilogram
kg/t	kilogram per tonne
Kitselas	Kitselas First Nation
Kitsumkalum	Kitsumkalum First Nation
km	kilometre
km^2	square kilometer
Kt	kilotonne
kV	kilovolt
L	Litres
L/s	Litres per second
LAA	Local Assessment Area
Lax Kw'alaams	Lax Kw'laams Band
LNG	liquefied natural gas
LSA	Local Study Area
LSA	local study area
m	Metre
m	metre
m^2	square metre
m^3	cubic metre
Mbcm	Million Bank cubic metre
Metlakatla	Metlakatla First Nation

mg/L	Milligrams per litre
ML/ARD	metal leaching/acid rock drainage
MLBV	Mainline Block Valves
mm	millimeters
MTPA	million tonnes per annum
MW	megawatt
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NO_x	Nitrogen Oxides
NRCan	Natural Resources Canada
O3	ozone
PAH	Polycyclic Aromatic Hydrocarbon
PM	Particulate Matter
PM_{10}	particulate matter 10 micrometres or smaller in diameter
$PM_{2.5}$	particulate matter 2.5 micrometres or smaller in diameter
Port	Port of Prince Rupert
PRPA	Prince Rupert Port Authority
RMA	Riparian Management Area
RRUC	Ridley Island Road and Railway Utility Corridor
RSA	Regional Study Area
SARA	*Species at Risk Act*
TC	Transport Canada
TLU	Traditional Land Use
TLUS	Traditional Land Use Studies
TOC	Table of Conditions
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
VC	Valued Component
Vopak	Vopak Development Canada Inc.
VPC Project	Vopak Pacific Canada Project
WCMRC	Western Canada Marine Response Corporation
WG	EAO's advisory Working Group
WMA	Wildlife Management Area
WMP	Wetlands Management Plan
WMU	wildlife management unit
WSA	*Water Sustainability Act*

PART A - INTRODUCTION AND BACKGROUND

1. PURPOSE OF THE ASSESSMENT REPORT

The purpose of this Assessment Report is to summarize the procedures and findings of the Environmental Assessment (EA) conducted by the Environmental Assessment Office (EAO) on the Application for an Environmental Assessment Certificate (EAC), submitted by Vopak Development Canada Inc. (Vopak) for the Vopak Pacific Canada Project (VPC Project) on November 9, 2020.

The EAO prepares this report as the Assessment Report for provincial Ministers who are responsible for making a decision on the Project under Section 17 of the 2002 *Environmental Assessment Ac*t (the former Act). For energy storage facilities, the deciding provincial Ministers are the Minister of Environment and Climate Change Strategy and the Minister of Energy, Mines and Low Carbon Innovation.

This Report:

- Describes the VPC Project, coordinated EA process with Prince Rupert Port Authority (PRPA), and Indigenous engagement (which includes the Crown's legal consultation obligations) undertaken during the EA;
- Documents work undertaken by the EAO to consult and accommodate Indigenous nations in keeping with the Supreme Court of Canada's direction in *Haida v. Minister of Forests* and related case law;
- Identifies the potential environmental, economic, social, health and heritage effects of the VPC Project, including cumulative effects and how the Proponent proposes to mitigate adverse effects;
- Identifies the residual adverse effects after mitigation;
- Summarizes all environmental management plans (EMPs) and follow up plans described in the Application and federally administered EMPs required by the PRPA;
- Sets out conclusions based on the VPC Project's potential for significant adverse residual effects with respect to the former Act.

This Report does not replicate the content presented in the Application. In the preparation of this Report, the following information has been considered:

- The Application and supplemental information provided by Vopak, including topic-specific Supplemental Memos;
- Advice provided on the Application and supplemental information by the Working Group, Indigenous nations, federal authorities; and
- Input received from members of the public.

This information has been posted to the EAO's Electronic Project Information and Collaboration website (EPIC).

2. PROJECT OVERVIEW

2.1 PROPONENT DESCRIPTION

The Proponent for the VPC Project is Vopak Development Canada Inc., a wholly owned subsidiary of Royal Vopak, an independent tank storage provider. Royal Vopak operates 68 terminals in 23 countries with a combined storage capacity of 35.2 million cubic metres (m^3), and is headquartered in Rotterdam, the Netherlands. The VPC Project would be managed out of Vopak's office in Calgary, Alberta at:

Vopak Development Canada Inc.
Suite 1460 – 444 5th Avenue SW
Calgary, AB T2P 2T8
Phone: 1 (587) 355-7873

2.2 PROJECT DESCRIPTION

Vopak is proposing to construct and operate a new bulk liquids tank storage facility in Prince Rupert, British Columbia (B.C.) that will store liquefied petroleum gas (e.g., propane, ethane, butane), , light diesel, gasoline), and methanol on behalf of Vopak's customers. The purpose of the VPC Project is to provide berthing and loading facilities for bulk liquid cargo that will be received via the existing rail loop on Ridley Island. Products will be transported from various locations across Western Canada to the VPC Project site via existing Canadian National Railway (CN) systems.

The VPC Project is proposed to be located on Ridley Island, B.C., with its lands and waters under PRPA jurisdiction. The physical works and activities of the VPC Project are located entirely on federal lands and waters administered by the PRPA, and within an area designated for port-related activities within PRPA jurisdiction (see Figure 1). The VPC Project site is approximately 16 kilometres (km) from the centre of Port Edward and 19 km from the centre of Prince Rupert via Highway 16 and the Ridley Island access road.

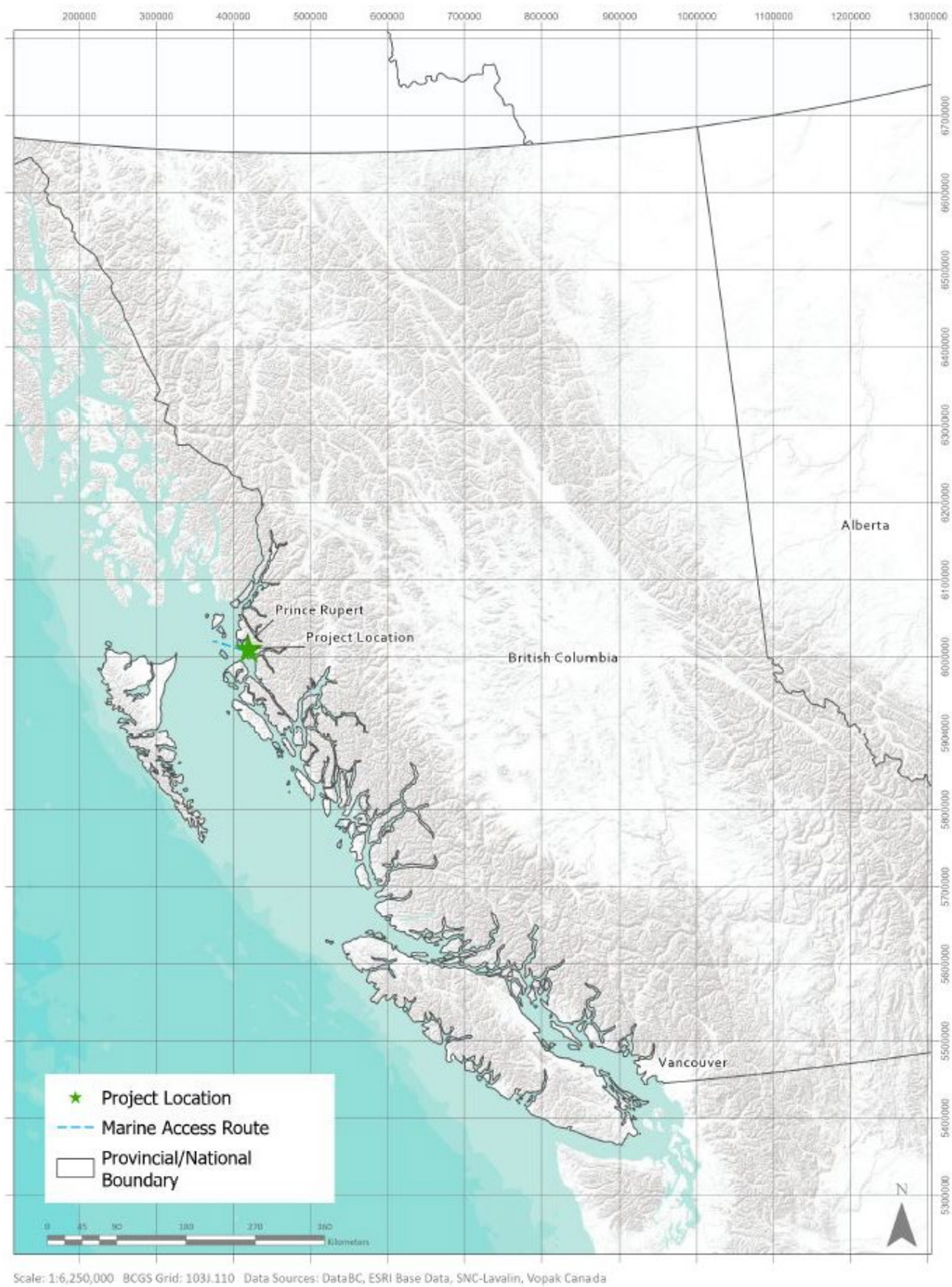

Figure 1: Vopak Pacific Canada Project Location

The VPC Project and its associated activities fall within the traditional territories of the following six Indigenous nations (listed in alphabetical order):

- Gitga'at First Nation (Gitga'at);
- Gitxaala Nation (Gitxaala);
- Kitselas First Nation (Kitselas);
- Kitsumkalum First Nation (Kitsumkalum);
- Lax Kw'alaams Band (Lax Kw'alaams); and
- Metlakatla First Nation (Metlakatla).

As shown in Figure 2, Vopak proposed the following major categories of components for the VPC Project in its Application.

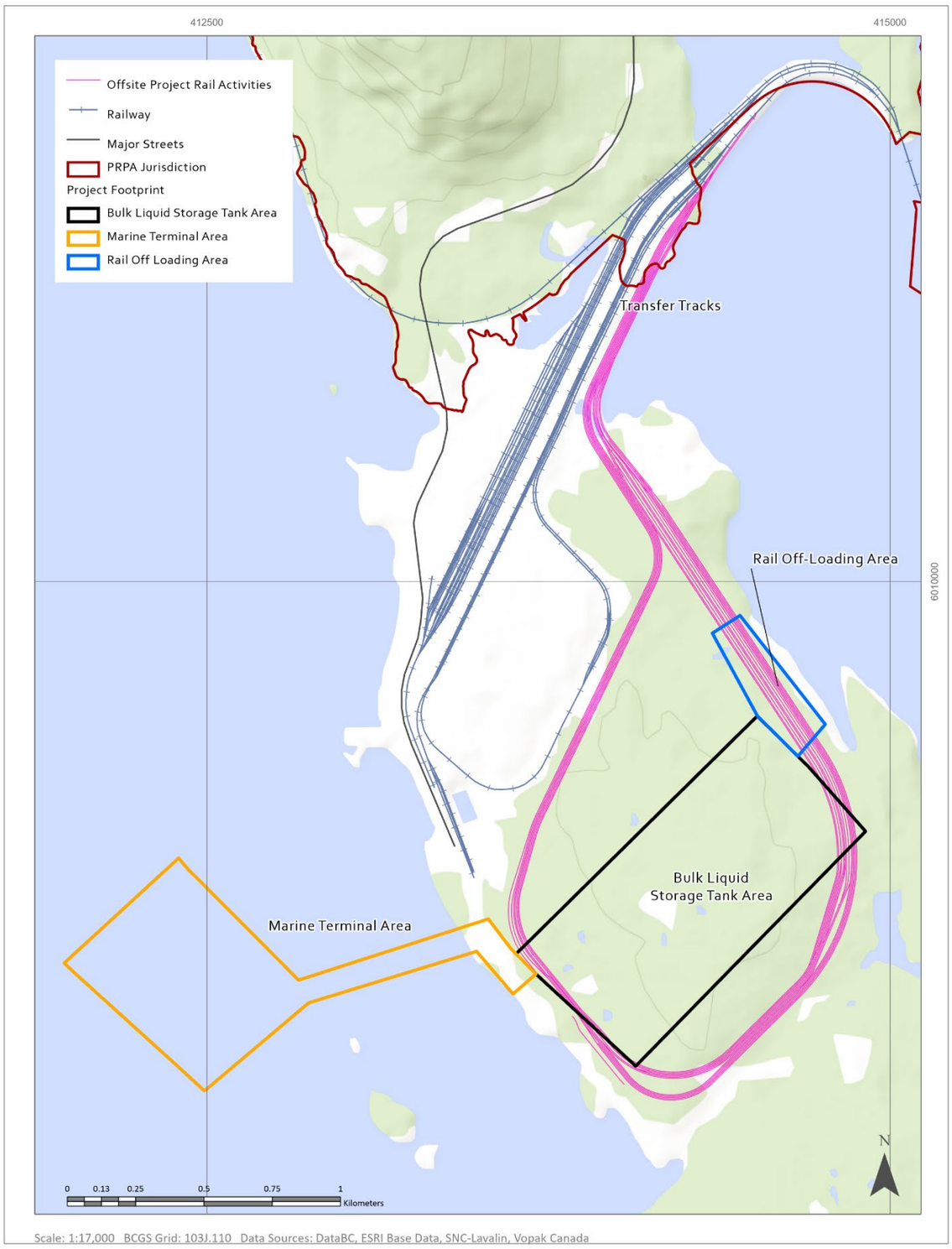

Figure 2: Project Components

BULK LIQUIDS TANK STORAGE FACILITY

The bulk liquids tank storage facility includes all infrastructure required to receive products from the CN Railway line, propane cooling and bulk liquids tank storage. The facility would encompass the following major components.

- 10 double-sided unloading racks for liquefied petroleum gas;
- 20 double-sided unloading racks for methanol;
- 20 double-sided unloading racks for light diesel and gasoline;
- Five liquefied petroleum gas bullets (50 metres [m] length by 6.25 m diameter of 1600 m^3) to be used for intermediate storage of liquefied petroleum gas;
- Liquefied petroleum gas cooling equipment;
- 15 storage tanks;
- One gas turbine to generate power for the facility;
- An emergency ground flare; and
- Process control and safety systems, which would include the following components:
    - Combustible gas detectors;
    - Detection systems;
    - Emergency shutdown buttons (for operational requirements);
    - Emergency shutdown valves (for pipelines);
    - Impermeable floors and curbs with drains to a slops system;
    - Fire detection system, fire extinguishers and firewater pump platform;
    - Escape routes from the jetty; and
    - A spill control system.

JETTY

The jetty would include all infrastructure necessary to support the loading and transferring of the products from the storage facility to a berthed ship. The jetty would encompass the following major components:

- A pipe rack to transport products and operationally required utilities;
- Up to 1200 m long, 5.6 m wide trestle with 95 m spans to accommodate product piping and utilities;
- Three firewater pumps along the trestle on a separate platform to draw water in the event of a fire;
- A 110 m by 30 m loading platform to support loading products onto vessels;
- Protection barriers, if required; and
- A multi-buoy mooring system consisting of four mooring buoys per berth which would be fixed to the seafloor by semi-taut anchoring systems.

SUPPORTING INFRASTRUCTURE

Supporting infrastructure encompasses all aspects not mentioned above that are required to operate and maintain the VPC Project and includes the following major components:

- One access road leading from Ridley Road to the Project site, interior roads and car parking;
- Drainage and storm water system, composed of collection sumps, site drains, ditches, and two storm water lagoons;
- Nitrogen for safety and maintenance purposes;
- An office that includes a central control room, as well as maintenance and utility buildings;
- Electrical substation and connection to BC Hydro grid; and
- Natural gas connection to Pacific Northwest Gas.

The VPC Project would involve three phases: Construction, Operations and Decommissioning. Construction of the VPC project is expected to begin in Q4 2021 and will take up to two years. Operations will be a minimum of 50 years and the project will be decommissioned in one year.

CONSTRUCTION

Construction activities for the VPC Project would include the following:

Site Clearing and Grading

Site clearing and grading of the VPC Project footprint would include:

- Surveying and flagging the site in preparation for clearing;
- Clearing area covered by peat, trees, and other vegetation;
- Draining wetland areas; and
- Blasting exposed bedrock.

Construction of Project Facilities on Land

Construction of the Project facilities on land would include the following activities:

- Constructing civil works (i.e., roads, parking areas, foundations for tanks, tank pits, drainage systems and buildings);
- Constructing mechanical works (i.e., storage tanks, pipelines, manifolds, pumps, valves and mechanical liquid petroleum gas cooling equipment, gas turbines, emergency ground flare, de-ethanizer, and rail unloading racks); and
- Construction electrical and instrumental works (i.e., cables, terminal lighting, instrumentation and control and safety systems).

Construction of the Marine Jetty and Berths

Construction of the marine jetty and berths would involve the following activities:

- Installation of pipe piles for the construction of the trestle, protection barrier, firewater pump platform, and loading platform via vibratory driving;
- Construction of the trestle, consisting of two to four piles to form its 12 piers and a concrete or steel platform;
- Installation of the top structure, loading and firewater pump platforms, and the multi-buoy mooring system, which would be pre-fabricated prior to the site and installed with construction barge cranes; and
- Installation and positioning of suction anchors.

Disposal of Surplus Organics and Excess Rock Material

Vopak estimates that 511,125 m^3 of organic soil and overburden from the VPC Project footprint will be removed and disposed of at the existing PRPA disposal area on Ridley Island. Vopak expects to generate an estimated 293,577 m^3 of excess rock from cutting and blasting and intends to reuse excess rock on-site wherever possible.

Post-Construction Clean-Up and Ground Reclamation

If required, Vopak will undertake reclamation and site clean-up activities following construction, which would include re-grading and revegetation of disturbed areas.

Commissioning

Commissioning activities would consist of the following:

- Energizing of systems and sub-systems;
- Pre-commissioning: preparation and functional testing for commissioning by contractors;
- Cold commissioning: activities required to test and assure completeness of scope, integrity and safe operability of VPC Project components by handling a “safe medium”;
- Hot commissioning: activities required to test and assure completeness of scope, integrity and safe operability of VPC Project components by handling products typically associated with the component; and
- Performance tests: demonstrations that design criteria and operating parameters are met.

Construction Worker Accommodation and Transportation to and from Site

During Construction, non-local workers would be transported to and from the VPC Project site via bus from one of two existing work camps near Port Edward, which would accommodate up to 250 workers. The work camp would be decommissioned following construction by the work camp contractor in accordance with existing permits. Vopak has yet to finalize a contract with a specific camp but is currently in discussions with two work camp contractors.

OPERATIONS

Vopak proposes that the VPC Project facility would operate 24 hours per day, 365 days per year, with a lifespan of a minimum of 50 years; a maximum year lifespan is dependent upon contractual agreement with the PRPA, which is not yet finalized, and proprietary in nature. Anticipated activities during Operations are summarized below.

Railway Operation

Vopak anticipates that products will be delivered via unit trains at the northeast section of the PRPA Road and Railway Utility Corridor, which consists of multiple railway tracks and service roads that surround Ridley Island. Vopak proposes to use nine rail tracks within the Road and Railway Utility Corridor to handle delivery of products, with six used for unloading products and three for shunting operation. Products will then be pumped approximately 1250 m away (25 m in elevation change) to the manifold and tank farm area. Vopak expects the number of rail cars to be unloaded per day at full capacity is approximately 240 over an annual average.

Liquid Petroleum Gas Cooling Process and Product Storage

Vopak's Application indicated that liquid petroleum gas would arrive by rail in a pressurized state, and rail cars would be unloaded into five intermediate pressurized storage bullets. Liquid petroleum gas would then be transferred through the Balance of Plan into the liquid petroleum gas storage tank. While liquid petroleum gas would be cooled and then transferred to the liquid petroleum gas storage tank, light diesel and gasoline and methanol would be pumped directly into the carbon steel storage tanks from the rail unloading area.

Vessel Berthing

Vopak expects to accommodate approximately 171 vessels per year, which would include:

- Approximately 25 Very Large Gas Carriers for liquid petroleum gas carriers, weighing a maximum of 60,000 dead weight tons;
- Approximately 116 Medium Range tankers for methanol, weighing a maximum of 50,000 dead weight tons; and
- Approximately 30 Panamax product tankers for light diesel and gasoline, weighing a maximum of 80,000 dead weight tons.

Vopak anticipates that one Very Large Gas Carrier will arrive every 14 days, one Medium Range tanker every three days, and one Panamax product tanker every 12 days. Vessels would be accommodated at one of two berths and would stay for an average of 40 hours. These berths are expected to operate 346 days per year, which accounts for an estimated 19 days of inoperable weather conditions per year.

Vopak expects vessels to arrive into the multi-buoy mooring system at a speed of approximately 1.0 knot and that vessels would be attached to tugs prior to entering the multi-buoy mooring system to slow speed further for mooring. Mooring line boats would service berthing within the multi-buoy mooring system. Upon departure, vessels would be expected to not exceed 2.0 knots within the multi-buoy mooring system and just outside it. As a result, little wake generation from the vessel is expected by Vopak. More information on potential impacts of vessel berthing can be found in Section 9: Marine Resources of this Report.

Cargo Loading

Vopak anticipates that cargo loading would occur once every three days, and products would be transferred through the pipes and loading system from the storage tanks to the vessels via electric motors. Vessels would be loaded with 3000 m^3 of product per hour.

General Terminal Operation

General terminal operation includes activities associated with the following categories:

- Lighting;
- Security;
- Terminal operation;
- Staffing;
- Water requirements during Operations;
- Storm water management;
- Domestic wastewater management and solid waste removal during Operations; and
- Flaring for maintenance and emergency purposes.

Off-Site Shipping Activities

Associated off-site shipping activities during Operations include pilotage and escort. Vessels loading products from the VPC Project berths would be required to call at the pilotage station at Triple Island. In accordance with PRPA's Port Information Guide (2020) and in consultation with the Pacific Pilotage Authority, Transport Canada and the Canadian Coast Guard, vessels would be required to submit to compulsory pilotage before entering PRPA waters. This same process would be followed for vessels leaving the VPC Project facility.

DECOMMISSIONING

Decommissioning activities for the VPC Project would encompass the following:

- Cleaning of tanks and infrastructure;
- Removal of tanks and infrastructure;
- Removal of buildings and utilities infrastructure;
- Removal of jetty topside and mooring buoys;
- Soil sampling and soil remediation (if required); and
- Backfilling of lagoons and other water management structures.

Vopak expected the jetty structure to remain following operations and decommissioning for future use.

The Application indicated that Vopak did not consider other locations for the VPC Project as Ridley Island housed existing infrastructure, including access to rail and deep tidewater. The Application described the process through which Vopak evaluated alternate design options for the VPC Project. Vopak considered alternatives for jetty design, compressor design, water use, bulk liquids storage facility layout, and liquid petroleum gas bullet number and size. Vopak used industry standard and regulatory requirements to evaluate Project design, including PRPA regulatory requirements.
Alternative means of undertaking these Project components that were considered in the Application are summarized in Table 1.

Project Component	Alternatives Considered	Rationale
Jetty location and design	A jetty design consisting of a jetty causeway, marine dredging, and disposal at sea of dredged material.	Revised design avoids dredging and disposal at sea as well as disposal on land of other waste materials. Preferred due to reduction in environmental impacts, costs, and concerns from stakeholders and Indigenous nations.
Compressors	Gas-driven compressors for the refrigeration unit of the liquid petroleum gas.	Electric-driven compressors were preferred due to their performance stability.
Water use for firefighting	Freshwater supply to be used in the event of a fire.	Vopak standard indicated that water supply for firefighting should be unlimited – therefore, seawater was preferred.
Bulk liquids storage facility layout	Light diesel and gasoline and methanol tank pits to be moved 35 m south.	Vopak adjusted the bulk liquids storage facility layout to ensure that adjacent land use outside the VPC Project footprint would not be impacted by potential accidents and malfunctions.
LPG bullet number and size	Six intermediate pressurized liquid petroleum gas bullets of 1000 m^3.	Intermediate pressurized liquid petroleum gas bullets with a capacity to store a total of 8,000 m^3 were decided on to allow for a more efficient cooling process.

Table 1: Alternative project designs considered in the Application.

Vopak's Application indicated that the revised design is preferred for the following reasons:

- Reduced environmental impacts, including preservation of habitat on Coast Island, elimination of dredging, removal of the causeway and decrease in number of piles;
- Reduced overall cost;
- Well-established technology;
- Mooring system is well-established and suitable;
- Reduced potential for environmental impacts to marine resources, including marine habitat, marine water quality, marine sediment quality, marine mammals, and marine birds; and
- Reduced concerns from stakeholders and Indigenous nations.

The Application indicated that Vopak considered the use of gas-driven compressors for the refrigeration unit of the liquid petroleum gas as opposed to electric-driven compressors. Vopak decided on electric-driven compressors based on further engineering as they are more stable in performance.

Vopak considered the use of freshwater as an alternative to seawater for firefighting. Vopak's corporate standard for firefighting indicates that there should be an unlimited supply of water, and freshwater supply within a tank on the VPC Project site would be limited; therefore, seawater was chosen as the form of water supply for firefighting.

Vopak updated the layout of the bulk liquids storage facility based on geophysical site conditions to minimize the cut and fill quantities of overburden and rock. The light diesel and gasoline and methanol tank pits were moved south as a result of Vopak's Quantitative Risk Assessment in order to ensure that adjacent land outside the Vopak footprint is not affected by potential accidents and malfunctions, and use of the adjacent land is thereby not restricted.

A summary (as identified by Vopak) of project design features, including changes, that occurred during the EA is provided in Table 2.

Project Feature	Project Design Measures	Change in Potential Effects
Jetty	Removal of marine dredging and disposal at sea in jetty design.	Reduced environmental impacts, including preservation of habitat on Coast Island, removal of dredging, removal of the causeway and decreased number of piles.
Multi-buoy Mooring System	Multi-buoy mooring system – addition of subsurface floats.	Mitigate potential disturbance to seafloor sediment.

Table 2: Project Design Feature of Measures Resulting from Working Group, Indigenous Nation and Public Input in the EA Process

ECONOMIC BENEFITS OF THE VPC PROJECT

Economic Benefits from Project Construction

Table 3 provides a summary of estimated annual economic benefits from Project Construction. The VPC Project would generate economic impacts through direct expenditures on goods and services, creation of employment opportunities and generation of tax revenues for local, provincial, and federal governments. Vopak estimates that approximately $885 million would be spent during the construction period.

	Local ($ million)	BC ($ million)
Direct Project Construction Expenditures	**62**	**885**
Gross Output	Not available	691 - 980
Contribution to Gross Domestic Product (GDP)	Not available	497 - 709
Labour Income	Not available	374 - 438
Effects on Government Revenues		
Federal Taxes	Not applicable	97
Provincial Taxes	Not applicable	81
Municipal Taxes (including property taxes)	16	Not applicable

Table 3: Summary of Estimated Economic Benefits during Project Construction[1]

Table 4 provides a summary of anticipated employment benefits during project construction. Annual project construction would be expected to create direct employment for 250 full time equivalents (FTEs) per annum in B.C. over a two-year construction period, with an average annual income of $47,800.

	Local (PYs)	Rest of B.C. and AB (PYs)	Total B.C. and AB (PYs)	Total (PYs)
Direct	140	360	500	500
Indirect	Not applicable	Not applicable	4,807	5,127
Induced	Not applicable	Not applicable	1,208	1,553
Total Employment	Not applicable	Not applicable	**6,515**	**7,179**

Table 4: Estimated Employment During Construction

[1] To determine economic benefits of the VPC Project during construction and operations, Vopak used the Statistics Canada Input-Output Model (STCIPIOM). Due to the nature of the model used by Vopak as well as internal engineering estimates, data on local gross output, GDP and labour income could not be provided for the Prince Rupert region. More information on Vopak's model can be found on the EAO's website here: XX

Economic Benefits from Project Operations

Table 5 provides a summary of estimated annual economic benefits from VPC Project Operations. The VPC Project would generate economic impacts through direct expenditures on goods and services, creation of employment opportunities and generation of tax revenues for local, provincial and federal governments. Vopak estimates that approximately $29 million would be spent annually in B.C., representing almost 100% of total annual expenditures.

	Local ($ millions)	BC ($ millions)
Direct Project Expenditures	3.5 (annual average)	29 (annual average)
Gross Output	Not available	2,121 – 2,248
Contribution to GDP	Not available	1,805 – 1,898
Labour Income		
Labour Income	Not available	164 – 192
Government Revenues		
Federal Taxes	Not applicable	44
Provincial Taxes	Not applicable	56
Municipal Tax Revenues	25	Not applicable

Table 5: Summary of Estimated Economic Benefits During Operations[1]

Table 6 provides a summary of anticipated employment benefits during VPC Project Operations. Annual VPC Project Operations would be expected to create direct employment for 39 FTEs per annum in BC, with an average annual income of $65,154.

	Local (PYs)	Rest of B.C. and AB (PYs)	Total B.C. and AB (PYs)	Total (PYs)
Direct	30	9	39	39
Indirect	Not applicable	Not applicable	131	143
Induced	Not applicable	Not applicable	32	42
Total Employment	Not applicable	Not applicable	**201**	**223**

Table 6: Summary of Estimated Employment Benefits During Operations (annual)

Vopak's Application indicated that the VPC Project has the potential to generate social benefits in local communities. Vopak's We Connect Foundation focuses on youth between the ages of 10 and 24 years old in regions where Vopak operates. The foundation aims to connect youth to the world by initiating early professional training to open new opportunities in the natural resource sector, and focuses on teamwork across cultures, languages and social backgrounds. Vopak operates the We Connect Foundation through partnerships with government or non-governmental organizations.

More information on the potential health benefits identified in the Application is available in Section 12: Social and Economic Effects.

3. AUTHORIZATIONS

In addition to the requirement for an EAC, Vopak also requires authorizations summarized in this section from federal agencies.

3.1 FEDERAL REGULATORY ENVIRONMENT

The VPC Project is subject to a federal Section 67 Review under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). As per Section 67, *an Authority must not make a decision about projects on federal lands unless the project is determined to be unlikely to cause significant adverse environmental effects or the Governor in Council (GIC; i.e., Cabinet) decides that those effects are justified under subsection 69(3) of CEAA 2012. Authorities are required to consider the likelihood of significant adverse environmental effects before a project can proceed.*[2] A complete list of the other federal authorizations is available in Table 7 below.

The VPC Project is not subject to a full federal EA because the VPC Project is not a designated project described in the federal Regulations Designating Physical Activities. However, as the VPC Project is proposed to be constructed and operational on federal lands, it is subject to environmental effects determinations under Section 67 of the *Canadian Environmental Assessment Act*, *2012,* which includes a review and decisions by several federal authorities on the significance of adverse environmental effects that may be caused by the VPC Project, including potential impacts to Indigenous communities. The Section 67 Environmental Effects Determination is being administered by the PRPA and Transport Canada

Environment and Climate Change Canada (ECCC) is proceeding with its review of the VPC Project as a Federal Authority under Section 82 of the *Impact Assessment Act*, as the Proponent applied to ECCC for a *Species at Risk Act* permit after the date that the *Impact Assessment Act* came into force and CEAA 2012 was repealed.

The EAO and PRPA agreed to a harmonized approach to their environmental reviews of the VPC Project and to coordinate Indigenous engagement and consultation activities to the greatest feasible extent. To date, ECCC has and will continue to coordinate its review of the VPC Project under Section 82 of the *Impact Assessment Act* with the EAO and other federal authorities. The PRPA, Transport Canada, and ECCC actively participated in the EAO's Working Group and intend to consider the information gathered during the provincial EA process in their Environmental Effects Determinations. Throughout the EA process, the EAO and the PRPA coordinated the development of provincial conditions and federal commitments for the VPC Project.

[2] https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/projects-federal-lands-outside-canada/projects-federal-lands-making-determination-under-section-67-canadian-environmental-assessment-act-2012.html#Toc009

This included:

- Focused federal-provincial engagement on jurisdiction to ensure practical coordination in determining the best-placed regulator(s);
- Internal coordination within the EAO on best practices for federal-provincial coordination based on previous experiences with federal authorities;
- Federal and provincial collaboration and input on provincial conditions and federal commitments;
- Joint outreach to Working Group members on condition setting and compliance coordination;
- Coordination with Vopak, Indigenous nations and Working Group members on respective questions and concerns regarding proposed mitigations and management plan oversight measures under federal and provincial jurisdiction;
- Formal review of draft provincial conditions and federal commitments, including discussion with PRPA's legal counsel to understand the full scope of PRPA's authorization and enforcement powers;
- Formal federal review of the EAO's draft Assessment Report; and
- Provincial review of the PRPA's Section 67 Determination Report.

Prior to the start of Construction, Vopak must obtain the federal authorizations summarized in Table 7.

Name of Authorization	Statute (Authorizing Agency)	Reason for Requirement
PRPA Authorization	*Canada Marine Act* (PRPA)	Required to use and occupy PRPA-administered lands.
Commercial Lease	PRPA under the Port Authority Operations Regulations of the *Canada Marine Act*	Compliance with mitigations as conditional approval. Financial and other penalties for non-compliance.
Marine construction approval	*Canadian Navigable Waters Act* (Transport Canada)	Approval for the construction of Project components (e.g., marine) that would affect navigation.
Section 73 Permit	*Species at Risk Act* (ECCC)	Permit authorizing activities affecting a threatened or endangered species, any part of its critical habitat or the residences of its individuals.
Environmental Effects Determination	Section 82, *Impact Assessment Act* (ECCC, 2019)	VPC Project requires an environmental effects determination by ECCC under the *Impact Assessment Act* as Vopak applied for its *Species at Risk Act* permit after CEAA, 2012 was repealed.
Environmental Effects Determinations	Section 67, *Canadian Environmental Assessment Act, 2012* (PRPA, Transport Canada).	VPC Project requires environmental effects determinations by relevant federal agencies as it is proposed to be built on federal lands.

Table 7: Federal authorizations required for the VPC Project.

3.2 PROVINCIAL AND LOCAL GOVERNMENT AUTHORIZATIONS

As the VPC Project is proposed entirely on federal lands, Vopak is not required to obtain any provincial or local government authorizations.

4. ASSESSMENT PROCESS OVERVIEW

4.1 OVERVIEW AND SCOPE OF THE PROVINCIAL ENVIRONMENTAL ASSESSMENT

The EAO determined that the VPC Project was reviewable pursuant to Part 4 (Electricity Project and Petroleum Natural Gas Projects), Table 8 of the Reviewable Projects Regulation because the Project would create an energy storage facility with the capacity to store an energy resource in a quantity that can yield by combustion ≥3 petajoules of energy.

Table 8 provides a summary of the key milestones in the Pre-Application and Application Review stages of the EA.

Date	Milestone
July 26, 2018	The EAO issued a Section 10 Order, initiating the provincial EA.
September 6, 2018 – October 9, 2018	30-day public comment period on draft Application Information Requirements (AIR).
November 2, 2018	The EAO issued a Section 11 Order, defining the proposed scope of the VPC Project and the procedures and methods for conducting the review.
July 25, 2019	The EAO issued the final AIR, which is a joint federal Terms of Reference for the concurrent Section 67 review under the *Canadian Environmental Assessment Act, 2012* undertaken by the federal authorities.
August 20, 2020	The EAO issued a letter to Vopak amending the AIR to reflect project design change.
October 9, 2020	The EAO determined the Application contained the information required in the AIR.
November 9, 2020	The EAO began the 180-day Application Review period under Section 16(1) of the former Act.
November 16, 2020 – December 30, 2020	45-day public comment period on the Application (extended period due to the COVID-19 pandemic)
November 24, 2020 and November 26, 2020	The EAO hosted two virtual open houses regarding the provincial and federal EA processes and Vopak's Application.
July 22, 2021 – August 21, 2021	30-day public comment period on the draft Decision Materials.
XX	Section 17 referral; conclusion of the EA and referral to Ministers.

Table 8: Summary of provincial environmental assessment milestones.

4.2 ROLE OF THE WORKING GROUP

The EAO established a Working Group, made up of federal, provincial and local government staff or representatives with the mandates and expertise relevant to the review of the VPC Project, as well as representatives of potentially affected Indigenous nations listed on Schedule B of the Section 11 Order. See list of Working Group members in Appendix D: List of Working Group Members.

The EAO sought and considered advice from the Working Group to understand and assess any potential adverse effects associated with the Project. Working Group members were responsible for providing timely advice to the EAO on:

- Key EA documents including, but not limited to, the selection of VCs, Application Information Requirements, Application, the EAO's Summary and Assessment Reports and proposed provincial conditions;
- Government policy direction and/or gaps that could affect the conduct of the EA;
- Potential conflicts with the legislation and/or regulations of their organizations;
- EA information requirements, as compared with permitting design and information requirements; and
- Technical issues raised by the public and Indigenous Groups during the public consultation process.

The following local governments were invited to participate in the Working Group:

- City of Prince Rupert;
- District of Port Edward;
- North Coast Regional District; and
- City of Terrace.

The following federal departments with specialist information or expert knowledge relevant to the VPC Project participated in the evaluation and the review of the Proponent's Application:

- The Canadian Coast Guard (CCG) provided comments related to its regulatory and statutory responsibilities within the themes of marine use and navigation, and accidents and malfunctions;
- ECCC provided comments and information related to its regulatory and statutory responsibilities within the themes of air quality and greenhouse gas emissions, terrestrial resources, marine resources, cumulative effects and monitoring;
- DFO provided comments and information related to its regulatory and statutory responsibilities within the theme of marine resources;
- Health Canada provided advice and information related to its regulatory and statutory responsibilities in regard to human health, with a focus on Indigenous health;
- Transport Canada provided comments and information related to its regulatory and statutory responsibilities within the themes of marine resources, marine use and navigation, accidents and malfunctions and social effects.

4.3 INDIGENOUS ENGAGEMENT

On November 2, 2018, the EAO issued an Order establishing the scope and procedures of the EA (Section 11 Order), which specified the consultation activities that both the EAO and Vopak would undertake with all Indigenous nations potentially affected by the VPC Project. Indigenous nations listed in Schedule B of the Section 11 Order include (alphabetically):

- Gitga'at First Nation;
- Gitxaala Nation
- Kitselas First Nation
- Kitsumkalum First Nation
- Lax Kw'alaams Band; and
- Metlakatla First Nation.

Indigenous nations in Schedule B of the Section 11 Order were consulted at the deeper end of the consultation spectrum. Further detail regarding engagement with Indigenous nations in provided in Part C of this Report.
The EAO is required to ensure that the honour of the Crown is discharged by ensuring appropriate consultation, engagement and accommodation of potential impacts of the VPC Project on the exercise of Treaty rights, proven Aboriginal rights, and asserted Aboriginal rights, including title (Aboriginal Interests) in respect of the decision by Ministers as to whether to issue an EAC.

Indigenous nations' comments and interests in terms of consultation and specific consideration of the Crown's duty to consult and accommodate Aboriginal Interests are factored into the analysis in Part C of this Assessment Report.

There is often considerable overlap between the interests of Indigenous nations and the assessment of environmental, economic, social, heritage and health effects. Indigenous nations' comments and interests that directly relate to the assessments of Valued Components are discussed in Part B of this Report.

The EAO distributed provincial funding to assist Indigenous nations to participate in the EA process.

4.4 PUBLIC CONSULTATION

Public consultation is an important aspect of the EA process. The EAO required Vopak to prepare a Public Consultation Plan. The plan laid out Vopak's consultation objectives and activities.

Through the course of the EA, Vopak submitted three Public Consultation Reports to the EAO. The first Public Consultation Report was submitted during the Pre-Application Stage, the second was submitted with the Application, and the third was submitted near the end of Application Review. The Public Consultation Plan and all Public Consultation Reports are posted on EAO's EPIC website.

4.4.1 SUMMARY OF ENGAGEMENT ACTIVITIES LED BY VOPAK

Based on the location of the VPC Project, Vopak focused their public consultation activities on communities near Prince Rupert. Vopak identified potentially affected stakeholders on the basis of proximity to the VPC Project site, anticipated interest in potential impacts, and feedback from early stakeholder consultation.

Vopak's Public Consultation Plan identified the following local governments and elected officials to involve in consultation and engagement activities:

- The City of Prince Rupert;
- The District of Port Edward;
- The North Coast Regional District;
- Member of the Legislative Assembly for the North Coast;
- Member of the Legislative Assembly for Skeena; and
- Member of Parliament for the Skeena-Bulkley Valley.

In addition to the specific local governments and elected officials noted above, Vopak identified the following stakeholder groups as having an interest in or being potentially affected by the VPC Project:

- The general public;
- Community organizations, including community service providers;
- Economic development organizations;
- Educational stakeholders, including colleges, skills training organizations and secondary schools;
- First responders, including fire, ambulance and police;
- Local business; and
- Marine users and associated stakeholders.

Specific activities and dates of engagement with the parties noted above are outlined in Vopak's Public Consultation Reports, which are available on the EAO's EPIC website.

Vopak's Public Consultation Plan describes key activities and timelines for each of the four phases: *Initial Engagement; Pre-Application Consultation; Draft Application Review Consultation;* and *Ongoing Engagement.* The Public Consultation Plan is posted to the EAO's EPIC website.

INITIAL ENGAGEMENT

Initial engagement was conducted in Spring 2018 prior to the formal EA process. The purpose of initial engagement was to initiate early discussions with stakeholders to introduce Vopak and the proposed VPC Project and to learn about local communities. Initial issues raised are available in Vopak's Public Consultation Report #1 and included potential impacts of the VPC Project on the quality of life in Port Edward due to noise, lighting, pollution, increased railway and marine traffic as well as potential impacts on the marine environment and economic opportunities.

PRE-APPLICATION CONSULTATION

Pre-Application consultation was conducted from Summer 2018 to Summer 2020, during which Vopak engaged with local communities and stakeholders via emails, phone calls and in-person and virtual meetings. Specifically, the purpose of pre-Application consultation was to seek input on the draft Terms of Reference (TOR) and Application Information Requirements (AIR). Vopak participated in two EAO-led open houses in Port Edward on September 25, 2018 and in Prince Rupert on September 26, 2018. The EAO held a 30-day Public Comment Period from September 6, 2018 – October 9, 2018, during which the EAO received 34 comments. Vopak submitted responses to these comments to the EAO in December 2018.

Vopak's Public Consultation Report #2 outlines key themes of public comments received and are summarized below:

- Rail traffic;
- Air quality;
- Marine traffic and navigational safety;
- Accidents and malfunctions;
- Marine resources (including birds);
- Local economy;
- Effects of the environment on the VPC Project; and
- Health and safety.

Vopak noted that the COVID-19 pandemic limited and delayed planned engagements with many stakeholders in 2019. Vopak was able to schedule and arrange several virtual meetings and phone calls with stakeholders but acknowledged that many stakeholders had an increased focus on community health, safety and well-being. Vopak also connected with local municipalities during this time to seek input on COVID-19 safety measures. Vopak noted that it would continue to reach out to stakeholders to provide updates on the VPC Project.

DRAFT APPLICATION REVIEW CONSULTATION

Draft Application Review consultation was conducted from Fall 2020 – Summer 2021, during which Vopak engaged with local communities and stakeholders through regular meetings, open houses and presentations to seek input on Vopak's Application for an Environmental Assessment Certificate. Due to the COVID-19 pandemic, the majority of engagement activities remained virtual. After submitting the final Application to the EAO on November 9, 2020, Vopak participated in two EAO-led virtual open houses on November 24 and 26. The EAO held a public comment period from November 16 – December 30, 2020, during which they received 75 comments. Vopak submitted responses to these comments on February 25, 2021.

Vopak's Public Consultation Report #3 outlines key themes of public comments received and are summarized below:

- Local opportunities;
- Rail traffic;
- Air quality and climate change, including GHG emissions;
- Wetland mitigation and compensation measures;
- Potential accidents and malfunctions;
- Freshwater fish;
- Marine life and habitat;
- Health and safety; and
- Regulatory process.

Vopak continued to engage with local municipalities on the development of the VPC Project's COVID-19 safety measures where field work was planned and implemented.

ONGOING ENGAGEMENT

In its Public Consultation Plan, Vopak committed to continue to engage with the public, including local communities and stakeholders, in order to maintain positive long-term relationships and encourage open dialogue about the VPC Project. In the event that the VPC Project is approved, Vopak proposed to continue the following activities:

- Provide ongoing updates through the VPC Project website;
- Continue use of the VPC Project email address for ongoing bilateral communication; and
- Facilitate meetings and presentations with interested parties when applicable.

Vopak noted that it intends to open a local office in Summer 2021 in an effort to engage with local community members.

PRE-APPLICATION PHASE

During the pre-Application phase, the EAO held a 30-day public comment period from September 6 – October 9, 2018 on the draft TOR and AIR documents for the VPC Project, which described the necessary information that Vopak needed to provide in their Application for an Environmental Assessment Certificate. During the public comment period, the EAO hosted two open houses, one in Port Edward on September 25, 2018 (20 attendees) and one in Prince Rupert on September 26, 2018 (64 attendees). A total of 31 comments were received during the public comment period.

APPLICATION REVIEW PHASE

During the Application Review phase, the EAO held a 45-day public comment period from November 16, 2020 – December 30, 2020 on the Application. During the public comment period, the EAO and PRPA hosted two virtual open houses on November 24, 2020 (approximately 63 attendees) and

November 26, 2020 (approximately 70 attendees). The EAO received a total of 75 comments from the public during the public comment period.

The EAO also held a final public comment period on a draft of its Decision Materials, from July 22 – August 21, 2021, prior to referral to Ministers. A total of XX comments were received from the public, which were related to XX.

Below is a summary of the key issues or themes raised by the public during the Pre-Application and Application Review stages:

- Local opportunities for the public related to the VPC Project, including contracting and procurement opportunities as well as training initiatives and hiring opportunities;
- Potential risks to and disruption of communities related to increased rail traffic;
- Air quality data, monitoring and enforcement;
- GHG emissions, including upstream and downstream assessments;
- Wetland mitigation and compensation measures;
- Potential accidents and malfunctions related to increased rail traffic and anchorages;
- Potential impacts to freshwater fish, marine life and habitat, marine sediment, and marine water quality, related to noise, light, terrestrial vegetation removal and increased marine traffic;
- Potential impacts of noise, light and emissions on human health;
- Effectiveness and inclusivity of public engagement measures; and
- Cumulative effects and risks.

A summary of the key issues raised by the public is provided in Appendix X: Key Issues Raised by the Public and EAO's Responses. Most questions were not directed to the EAO.

Public comments from all public comment periods and Vopak's responses are posted on EAO's EPIC website.

During Application Review, the EAO requested additional reference materials and supplemental information from Vopak to support the EA. The EAO's requests for additional information were primarily driven by concerns raised and requests submitted by the public, Working Group and Indigenous nations. Notably, the EAO issued a request for additional information on a number of topics on March 11, 2021, including Accidents and Malfunctions, Economic Benefits, Cumulative Effects and Fish and Fish Habitat.

Key information that was provided to the EAO by Vopak during Application Review is available on the EAO's EPIC website.

During Application Review, Vopak's responses to the Working Group comments on the Application and supplemental information were captured in the following tracking tables:

- Vopak Working Group Issues Tracking Table [link].

The EAO considered all comments received from the Working Group and the responses of Vopak in preparation of this Assessment Report.

The EAO hosted Working Group meetings during Application Review where Vopak was required to respond to questions and concerns.[3] The summary meeting notes were posted to EAO's website at:

- VPC Project Advisory Working Group Meeting – November 19, 2020
- VPC Project Advisory Working Group Meetings – January 20 & 21, 2021
- VPC Project Advisory Sub Working Group Meeting: Greenhouse Gas Emissions Management – February 25, 2021
- VPC Project Advisory Sub Working Group (Indigenous nations) – Provincial Conditions and Federal Commitments Coordination Overview – April 15, 2021

Project related information was made available to the public on the EAO's website at: Vopak Pacific Canada Project Page.

4.5 CUMULATIVE EFFECTS AND EXISTING REGIONAL CROWN INITIATIVES

The EAO notes that several Crown initiatives are currently underway to help address cumulative effects on the North Coast including the Prince Rupert Harbour and Chatham Sound. The EAO considers these initiatives to be important context for understanding regional cumulative effects and potential outcomes or impacts for a range of natural resource-related values.

Descriptions of existing regional Crown initiatives designed to collect baseline information to increase knowledge, address cumulative effects, foster Indigenous partnership with government or support stewardship initiatives are provided in Appendix C: Existing Regional Crown Initiatives to Address Cumulative Effects. The list of regional Crown initiatives does not represent an exhaustive or formal region-wide initiative inventory and the EAO acknowledges there may be additional initiatives related to cumulative effects management in the region.

4.6 RAIL TRAFFIC BEYOND THE SCOPE OF THE PROJECT

Vopak has indicated that products will be delivered to the VPC Project via the existing CN Railway and expects the annual average number of rail cars to be unloaded per day is 240. Operational rail activities of the VPC Project within the Port of Prince Rupert are scoped into the provincial EA as described in the Section 11 Order.

The EAO understands that the federal Section 67 review is limited to federal lands and does not consider rail effects and mitigations outside the Port of Prince Rupert; all effects considered for the federal review must result from components of the VPC Project located on federal land.

[3] This summary does not include regular EAO-Working Group member engagements, EAO-Indigenous nation consensus-seeking meetings, bi-weekly EAO-Vopak-federal authority engagements, or joint EAO-PRPA planning sessions that took place throughout the Pre-Application and Application Review periods.

During the Pre-Application phase, concerns were raised by the six Indigenous nations and the public regarding the potential effects of increased operational rail traffic of the VPC Project beyond the Port of Prince Rupert, and the EAO was asked to consider including this increase in rail traffic within the scope of the EA. The EAO met with PRPA, Transport Canada and CN during Pre-Application to understand the rail traffic management regime in BC.

On November 22, 2019, the EAO shared a draft Section 13 Order with Indigenous nations proposing to amend the Section 11 Order to include operational rail traffic as an off-site Project component to the northern boundary of Kitselas First Nation's Gitaus Reserve near Terrace, BC.

The EAO recognizes that Transport Canada is the lead regulator of interprovincial rail transportation in BC and Canada. As a result of deliberations between the EAO and Transport Canada during the Pre-Application phase, including in respect of the EAO's draft Section 13 Order, the EAO concluded that increases in rail traffic associated with the VPC Project would not be scoped into the EA because interprovincial rail is more appropriately and effectively considered and, if necessary, mitigated by Transport Canada through existing federal legislation. Transport Canada outlined to the EAO the legislation and regulations that are in place to govern the safe operation of rail traffic in BC.

Transport Canada has noted that CN rail transportation operations occurring beyond the provincial and federal scope of the VPC Project are governed by the regulations, rules and standards that apply to federal railways. All federal railways operating in Canada must comply with Canada's national rail oversight regime pursuant to the *Railway Safety Act*. Compliance with these regulations, rules and standards will be monitored and enforced through existing compliance and enforcement programs.

In addition, Transport Canada indicated that the transportation of dangerous goods associated with the VPC Project beyond the provincial and federal scope is governed by and must comply with the *Transportation of Dangerous Goods Act* and its regulations. Compliance with the *Transportation of Dangerous Goods Act*, regulations (and standards) will be monitored and enforced through Transport Canada's risk-based compliance and enforcement activities under the Transportation of Dangerous Goods program.

On April 15, 2020, the EAO wrote to Transport Canada[4] to confirm that the scope of the provincial EA would not include VPC Project rail traffic beyond the Port of Prince Rupert; the EAO did not receive a formal response to the letter but has continued to discuss a responsive approach to the Indigenous nations' concerns with regards to rail safety and operations with Transport Canada throughout Pre-Application and Application Review.

As a result of the rail concerns raised by Indigenous nations during Pre-Application, Vopak also committed to provide additional information regarding the potential effects from increases in rail traffic to Indigenous nations when submitting its Application to the EAO. Vopak's Supplemental Technical Report

[4] https://projects.eao.gov.bc.ca/api/public/document/5e978b57d3008c001a0cbcfb/download/357095_TC_Final.pdf

entitled Rail Traffic Beyond the Scope of the Project[5] contains this additional information.

In response to concerns raised by the Indigenous nations and the public with respect to VPC Project rail transportation beyond the scope of the provincial EA, the EAO reached out to Transport Canada to better understand the federal rail safety regime and the transportation of dangerous goods program for rail activities occurring outside of federal lands. The EAO connected the Indigenous nations with Transport Canada and CN, and it is the EAO's understanding that the Indigenous nations, Transport Canada, CN and PRPA have initiated a four-part rail dialogue forum to discuss the rail regulatory framework, share information and consider appropriate avenues for Indigenous engagement on rail transportation matters moving forward.

Although the provincial scope of the EA remains unchanged from that outlined in the Section 11 Order, the EAO acknowledges that Indigenous nations consider the exclusion of off-site rail activities in Vopak's Application to be a limitation of the EA, which is reflected in nation-specific sections of this Report as appropriate.

5 https://projects.eao.gov.bc.ca/api/public/document/5fc016613afc1f0021cb35df/download/20201109_656431_RPT_Vopak_Rail_Supplemental_Report_Final.pdf

PART B: ASSESSMENT OF POTENTIAL ADVERSE EFFECTS

5. AIR QUALITY

5.1 BACKGROUND

This chapter provides an assessment of the potential effects of the VPC Project to the Air Quality VC.

Ambient concentrations of criteria air contaminants (CACs) were used to assess Air Quality. These included but were not limited to:

- Suspended particulate matter (Total Suspended Particles; Particulate Matter <2.5 micrometres [$PM_{2.5}$], Particulate Matter <10 micrometres [PM_{10}]);
- Hazardous air pollutants;
- Nitrogen Oxides (NO_x);
- Sulphur Dioxide (SO_2);
- Volatile organic compounds (VOCs); and
- Carbon monoxide (CO).

The Application identifies the federal and provincial legislation and policy used to guide the assessment of effects on Air Quality, as well as other guidelines.

The federal regulatory guides include:

- Canadian Ambient Air Quality Standards for fine particulate matter and ozone in 2015 and 2020 (2013);
- Update to Canadian Ambient Air Quality Standards for ozone in 2025 (2019);
- Canadian Ambient Air Quality Standards for nitrogen dioxide in 2020 and 2025 (2017);
- Canadian Ambient Air Quality Standards for sulphur dioxide in 2020 and 2025 (2017);
- *Canadian Environmental Protection Act* (1999);
- Environment and Climate Change Canada (ECCC) (2019). ECCC National Inventory Report 1990 – 2017: Greenhouse Gas Sources and Sinks in Canada;
- Government of Canada (2019). ECCC National Marine Emissions Inventory Tool and report;
- Health Canada (2016). Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality; and
- Transport Canada. Transport Canada Port Emissions Inventory Tool and User Guide.

The provincial regulatory guides included:

- British Columbia Ministry of Environment (2015). British Columbia Air Quality Dispersion Modelling Guideline; and
- Province of BC (2019). British Columbia Ambient Air Quality Objectives.

SPATIAL BOUNDARIES

The spatial boundaries for assessing a project's effects include its footprints (facilities and workspaces), Local Study Area (LSA) boundaries, and Regional Study Area (RSA) boundaries.

The LSA and RSA boundaries for Air Quality were (Figure 3):

- LSA – 10 by 10 km area centered on the facility, and one kilometre on either side of the marine shipping route.

RSA – 30 by 30 km area centered on the facility, and one kilometre on either side of the marine shipping route.

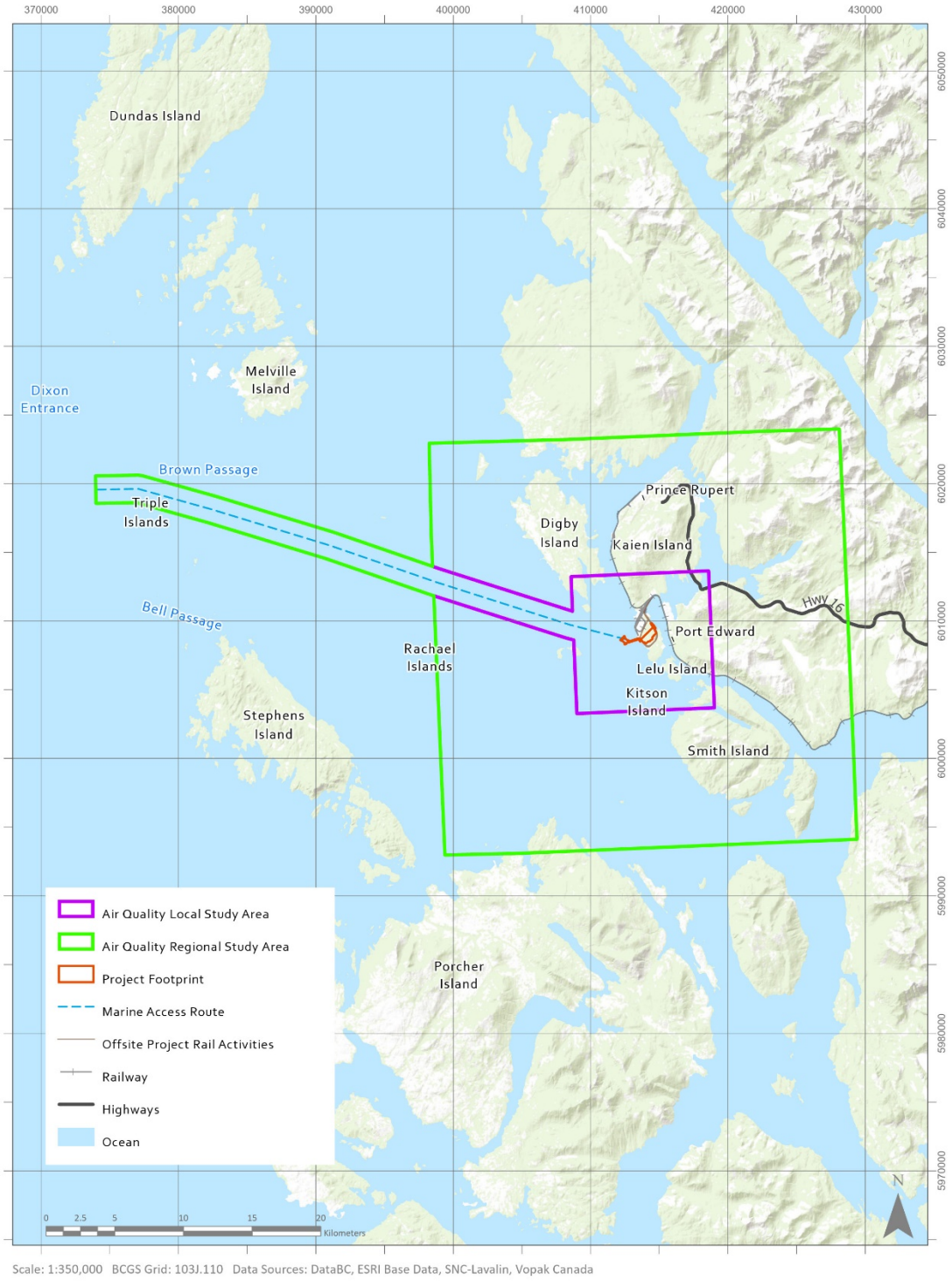

Figure 3: Air Quality Local and Regional Study Areas

TEMPORAL BOUNDARIES

The temporal boundaries for the effects assessments of Air Quality include:

- construction – two years;
- operation – minimum of 50 years, but that the maximum number of years is not known as that would be dependent upon market conditions; and,
- decommissioning – 12 months.

5.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

The RSA is completely within the Prince Rupert airshed. The PRPA monitors air quality on an hourly basis year-round. All monitored air contaminants are below ambient objectives and standards, this includes: Nitrogen Dioxide (NO_2); SO_2; $PM_{2.5}$; PM_{10}. Monitored air contaminant levels represent the effects on air quality of projects and activities in the RSA at the time of monitoring.

The Application reported that most activities during construction, operation and decommissioning could potentially affect Air Quality.

During construction, Air Quality within the LSA could be affected by dust that is generated, which could affect ambient particulate matter concentrations, and the release of CACs from the consumption of fuel. The amount of blasting required, and the dust generated from that are not known at this time because some site-specific management planning will still be required. The risk of air quality effects from dust and equipment/vehicle emissions depends on the maximum and average rate of emissions and the proximity of sensitive receptors.

Construction emissions for combined sources were estimated to be equivalent to one moderately sized source (e.g., one ship while at berth). Emissions from construction distributed over a larger area will be well mixed in the atmosphere at and near the project site. The Application reports that the risk of construction emissions affecting Air Quality is low.

During operation, facilities and equipment (e.g., locomotives, vessels, tugs, liquid propane gas cooling process, and general terminal operations) will consume energy and fuel, and produce emissions of CACs, which could affect Air Quality. Product storage could also release fugitive CACs and affect Air Quality.

Project operation influences Air Quality from emissions of CACs and release of fugitive CACs. The most significant sources of emissions during operation will be from the following, in periodic (regular intervals), continuous, or intermittent (sporadic activities):

- gas turbine power generation (continuous);
- locomotives in transit (intermittent) and shunting tanker cars (largely continuous);
- petroleum and methanol storage tanks (intermittent);
- flaring (intermittent);

- tankers berthed at the facility (periodic); and,
- assist tugs (intermittent).

Gas turbine emissions would be the biggest source of NO_2, SO_2, PM_{10}, $PM_{2.5}$, and CO. Storage tanks and ship loading are the biggest sources of VOCs.

Modeled estimates of ambient concentrations of $PM_{2.5}$ (respirable particulate matter) are far below the applicable Ambient Air Quality Objectives except for a minor exceedance adjacent to the VPC Project boundary, central to Ridley Island, in an area not accessible to the public. The model predictions of PM_{10} (inhalable particulate matter) align with $PM_{2.5}$ predictions and are lower than the provincial 24-hour Ambient Air Quality Objectives.

All predictions of CO are much lower than the applicable Ambient Air Quality Objectives. No relevant CO hot spots were identified. No 1-hour NO_2 Ambient Air Quality Objectives were exceeded at the assessed location, with the exception of near the marine berths (jetty) where the public will not have access; at this specific location the primary cause is assumed to be background concentration, rather than concentrations modelled to result from VPC Project emissions. The maximum predicted concentrations of VOCs occur at the shipping berths because fuels (products) loading are the dominant VOC emitters. Of six hazardous air pollutant species (acetaldehyde, acrolein, crotonaldehyde, benzene, ethylene, and formaldehyde), the only hazardous air pollutant objective that may be exceeded is for acrolein in the area surrounding the jetty. The ship jetty is the main source of emissions and will not be accessible by members of the public.

During decommissioning, Air Quality within the LSA could be affected by dust that is generated, which could affect ambient particulate matter concentrations, and the release of CACs from the consumption of fuel.

Vopak proposes to mitigate negative effects by developing and implementing environmental management plans for construction, operation, and decommissioning, that have component plans for air quality, dust control, soil management, and traffic management. These plans include best management practices for:

- Transportation of soil, including spraying overburden and soil with water if it appears to be overly dry (i.e., airborne) prior to moving it;
- transportation of workers to and from the work camp in Port Edward by bus to reduce traffic and dust generation;
- controlling dust generation with water spray use to increase moisture levels in active areas (e.g., unpaved roads, temporary soil, and overburden stockpiles) if dry conditions are present;
- specifying vehicle speed limits on site;
- engine idling policy to reduce fuel consumption/emissions by construction equipment (e.g., graders, excavators);
- use of efficient, lower-emission vehicles and equipment, where practical;
- implementation of an air quality monitoring program during construction and operation and a dust monitoring program during construction;
- avoid usage of excessive vehicles or machinery at site;

- use vapour-tight connections during the unloading of rail cars and loading of the storage tanks;
- leak detection and repair program for terminal fuels storage and processing systems to reduce fugitive vapour emissions;
- a VOC Control Measures report will be provided during the detailed design stage of the VPC Project and, if necessary, additional control measures will be put into place;
- development of an updated fugitive VOC inventory for terminal operation once fuels consumption and volumes data are clear;
- work with the PRPA through their annual emissions inventory program to evaluate shipping emissions associated with terminal operation, including the potential effects of SO_2 scrubbers on visiting ships;
- locations of predicted air quality exceedances will be considered as part of the PRPA, in consultation with Vopak, determining the navigational safety zone; and
- LPG combusted via a ground flare without visible flames in emergency situations.

The Application reported that:

- during construction and decommissioning, adverse changes to Air Quality from dust and CAC emissions are predicted to be low risk, and mitigation measures (i.e., engine idling policy and efficient, lower-emission vehicles and equipment) will reduce potential emissions to negligible levels;
- during operation, mitigation measures should effectively reduce the potential for a measurable change to Air Quality in the LSA, and, similar to Construction, potential vapour emissions will be reduced to negligible levels; and,
- no residual effects are anticipated for Air Quality.

5.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

The following key issues related to the Air Quality VC were identified, based on the EAO's review of the Application and with feedback from members of the public, technical working group and Indigenous nations:

EXCEED AIR QUALITY OBJECTIVES

ECCC and Health Canada voiced concerns regarding air quality objectives. It was noted that the CAAQS are health and environmental-based air quality objectives, working as the drivers to protect human health and the environment. However, while the Application has set objectives to meet the 2020 CAAQS, a more stringent set of objectives will come into effect in 2025 and, as the VPC Project will be continuing well past 2025, these standards should be used for air quality assessment including standards set for NO_2 and SO_2. In addition, Health Canada requested air quality monitoring to occur during the VPC Project lifetime to verify Vopak's modelling predictions.

Vopak noted that the air quality assessment scope was developed eight years prior to the 2025 CAAQS coming into effect, and that almost all initial model predictions exceed both the current and 2025 1-hour NO_2 Ambient Air Quality Objectives. Following the BC Dispersion Modelling Guidelines – a more sophisticated modelling method – showed no exceedances to the current or 2025 standards with the exception of a minor exceedance very close to the jetty where public access is prohibited. In none of these scenarios were annual average concentrations predicted to exceed either the 2020 or 2025 standards. Vopak committed to developing and implementing an air quality monitoring program at the terminal. Vopak also noted that the PRPA is in the process of installing a new air quality monitoring station in Port Edward.

Health Canada suggested that Vopak and/or PRPA investigate the technical and economic feasibility of additional mitigation measures to address air emissions from Ridley Island operations, such as shore-power connections to limit emissions from ships at berth.

Vopak is aware of ongoing emissions reduction programs at the Port, including those that target NO_x amongst other air contaminants (via initiatives such as shore power and emerging initiatives including electrification of vehicles and cargo equipment). Vopak expects to participate in the annual PRPA emissions inventory program and maintain a dialogue with PRPA on emissions initiatives.

Health Canada noted that several Indigenous nations may harvest along the shorelines and waters surrounding Ridley Island, as well as on the southern part of the island itself. There is an exposure risk to air quality exceedances near the terminal boundary on Ridley Island from the proposed generators and at the marine jetty; public access restrictions to this area reduce the extent of this concern. Health Canada requested confirmation regarding the potential risk of Indigenous nation members exposure in these areas based on harvesting activities.

Vopak stated that Indigenous nations may currently harvest in these areas. However, public access to Ridley Island is and will continue to be restricted in addition to a new safety zone being established around the marine jetty. Following completion of construction, the access to the VPC Project will be regulated by site-security measures and visitor control procedure. Therefore, public access, including by Indigenous nations, will be prohibited where these concerns are predicted.

IMPACT ON HARVESTING

Indigenous nations raised concern regarding harvester activity downwind of the VPC Project.

Harvester activity downwind of the VPC Project was considered by Vopak in the Assessment when it identified how far the worst-case exceedances may extend from the marine jetty. The worst-case emissions scenario has all sources active (ships in transit, tugboat assist, ships at berth with their auxiliaries active as well as all rail activity) for each hour of the year. This will not occur for the vast majority of the time. In addition, for safety reasons, it is not expected that the public will be in the area around the marine jetty during ships moving to and from the berths.

RESIDUAL AND CUMULATIVE EFFECTS

Indigenous nations noted that while some mitigation measures are identified, they do not address railway operations, vessels (tugs and tankers) at berth, or vessels (tugs and tankers) in transit. Therefore, residual effects must be carried forward to an in-depth residual effect assessment.

Vopak responded that the Application focused on the assessment of VPC Project-VC interactions where the potential for significant adverse effects is the greatest, which is in alignment with the EAO guidance. Vopak acknowledges that where an effect (however small) is not considered to be fully eliminated after mitigation measures are applied, there is a possibility that it may act cumulatively.

During operations, Vopak identified possible sources and quantities of emissions in Section 5 of the Application. The VPC Project design for the rail car unloading system and the vessel loading system described in Section 2 of the Application will have a minimum number of potential emission points by taking steps prevent product releases. Mitigation for operation in Section 5 of the Application focus on activities that are within Vopak's control and include rail and vessel loading/unloading operations. In a separate memo Vopak assessed the residual effects of the VPC Project on the air quality VC which included railway operations and vessels in transit. The memo concluded that the residual cumulative effect is not expected to be significate as the threshold is not exceeded.

VAPOUR EMISSIONS

ECCC notes that the risk of VOC vapour emissions release from rail cars and ship tanks during loading, unloading or idling on-site could occur and should be considered; ECCC requested further information regarding this potential risk and associated emissions was requested. In addition, the ECCC recommended, to reduce VOC emissions, that detailed and specific technical and operation measures should be developed and included in Vopak's mitigation plan for rail car unloading and storage tanks, as well as for vessels.

Vopak stated that the liquified petroleum gas rail cars are not vented as the vapours are used for pushing product out and depressurized, if required, for reuse within the propane unloading loop. However, rail cars containing methanol, gasoline and light diesel are opened to the atmosphere prior to unloading to prevent risk of damage from vacuums. These emissions are estimated to be zero to very low over the short distance the rail cars move through the LSA.

Vopak responded that clean petroleum products/diesel and methanol ships will not have vapour systems being used while loading, as vapours are captured for other fuels. Venting will occur while loading these fuels and may also happen during certain conditions after vessel is loaded. Emissions during loading were assessed in the Application, and Vopak asserts that loaded vessel venting may occur for safety reasons.

LPG rail cars are not vented as the vapours are used for pushing product out and depressured, if required, to be reused within the propane unloading loop. Methanol and CPP rail cars are opened

to the atmosphere prior to unloading to prevent a vacuum occurring and damaging the rail car. This unloading practice results in air being brought into the rail car to fill the space voided by the fluid which is being removed. There are no fugitive VOC emissions expected during the unloading of rail cars. As identified in
US EPA AP-42 ch. 5.2.2.1.1, loading losses occur as a result of organic vapours in empty vessels being displaced. Transit losses (fugitive VOCs) are possible and depend on parameters such as pressure relief valve settings and pressure in the tank at trip start. These emissions were not calculated as they would be zero to very low over the short distance the rail cars move through the LSA.

Vopak stated they will consider measures that are identified in the VOC Control Measures report during the detailed design stage and may implement if determined to be technically and economically feasible. However, the potential VOC emissions related to vessels and shipping are not applicable to the VPC Project. Vopak also reiterated that the VOC emissions from loading of vessels and unloading of rail cars are very low and the proposed mitigation measures will address these potential effects.

Health Canada noted that transportation related VPC Project activities may also lead specifically to increased levels of diesel particulate matter and Polycyclic Aromatic Hydrocarbons (PAHs). However, these scenarios were not characterized in the Application. In addition, Health Canada stated that the impact from the contribution of diesel particulate matter and PAH from the VPC Project remains uncertain as diesel particulate matter is both carcinogenic and non-carcinogenic and heavy equipment/diesel engines will operate throughout construction resulting in the emission of PAHs.

Vopak explained that diesel particulate matter and PAHs were not characterized in these cases due to relatively low particulate emissions. Project-related diesel particulate matter can be conservatively estimated by assuming equivalence to the model predictions of $PM_{2.5}$ and there are no VPC Project sources that are expected to have significant PAH emissions.

With respect to diesel particulate matter, Vopak completed modelling to predict potential concentrations and determined an exceedance of the 1-hour threshold would occur only 0.3% of the time, in a location outside of the VPC Project area near the jetty, which Vopak has stated would not be accessible to the public.

5.4 THE EAO'S ANALYSIS AND CONCLUSIONS

The EAO's characterization of the expected residual effects to Air Quality from the VPC Project is summarized below, as well as EAO's level of confidence in the determination of effects (including their likelihood and significance).

Table 9: Summary of Residual Effects to Air Quality

Criteria	Assessment Rating	Rationale
Context	Moderate	Air Quality has a low resiliency or are acutely sensitive to a change in existing conditions.
Magnitude	Low	Modelling predicts negligible to low increases in concentration of CACs following implementation of mitigation measures.
Extent	Local	Predicted effects to Air Quality for all CACs are entirely within the LSA, with the exceedance identified being minor and limited to a small geographic area adjacent to the VPC Project.
Duration	Long-term	The residual effects from the emission would last throughout the Construction and Operations phases of the VPC Project.
Reversibility	Reversible	The residual effects to Air Quality would cease after decommissioning. However, should any adverse effects to other VCs (e.g., Human Health or Vegetation) result they may not be fully reversable.
Frequency	Continuous	The residual effects to Air Quality would be continuous throughout Construction and Operation phases of the VPC Project.
Likelihood	There is a high likelihood that the levels of air emissions reported would be produced with the current design of the facility, and that these emissions would contribute to a residual effect.	
Significance Determination	The effect on Air Quality is expected to not be significant based on the low magnitude of emissions.	
Confidence	There is a high level of confidence in the likelihood determination given the limitations of mitigation and the design of the facility, and that the contribution it would make to the residual effect is understood. There is a moderate level of confidence in the significance determination given the preliminary nature of the design information in the Application.	

5.5 CUMULATIVE EFFECTS ASSESSMENT

Vopak identified seven past, present and reasonably foreseeable future projects with the potential to interact cumulatively with the residual effects of the VPC Project on Air Quality. These projects range from less than 1 km to approximately 4 km from the VPC Project.

In a supplemental memo submitted January 18, 2021, Vopak determined there was a potential for the VPC Project-related residual effects (24-hour exceedance of acrolein near the marine terminal) to interact with the nearby Ridley Island Propane Export Terminal. Specific mitigation measures to address this potential cumulative effect were not proposed. The mitigation measures proposed by Vopak in their Air Quality and Dust Control Management Plan as well as the Construction Traffic Management Plan will help to reduce effects to Air Quality from the VPC Project in the future. In addition, Vopak has proposed an air quality monitoring program to be in place during Operation.

In the Table of Conditions, Condition 9 (Cumulative Effects Management) will require Vopak to participate in initiatives related to the monitoring, assessment and management of the VPC Project's cumulative effects.

The Application and supplemental memo did not include the PRPA's January 2020 proposed Ridley Island Export Logistics Platform about 1 km from the VPC Project which may impact Air Quality. Vopak responded that this project was not known and listed in the July 2019 joint provincial Application Information Requirement and federal Terms of Reference for the VPC Project.

Currently the PRPA actively monitors CAC concentrations at the port to ensure the Air Quality meets the required provincial standards. This information is made available for the public to review (https://www.rupertport.com/air-quality/).

The EAO concludes that there will be significant residual cumulative effects Air Quality from the interaction of the VPC Project with other current and proposed projects that will continue for the foreseeable future.

5.6 CONCLUSIONS

Considering the above analysis and the conditions identified in the Certified Project Description, Table of Conditions and the federal Section 67 Determination requiring Vopak develop a CEMP which includes dust control, traffic management and air emissions management, the EAO concludes that the VPC Project would not have significant adverse effects on Air Quality.

6. GREENHOUSE GAS EMISSIONS

This chapter provides an assessment of the Greenhouse Gas (GHG) emissions from the VPC Project.

6.1 BACKGROUND

The VPC Project is located on Ridley Island which is land that is administered by the PRPA.

The Application identified the federal and provincial legislation and policy used to guide the assessment of GHG emissions.

The federal regulatory guides included:

- Greenhouse Gas Emission Reporting Regulation (2016);
- *Greenhouse Gas Reduction* (Renewable and Low Carbon Fuel Requirements) *Act* (2008);
- ECCC. 2019. National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada;
- *Greenhouse Gas Reduction Targets Act* (2018);
- *Greenhouse Gas Reduction (Emissions Standards). Statutes Amendment Act* (2008);
- *Greenhouse Gas Reduction (Vehicle Emissions Standards) Act* (2008);

- *Greenhouse Gas Industrial Reporting and Control Act;* and
- Greenhouse Gas Emission Control Regulation (2014).

The provincial regulatory guides included:

- BC Emissions Quantifications Methodologies for Industry (GHG Reporting Regulation);
- *Climate Change Accountability Act* (2007);
- *Carbon Tax Act* (2008); and
- Final Essential Requirements for Mandatory Reporting (2011).

SPATIAL BOUNDARIES

The Local Study Area (LSA) and Regional Study Area (RSA) boundaries are not applicable to GHG emissions. The Assessment is relevant to provincial and federal GHG emissions inventories.

TEMPORAL BOUNDARIES

Vopak reported that the VPC Project will:

- take two years to construct;
- operate for a minimum of 50 years, but that the maximum number of years is not known as that would be dependent upon market conditions; and
- take 12 months to decommission.

6.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

GHGs consist of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NOx), and other trace gases. The three main gases are summed to equivalent carbon dioxide (CO_2e) to assess effects on global warming. The Application included Canadian GHG emissions data.

The Application reported that the VPC Project is based on basic engineering, assumptions made will be reviewed during future detailed engineering studies, and all components and dimensions are approximate and may be subject to change based on the outcome of those studies.

The Application reported that most activities during Construction, Operations and Decommissioning will produce GHG emissions. During Construction, combustion engines (on-road vehicles, off-road equipment and vessels) will produce emissions, and the change in land use/removal of vegetation and wetlands will both produce emissions and eliminate a carbon sink. The most significant sources of emissions would occur during Operations and be related to:

- two 16.5 megawatt (MW) gas turbines generating power for the facility (combined operation of up to 20 MW);
- tankers when berthed at the facility and loading cargo;

- tankers in transit; and
- trains in transit and locomotive switching.

Normal Operations will only require one of the turbines (16.5 MW). Both turbines will be required during a maximum load scenario (20 MW). This would happen if all products were being unloaded from rail cars at maximum rates, two ships were being loaded, and on a sunny/warm summer day. The extra energy would be supplied by the second turbine.

GHG emissions during Operations are estimated to be approximately 97,000 tonnes CO_2e per year. The gas turbines will produce the majority (approximately 81,000 tonnes per year) of these emissions. Facilities that emit 10,000 tonnes of CO_2e per year or more are required by Canada and BC (*Greenhouse Gas Emission Reporting Regulation*) to report their emissions.

Vopak reported that BC Hydro power in the area is susceptible to outages, the capacity of the existing lines are almost maxed out, and the VPC Project needs reliable power to operate safely. (BC Hydro operates a 46 MW combustion generating station in Prince Rupert to provide short-term energy during transmission interruptions in the area.) Vopak examined using BC Hydro power as an alternative to gas turbine generators, and concluded it was likely that upgrades would be required to the local BC Hydro grid. Vopak will still purchase some power from BC Hydro (about 2.5 MW).

Vopak reported that if it were to rely on power from BC Hydro, an emergency backup power source that uses fuel would be required. Natural gas from the local provider (Pacific Northern Gas) will be used to supplement the ethane that will fuel the gas turbine generators.

Vopak will not own the products that the facility will handle. Asia markets require the ethane content in liquid gas to be less than what is produced in Western Canada. To meet this requirement, some ethane will be removed at the facility before the product is shipped, and Vopak will then own and utilize this ethane.

Vopak reported that there is currently no market in Western Canada for ethane, disposal of ethane is through combustion in either flare systems or gas turbine generators, and gas turbines provide more complete combustion compared to flaring, producing lower GHG emissions. Vopak reported that transporting the ethane to an existing gas turbine power generating facility for use would likely generate additional GHG emissions.

Vopak concluded that using ethane as fuel to generate power for the VPC Project overall produces the lowest GHG emissions compared to other options.

Vopak proposed to mitigate adverse effects by developing and implementing environmental management plans for Construction, Operations, and Decommissioning, that include the following component plans to reduce GHG emissions:

- Air Quality and Dust Control Management Plan (Construction and Decommissioning);

- Construction Traffic Management Plan (Construction);
- Traffic Management Plan (Construction and Decommissioning);
- Operation Environmental Management Plan (Operations);
- Energy Management Plan (Operations); and
- Decommissioning Environmental Management Plan (Decommissioning).

These plans will include the following to reduce GHG emissions:

- an engine idling policy to reduce fuel consumption of equipment (e.g., graders, excavators);
- transport workers via bus to reduce number of vehicles;
- use of efficient, lower-emission vehicles and equipment, where practical;
- vehicle speed limits;
- a leak detection and repair program for terminal fuels storage and processing systems to reduce fugitive vapour emissions; and
- measures to address energy consumption during Operations, and annual emissions tracking.

The Application reported that while GHG emissions are unavoidable because equipment usage consumes fuel, with the measures identified above:

- emissions will be reduced to negligible levels during Construction and Decommissioning;
- annual emissions during Operations are anticipated to be negligible compared to Provincial and Canadian totals; and
- there will be no residual effects on GHG emissions.

6.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

The EAO identified the following as the key GHG issues from review of the Application and the feedback received from members of the public, technical Working Group, and its Indigenous nation members.

Members of the public expressed concern that: the downstream GHG emissions from consumption of products were not included in the assessment; the assessment reported there would be no residual or cumulative effects from GHG emissions produced by the facility; and, that the term “clean” was used in referring to petroleum products.

> Vopak responded that: it committed to numerous measures to mitigate GHG emissions, including an Energy Management Plan to reduce operational GHG emissions; it will be required to report all GHG emissions on an annual basis; and “clean petroleum products” are those that have been refined and are ready for use.

ECCC identified errors in the GHG emissions estimates and requested a plan to decrease GHG emissions over the life of the VPC Project to support Canada’s goal of net-zero emissions by 2050, including use of best available technologies and best environmental practices; ECCC also inquired if ship-to-shore power connections would be considered at the facility in the future and, requested that heavy trucks meet the most stringent GHG standards.

> Vopak provided supplemental information revising GHG emission estimates, and responded that: emissions will be tracked, and the Energy Management Plan will be responsive to regulatory changes and consider best available technologies and best environmental practices; ship-to-shore power connections are not planned in the facility design; and, it cannot commit to meeting the most stringent GHG standards for heavy trucks at this time.

Indigenous nations expressed concern that: power from BC Hydro is not being used instead of a gas turbine (Metlakatla); the VPC Project exceeds the reporting threshold for GHG emissions and will contribute to climate change, and so asked if there is a plan to reduce emissions (Kitsumkalum). Gitga'at and Gitxaala inquired why upstream emissions were not included in the assessment.

> Vopak responded that: power from BC Hydro is seen as less favourable because waste ethane will be produced at the facility that is best disposed of as fuel for a gas turbine; it is unlikely that mitigations can reduce GHG emissions below the reporting threshold when the terminal is operating at full capacity; and upstream sources of emissions are outside the scope of the environmental assessment.

6.4 THE EAO'S ANALYSIS

Canada and BC have programs in place to progressively reduce total GHG emissions over time.

The Province's *Climate Change Accountability Act* (formerly the *Greenhouse Gas Reduction Targets Act*) establishes targets for reducing provincial GHG emissions (40% below 2007 levels by 2030, 60% by 2040, and 80% by 2050: there is an interim target of 16% by 2025).

The provincial environmental assessment process does not consider GHG emissions using the framework that is applied for other Valued Components.

The GHG emissions that Vopak reported for the Operations of the VPC Project are based on estimated average daily volumes of products that the facility will receive. Increasing the daily input and maximum aggregate limits would increase GHG emissions. Vopak's customers will arrange shipping of their products to and from the VPC Project, and variations in the types and volumes of products that might be handled (dictated by market conditions and shipping logistics) creates some uncertainty.

Activities associated with the facility will produce GHG emissions for a minimum of 50 years. During Operations about 84% of GHG emissions produced will be from gas turbines generating power for the facility. More than 90% of the GHG emissions produced will be CO_2. GHG emissions will occur 100% of the time during facility Operations and will cease after Decommissioning.

As noted above, there may be design options available that would reduce GHG emissions during VPC Project Operations that are not currently being considered by Vopak.

The VPC Project is located on Ridley Island which is land that is administered by the PRPA. On June 7, 2021, ECCC advised Vopak that it is a responsible federal authority for the VPC Project, and required Vopak to provide a credible plan that describes the measures that will be taken to minimize GHG emissions throughout all project phases and achieve net-zero emissions by 2050 (about halfway through the minimum life-of-facility, depending upon when Operations begin). The plan itself may be produced in the next 1-2 years, with the submission date still under consideration between ECCC and Vopak at the time of this Assessment Report.

Subsequently, ECCC recommended that additional measures to reduce GHG emissions be implemented and considered within Vopak's plan to meet net-zero emissions by 2050, including measures that would reduce emissions from the primary sources (gas turbine generators, tankers, and trains) at specified intervals. ECCC also recommended that zero-emission vehicles and equipment be utilized during all project phases, and if not available or not technically or economically feasible, justification be provided, and low-carbon fuel or diesel be used.

Table 10: Summary of residual effects for GHG emissions

Criteria	Assessment Rating	Rationale
Context	Moderate	Activities associated with the facility will produce GHG emissions for a minimum of 50 years. More than 90 % of GHG emissions produced will be CO_2. Some is absorbed quickly (e.g., by the ocean surface), but some will remain in the atmosphere for thousands of years in dispersed form.
Magnitude	Low	GHG emissions will be about nine times above the reporting threshold, and annual reporting will be required. Annual emissions will be about 0.14% of BC's total emissions (2017). The rating excludes the consumption of the products handled by the VPC Project.
Extent	N/A	The assessment is not bound by spatial boundaries.
Duration	Long-term and Permanent	Emissions: GHG emissions will be produced for a minimum of 50 years. Effects: The effects of GHG emissions will continue after emissions are no longer being produced.
Reversibility	Reversible and Irreversible	Emissions: GHG emissions will cease after Decommissioning. Effects: The effects of GHG emissions will continue after emissions are no longer being produced.
Frequency	Continuous	GHG emissions will occur 100% of the time during facility Operations, and the effects of emissions will continue after emissions are no longer being produced.
Likelihood	There is a high likelihood that the levels of GHG emissions reported will be produced with the current design of the facility, and that these emissions will contribute to a residual effect, climate change.	
Significance Determination	The facility's contribution to climate change is expected to not be significant based on the low magnitude of GHG emissions, and provincial and federal programs to reduce total GHG emissions over time.	
Confidence	There is a high level of confidence in the likelihood determination given the limitations of mitigation and the design of the facility, and that the contribution it will make to the residual effect is understood. There is a moderate level of confidence in the significance determination given the preliminary nature of the facility design information in the Application.	

Note: Criteria and assessment ratings are defined in Appendix XX: Summary Characterization of Residual Adverse Effects for Valued Components

6.5 CUMULATIVE EFFECTS ASSESSMENT

The Application reported that, as there are no residual effects on GHG emissions, there is no potential for the residual effects of other projects to act cumulatively within the same temporal and spatial extents.

The EAO notes that regardless of whether the total Canadian and BC GHG emissions reported annually decreases or increases while the VPC Project is operating, the GHG emissions produced by the VPC Project will contribute cumulatively to climate change effects that will remain after emissions are no longer being produced by the VPC Project.

6.6 CONCLUSIONS

As noted in Section 1.3 above, design options may be available that would reduce GHG emissions during VPC Project Operations that are have not yet been considered. The recommendations set out by ECCC to achieve net-zero by 2050 requires Vopak to consider these potential options and their implementation.

Considering the above analysis and having regard to provincial and federal programs to reduce overall GHG emissions over time, the EAO is of the view that GHG emissions from the VPC Project are unlikely to affect the Province being able to meet its emission reduction targets of 80 percent by 2050.

7. NOISE

7.1 BACKGROUND

This chapter assesses potential impacts to the Noise VC (Chapter 5.2 of the Vopak EEE/Application) due to the VPC Project. Results of the noise assessment were incorporated into the assessment of potential impacts to Terrestrial Resources (Section 10), Marine Use and Navigation (Section 12: Social and Economic), and Human Health (Section 14). The underwater noise effects are assessed in Marine Resources (Section 9).

The following indicators were used for the Noise VC assessment:

- Ambient sound levels;
- Incremental change in noise level from construction of the VPC Project;
- Incremental change in noise level from facility operations;
- Percent highly annoyed; and
- Low-frequency noise and vibration (frequencies below 100 to 200 hertz)

The Application considered the following federal and provincial legislation, regulations, and guidelines:

- British Columbia Noise Control Best Practice Guidelines (BC Oil and Gas Commission [BC OGC], 2018);
- District of Port Edward Noise Control Bylaw No. 520. 2011;
- Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (Health Canada, 2017);
- City of Prince Rupert Noise Control Bylaw No. 2430. 1989;
- Roadway construction noise model user guide (United States Department of Transportation, 2017); and
- Transit Noise and Vibration Impact Assessment Manual. U.S. Department of Transportation. FTA Report No. 0123. (Federal Transit Administration, 2018).

SPATIAL

The LSA was defined as 1.5 km from the VPC Project-noise sources. The RSA was defined as 3 km from the VPC Project-noise sources, adding a 1.5 km buffer from the LSA.

Vopak used two points of reception in their noise assessment which provided a comparison within two different noise environments. Receptor 1 was located within the LSA and represented the worst-case residential location in Port Edward for noise due to the VPC Project sources. Receptor 2 was located in the RSA and was chosen because it is removed from the noise interference from the railway line.

TEMPORAL BOUNDARIES

Vopak reported that the VPC Project will:

- Take two years to construct;
- Operate for a minimum of 50 years, but that the maximum number of years is not known as that would be dependent upon market conditions; and
- Take 12 months to decommission.

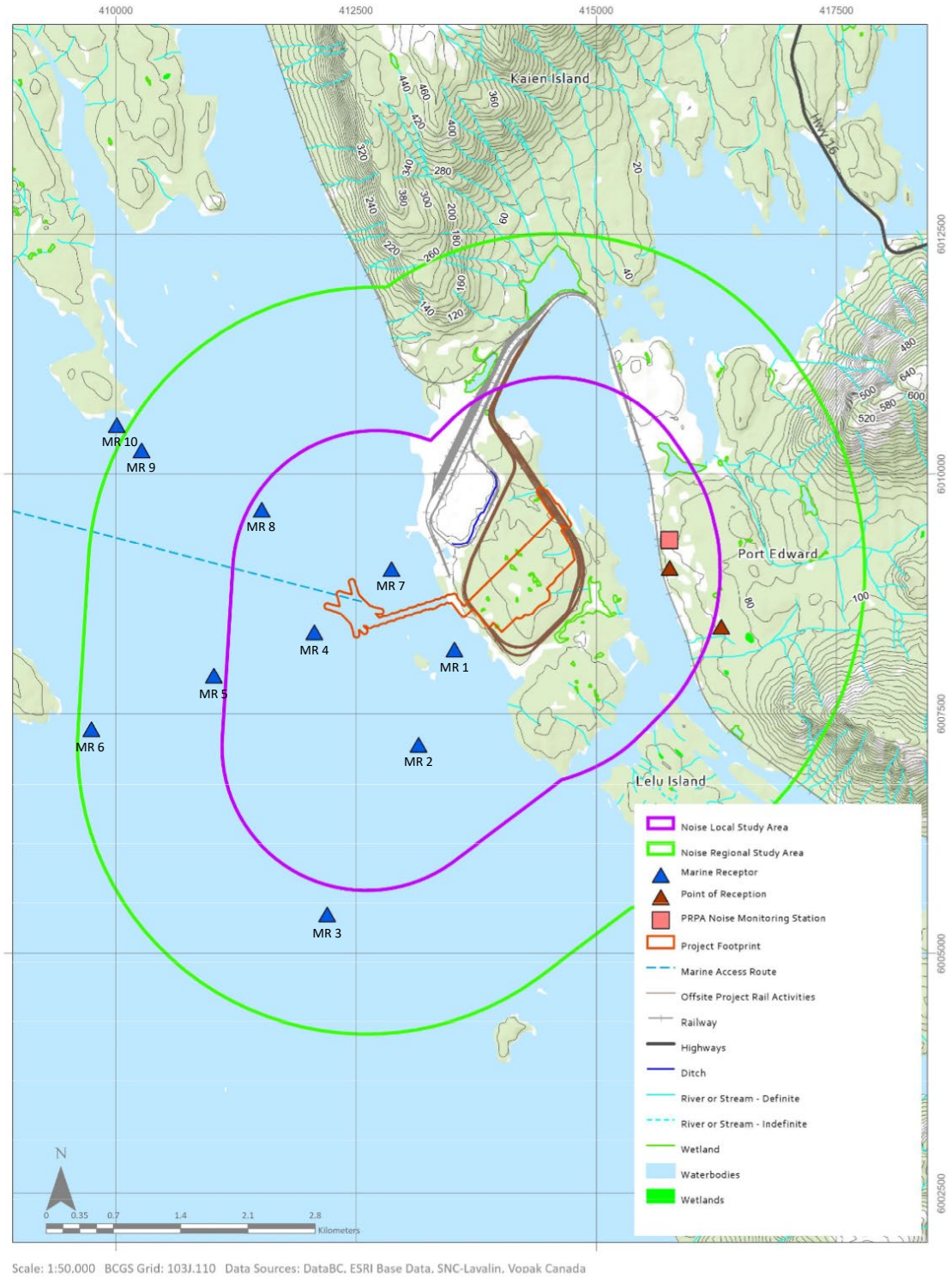

Figure 4: Spatial boundaries for the Noise VC.

7.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

This section provides an overview of potential effects and proposed mitigations identified in the Application.

BASELINE INFORMATION

The methodology for collecting baseline data included a desktop-based assessment using the available ambient noise data in the vicinity of the VPC Project. Vopak used the BC Noise Control Best Practices Guideline to evaluate the noise from the VPC Project. The methodology is receptor-based, where permissible sound levels are evaluated at selected receptors (that is, occupied dwellings or residences) rather than at the property line of the industry. The permissible sounds levels for each receptor were calculated by considering their proximity to different types of transportation and the density of dwellings in the area.

The following steps were conducted to evaluate the noise levels emitted by the VPC Project, consistent with the BC OGC guidelines:

- All potential receptors in the LSA were identified;
- Additional receptors within the RSA were considered, as needed;
- The permissible sound levels and ambient sounds levels were determined at the various receptors;
- The development sound levels, the noise produced by the VPC Project, were modelled at each receptor;
- The ambient sound levels and development sound levels at each receptor were added (logarithmically) to determine the estimated sound levels at receptors; and
- The estimated sound levels were compared to the permissible sound levels to evaluate the compliancy of the VPC Project in relation to the BC OGC guidelines.

Vopak also considered Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise for evaluating construction noise. This included calculating the change in percent highly annoyed in the population due to the VPC Project and a characterization of low frequency noise and vibration.

Sound levels were represented as A-weighted decibels (dBA). The dBA measurement unit corresponds to sound levels measured on a sound level meter with a filter emphasizing the middle frequency components like the frequency response of the human ear. Sound levels for a receptor were represented as the equivalent continuous sound level (L_{eq}) measured. The equivalent continuous sound level value is the sound level averaged (logarithmically) over a specified time period.

Variable noise environments (such as traffic) can be presented as a single equivalent sound level value.

The PRPA has a noise program to manage noise related to terminal activities and their effect on residential

areas. PRPA adopted a 55 dBA baseline threshold for their noise management program. A 55 dBA limit was assumed as the daytime equivalent sound level limit at the receptor nearest to a port facility and a general port-wide limit for this noise assessment.

The PRPA had a noise monitoring station installed at the Sunset Drive Fire Hall in Port Edward (at the edge of the LSA) in September 2015. Vopak applied the noise monitoring provided by the PRPA at the Port Edward station as the representative noise level at the model receptors (Receptor 1 and 2) nearby. The noise monitoring station data from 2016 was used to calculate the change in percent highly annoyed as it provided the most conservative comparison of existing ambient sound levels.

NOISE LEVELS AT LAND BASED RECEPTORS DURING CONSTRUCTION

The application predicted that construction activities, including site clearing and excavating, assembly of structural components, road traffic, and on-site activity of mobile equipment, would not have an adverse residual effect on nearby land-based receptors.

The construction site sound levels calculated a one dBA increase in noise level over ambient conditions during the nighttime at Receptor 1 and no increase in noise level during the day at Receptor 1 and during the day or night at Receptor 2. The model considered construction activities would occur during both daytime and nighttime to be conservative.

The Application showed that the increase in percent highly annoyed predicted during construction was 0.2 percent at Receptor 1 and 0.1 percent at Receptor 2, which is below the Health Canada Guidance threshold of 6.5 percent.

The application did not include an assessment of low frequency noise and vibration for construction. The reason provided was that the main construction sources have well-known source profiles and are commonly used in the communities of Port Edward and Prince Rupert without adverse related effects. The application notes that it is possible that short-term construction activities (e.g., blasting) could be associated with low frequency noise or vibration.

NOISE LEVELS AT LAND BASED RECEPTORS DURING OPERATIONS

Vopak modelled noise during the operations with the consideration of fixed equipment, such as compressors, pumps, coolers, and generators, along with mobile equipment, such as trains and marine vessels. All VPC Project noise sources were assumed to operate continuously seven days a week and 24-hours per day. The estimated sound levels at both receptors were predicted to be 45 dBA which is an increase of 2 dBA above ambient nighttime levels but below the 48 dBA nighttime permissible sound level thresholds for both receptors, as per the BC Noise Control Best Practices Guideline. The estimated sound levels are also well below the daytime permissible sound level thresholds of 58 dBA.

The Application estimated that the percent highly annoyed would increase by 0.11 percent at both receptors during the operations phase, which is below the 6.5 percent Health Canada Guidance limit.

Vopak assessed low frequencies using the Health Canada methodology. Consistent with this methodology, low frequencies are not considered problematic when octave-band sound pressure levels at 16, 31.5 and 63 hertz are less than 65, 65 and 70 dBA, respectively. Data provided by Vopak for the sources with the highest potential for low-frequency noise (compressors) showed that noise emissions at 63 hertz could be as high as 70 dBA. Noise data at the lower frequencies of 16 and 31.5 hertz were not available. Vopak noted that if emitted noise at these low frequencies during operation are in fact higher than the Health Canada thresholds, the transmission of low-frequency noise or associated vibration would not be expected at Receptor 1 and 2 due to the distances involved as well as separation of the community by water from Ridley Island.

The Application proposed the following mitigation measures:

Construction:

- Schedule expected noisy construction activities (e.g., pile driving, blasting) during daytime hours; and
- If complaints are received, Vopak will investigate and, if necessary, test for low-frequency noise and vibration transmission.

Operations:

- Use mufflers on the VPC Project gas engines (such as, generators);
- Schedule expected noisy activities (such as maintenance) during daytime hours, when possible; and
- Consider the addition of acoustical screening (provides an absorbent barrier to sound), if necessary.

7.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

NOISE FROM PILE DRIVING AND RESIDUAL EFFECTS OF CONSTRUCTION

Gitxaala requested that Vopak provided an effects assessment of construction noise, including a description of magnitude, extent, duration, frequency, reversibility, context, likelihood and confidence, as it was identified to have a non-zero effect. Kitselas and Metlakatla also identified that construction noise should be subject to a more detailed assessment.

Kitsumkalum identified that no specific marine equipment was modelled and noted that pile driving, blasting and rock drilling are also all very noisy activities.

> Vopak provided a Residual Effects memo, which included carrying forward an analysis of residual effects on the Noise VC from construction. Vopak also included the activity of pile driving which was not previously included in the noise model. A summary of the results of this part of the memo is included below.
>
> The model included the scenario of two piles using the drop hammer method and considered that pile driving will occur during daytime hours. The results of the construction site sound level models that included pile driving showed an increase of 4 dBA over ambient sound levels at Receptor 1 and an increase 3 dBA over ambient sound levels at Receptor 2. Vopak also calculated the increase in percent highly annoyed for construction noise that included pile driving and found an increase in percent highly annoyed of 0.6 percent at Receptor 1 and 0.3 percent at Receptor 2 which is also well below the 6.5 percent Health Canada threshold.
>
> Vopak provided a characterization of residual effects for construction noise and a cumulative effects assessment for construction noise. Vopak's significance conclusion was the residual effect of change in ambient noise levels during construction is considered to be not significant because the change in percent highly annoyed at the nearest residential locations and sensitive receptors is well within the change threshold set by Health Canada. The likelihood of the prediction is high due to the conservative assumptions made in the noise modelling. Confidence in the predicted effect is also high because the nature of the effect and consequences are well understood and thresholds well defined.

OFFSHORE NOISE MODELLING

Gitxaala noted that the soundscape is an important element of "sense of place" and changes to the soundscape have the potential to affect peaceful enjoyment of a space, and requested that Vopak provide sound contours for VPC Project noise, regardless of whether they exceed regulatory guidelines. Gitxaala also commented that they continue to be concerned that the lack of receptors in the marine environment and on Digby Island means that the proponent has not provided an assessment of the potential impacts from noise on potential users in these locations. This information is necessary to understand the changes

expected and to inform the Nation's own opinion on the seriousness of the effects, especially as they relate to those effects in both community wellbeing and in Part C.

Kitselas requested a revised noise assessment as they were concerned with the level of detail provided in the assessment. In Kitselas' view, the noise assessment was considered insufficient to understand impacts on traditional use because contour maps did not include a baseline figure, offshore effects and offshore receptors to account for traditional use.

Metlakatla commented that they would like to understand the distribution of noise resulting from the VPC Project to be able to evaluate impacts to the practice of Indigenous rights via sound contours for the VPC Project noise impacts. Metlakatla members use the adjacent marine space; noise has the potential to alter the ability or experience of the exercise of their traditional rights. It is therefore important to be able to characterize effects in these locations in order to develop sufficient mitigation. In summary, Metlakatla would prefer that offshore receptor locations be identified and impacts to them assessed.

During a meeting between Vopak, Health Canada and the EAO[6], Health Canada noted that their guidance for noise assessments is not limited to residences as receptors. Health Canada suggested that Vopak acknowledge and provide some kind of indication of what people might be experiencing on the water.

> Vopak provided a memo on March 8, 2021 on the expected noise levels over the marine environment. The memo included information about noise levels considered acceptable for receptors in the marine environment and predicted noise levels at 10 different locations in the marine environment, including Digby Island, (the locations of the marine receptors are shown in Figure 4 above) for operation and construction activities. The memo also included noise contour maps for the five different VPC Project scenarios that were evaluated. A summary of the memo is provided below.
>
> Vopak considered the Health Canada (2017) guidelines as the most relevant guideline for the marine environment. Specifically, the section named "Interference with speech comprehension" which recommended a background noise level of 55 dBA to sustain good outdoor speech comprehension. Vopak proposed to use this limit of 55 dBA to analyze the estimated noise levels of the VPC Project on the marine environment. Vopak noted this is not a regulatory limit and is not intended to determine compliance of noise emissions from the VPC Project.
>
> Vopak used similar methods to evaluate the impact of the VPC Project on the marine receptors as they did the Port Edward Receptors (summarized above in the baseline information section). The ambient sound levels considered at all the receptors in the marine environment was 45 dBA. Vopak considered five different VPC Project scenarios for their analysis:
>
> 1. Operation activities (all equipment in operation 100 percent of the time);
> 2. Construction activities without pile driving;

[6]February 5, 2021

3. Construction activities with two hammer pile drivers operating at the same time;
4. Construction activities with two vibratory pile drivers operating at the same time; and
5. Construction activities with one hammer pile driver and one vibratory pile driver operating at the same time.

Table 11 below provides the estimated sound level results of the noise modelling for all five scenarios and compared it to the proposed 55 dBA guideline for outdoor background noise level.

The estimated sounds levels in the marine environment during operation activities and construction activities without pile driving were below the proposed 55 dBA guideline for all receptors. The estimated sounds levels for construction activities when there is pile driving in progress, can exceed the proposed 55 dBA guideline at some receptors. The worst cases were Scenarios 3 and 5 where eight of the ten receptors modelled were above the proposed 55 dBA guideline. Both scenarios included hammer pile driving activities. Vopak acknowledged these scenarios would have higher magnitude effects, over a short period of time, and will avoid hammer piling whenever possible.

Regarding Scenario 4, which represented construction activities with two vibratory piles drivers operating at the same time, only two of the modelled receptors (MR 1 and MR 7) exceeded 55 dBA. The results showed that the use of a vibratory pile driver will result in lower noise levels in comparison with the hammer pile driver.

Vopak stated that they intend to maximize the use of vibratory piling and minimize the use of hammer piling. Vopak would decide ahead of time on which method of pile installation is appropriate based on the geotechnical information about the pile location. Where hammer pile drivers are required, Vopak will communicate with nearby sensitive receptors to indicate possible noise disturbances caused by this construction activity for a given period. In addition to this, in-water works, including pile driving, will be restricted to a November 30 to February 15 timing window, occur only during daytime hours and the Construction phase is expected to only occur over a two-year period.

Table 12: A comparison of the estimated sound levels (ESL) from the five VPC Project scenarios modelled to the proposed Health Canada guideline threshold of 55 dBA for good outdoor speech comprehension. The asterisk (*) beside numbers represents estimated sounds levels that exceeded 55 dBA.

Receptor	Health Canada Guideline (dBA)	Operation activities ESL (dBA)	Construction without pile driving ESL (dBA)	Construction with two hammer pile drivers ESL (dBA)	Construction with two vibratory pile drivers ESL (dBA)	Construction with one hammer and one vibratory pile driver ESL (dBA)
MR 1	55	53	48	84*	71*	81*
MR 2	55	49	46	71*	55	68*
MR 3	55	46	45	52	45	50
MR 4	55	55	46	69*	53	66*
MR 5	55	48	45	64*	48	61*
MR 6	55	46	45	59*	46	56*
MR 7	55	55	47	74*	58*	71*
MR 8	55	49	45	65*	49	62*
MR 9	55	46	45	60*	46	57*
MR 10	55	46	45	54	45	51

Gitxaala and Metlakatla commented that the indicators used are insufficient to characterize impacts to experience since it creates no distinction between desirable natural sound and unwanted sound. As soundscape is critical to sense of place and peaceful enjoyment, the lack of clear discussion of the potential for unwanted sound increasing the project's effect on the experiential potentially undervalues the nature of these effects.

The EAO notes that Vopak has committed to a several mitigations as listed in Sections 1.2.2 and 1.3 of this Chapter, Environmental Management Plans – to be developed under federal authority oversight - as well as Indigenous Engagement-specific mitigations including the Indigenous Engagement Memo, and Indigenous Interests Management Plan. It is the EAO's perspective the several forums to discuss these issues remain available before and during VPC Project commencement.

SLEEP DISTURBANCE FROM INCREASED RAIL TRAFFIC

While rail traffic for the provincial scope of the VPC Project Environmental Assessment is limited to the facility railyard where Vopak would have care and control of the railcars, most Working Group members have raised rail traffic as a concern, including on the topic of noise.

Health Canada requested information about the frequency of intermittent night-time noise events (e.g. from train arrivals) and the potential for sleep disturbance during full operation.

Vopak responded that the intermittent noise sources that they subsequently modelled for noise events (that is, related to train arrivals) were below the World Health Organizations (1999) guidelines for sleep disturbance. The estimated number of train arrival is one per night.

ADDITIONAL NOISE MITIGATIONS

Health Canada stated that they supported the proposed noise mitigations for the VPC Project and proposed two additional mitigations. The first was notifying surrounding communities of any particularly noisy activities (blasting, pile driving) and their expected duration during both operations and the two-year construction period. The second suggested mitigation was that Vopak more prominently advertise a noise complaint phone line/website to allow for noise reporting and further investigation. Health Canada noted that information on the PRPA's community feedback line is currently located within a pop-up window in the PRPA's noise data portal, making it potentially difficult for residents to locate.

Kitsumkalum commented that they would like to confirm that monitoring, likely in the form of complaints management, is developed for both construction and operations to ensure effects from noise are adaptively managed.

Vopak responded that they committed to a procedure for community notification of noisy activities such as blasting or pile driving, in Section 10.3.7 of the Application.

Vopak would also establish its own two-way communication channels with the public. Community members are able to engage with the VPC Project to provide their feedback or voice their concerns on their website (**www.vopakpacificcanada.com**), at their general email, and in-person at a local office opening in late 2021. Vopak would establish a phone line where complaints can be received. Vopak would investigate all complaints and respond to the individual who notified Vopak of the complaint.

Gitxaala and Metlakatla noted the concern that Indigenous groups would have to alter their behaviour in response to Vopak's schedule to avoid noisy activities during construction. Metlakatla also noted that this would inhibit activity in preferred locations.

7.4 THE EAO'S ANALYSIS AND CONCLUSIONS

After considering Vopak's proposed mitigation measures, PRPA's existing noise monitoring programs and oversight as federal land manager, the EAO concludes that the VPC Project will result in the following residual adverse effects on the Noise VC:

- Increase in noise level from construction of the VPC Project.

Table 13: Summary of residual effects for noise from construction.

Criteria	Assessment Rating	Rationale
Context	Low	Zero to five historical noise complaints (logged against commercial or industrial operations) per year by residents of a local community over the previous five years. Ridley Island is designated for industrial development, and the PRPA determines what types of developments will occur.
Magnitude	Low to Moderate	Predicted noise levels due to VPC Project sources are below health and annoyance levels identified in relevant municipal bylaws as well as provincial and national guidelines, at the nearest residential locations, and for the most part will not result in any increase in noise levels over ambient conditions. Predicted noise levels on the marine side do exceed 55 dBA, the recommended guideline for good outdoor speech comprehension, during pile driving and particularly during the use of hammer pile driving.
Extent	Regional	Modelling indicated that noise from most construction activities will not extend beyond the LSA. During hammer pile driving activities the noise effects can extend beyond the LSA.
Duration	Short Term	The construction phase is 24 months. Piling installation is anticipated to occur between the November 30 and February 15 for both years where marine activity is expected to be at a reduced level (i.e. during winter).
Reversibility	Reversible	Baseline conditions are immediately restored after the cessation of construction activity.
Frequency	Frequent	Noise effects will occur on multiple occasions at regular intervals.
Likelihood	The likelihood of an impact to the noise environment in Port Edward from construction is low; the likelihood of an impact to the noise environment of marine receptors from pile driving is high.	
Significance Determination	In consideration of the above assessment, as well as the conservative nature of the predicted effects, the EAO concludes that VPC Project would not have significant adverse residual effects on the Noise VC. From a well-being and recreational perspective, activities that occur on the water might be impacted during the use of pile drivers. The use of pile drivers will be limited to the DFO least risk window of November 30 to February 15. Vopak will also be informing the communities when pile driving is likely to occur; Indigenous nations have noted concerns that members may have to alter behaviour in response to Vopak's construction schedule.	
Confidence	The EAO's confidence in this assessment is high.	

7.5 CUMULATIVE EFFECTS

Vopak considered a number of past, present and reasonably foreseeable future projects and activities in the cumulative effects assessment for the Noise VC. Vopak stated that the VPC Project-related noise levels are expected to attenuate to baseline levels at or before the LSA boundaries for the majority of construction activities, and to intermittently extend outside the LSA to the west. Therefore, Vopak considered only projects and activities that have the potential to interact cumulatively with the VPC Project's residual effect on noise levels which would be limited spatially to those occurring on and around

Ridley Island.

Vopak stated that baseline ambient noise levels were used as inputs for the model used in this assessment, and included noise from existing projects and activities, which are therefore are already accounted for in the VPC Project-specific noise model assessment. For the current VPC Project, calculations indicated that the existing noise levels at the nearest residential locations will not change during the construction phase, staying at 63 dBA.

Vopak explained that to understand the potential for residual noise effects from the VPC Project's construction activities to interact with those associated with other future projects and activities, it should be noted that the combined effect of sound levels in decibel from different noise sources is logarithmic. Should future projects and activities produce noise during the construction phase of the VPC Project, ambient noise levels would change in one of the following three ways:

- If the other projects produce noise lower than 53 dBA, there will be no change to ambient noise levels;
- If the other projects produce noise between 53 and 63 dBA: there will be an increase of up to 3 dBA in ambient noise levels; and
- If the other projects produce noise higher than 63 dBA, there will be an increase of 3 dBA or more in ambient noise levels.

Vopak stated that in each of these scenarios, the noise from the construction phase of the VPC Project is not expected to contribute to a cumulative increase in ambient noise levels. In other words, with or without the construction activities of the VPC Project, ambient noise levels at the nearest residual locations will either remain the same or be increased solely due to the other future projects and activities.

Given the limited marine construction window (November 30 – February 15) over a two year period, the mitigations to avoid the use of hammer pile driving and concurrent in water-activities whenever possible, and the commitment develop a procedure for community notification of noisy activities such as blasting or pile driving, the EAO is of the opinion that there will not be significant residual cumulative effects to marine receptors. The EAO has low confidence in this assessment as the construction period of the recently proposed Ridley Island Export Logistics Platform has the potential to overlap with the VPC project construction period and could impact marine receptors.

Based on the predicted low magnitude impacts to residential land-based receptors, the logarithmic nature of sound explained above, the proposed mitigations including Vopak's commitment to establish a phone line and to investigate and reply to all noise complaints, the EAO concludes that there would not be significant residual cumulative effects to the increase in noise level from the interaction of the construction of the VPC Project with other reasonably foreseeable projects.

7.6 CONCLUSIONS

Considering the above analysis and the federal Section 67 Determination, the EAO concludes that the VPC Project will not have significant adverse effects on Noise.

8. VISUAL QUALITY AND AMBIENT LIGHT

This chapter provides an assessment of how Visual Quality, including Ambient Light, could be adversely affected by the VPC Project.

8.1 BACKGROUND

The VPC Project is located on Ridley Island, on federal lands administered by the PRPA. The Application did not identify any federal legislation or guidelines related to Visual Quality. The Application identified provincial forestry regulation and associated guidance related to Visual Quality, and some of this was referred to in the assessment of effects. Industry guidance was used to inform the assessment relating to Ambient Light.

SPATIAL BOUNDARIES

The spatial boundaries for assessing effects includes a project's footprints (facilities and workspaces), LSA boundaries, and RSA boundaries.

The LSA and RSA boundaries for Visual Quality were (Figure 5):

- LSA – eight km from the storage facility and marine terminal, and four km from the center line of the marine access route (details can be observed); and
- RSA – 25 km from the storage facility and marine terminal, and 12 km from the center line of the marine access route (larger features can be observed).

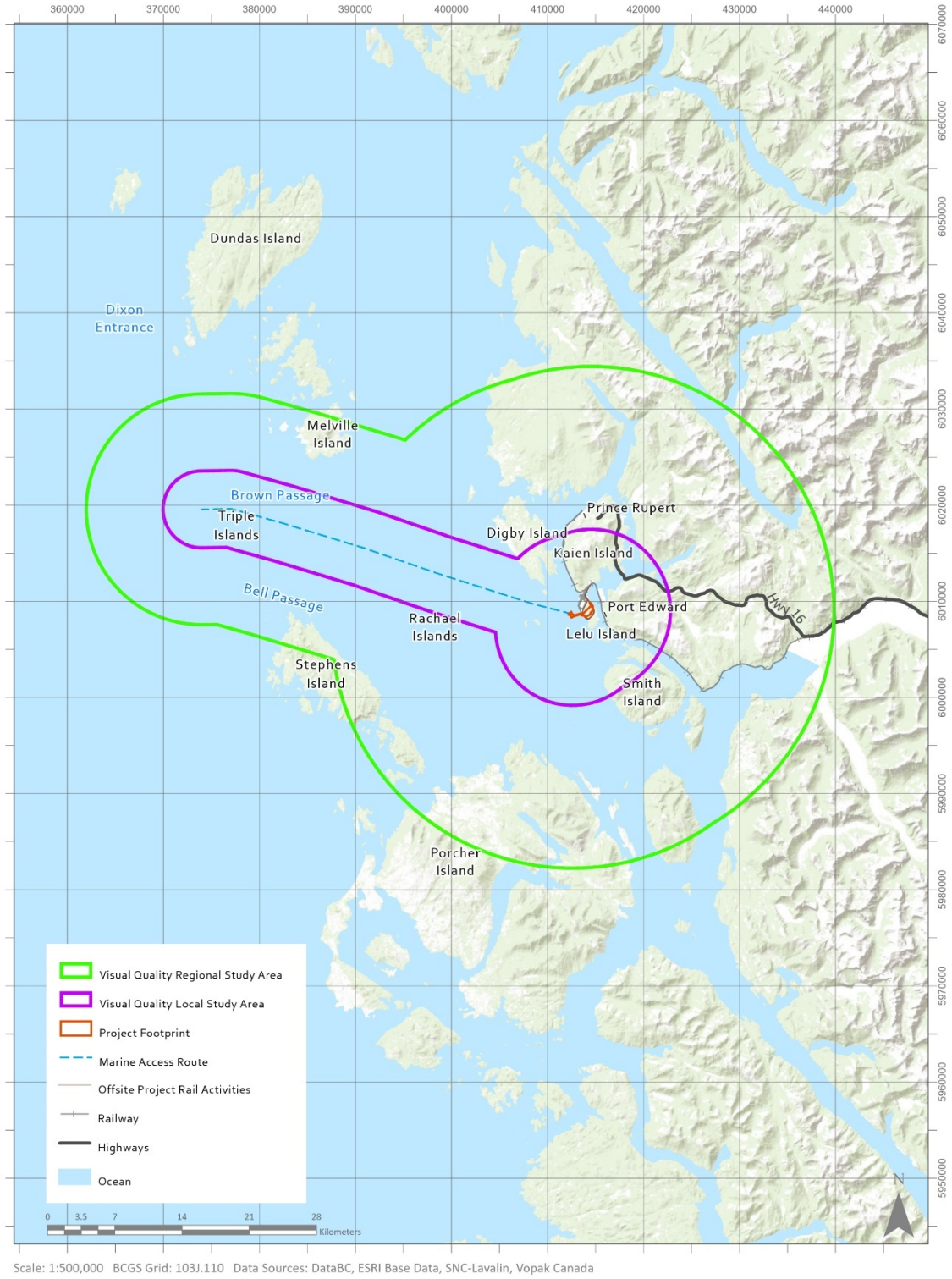

Figure 5: Visual Quality

TEMPORAL BOUNDARIES

Vopak reported that the VPC Project will:

- take two years to construct;
- operate for a minimum of 50 years, but that the maximum number of years is not known as that would be dependent upon market conditions; and
- take 12 months to decommission.

8.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

The study areas are subject to both commercial and recreational marine traffic. In recent years there has been an expansion of facilities within the Port and associated commercial shipping traffic, and this trend is expected to continue (PRPA Land Use Plan, September 2020).

Ridley Island, which is approximately 552 hectares in area, may be fully developed for Port operations over time. This industrial area currently includes existing infrastructure, and activities subject to federal environmental assessment not yet constructed or fully constructed. Some operating industrial facilities have limited consideration for lighting design, while others limit light pollution.

Ridley Island is visible from vessels in the open waters around it and the community of Port Edward across Porpoise Channel three km to the east. The terrain ranges from sea level to 50m in elevation. The site of the VPC Project storage facility is 20 m to 45 m above sea level, is mostly undisturbed with patchy coniferous tree cover, and largely comprised of bog-wetland complexes with some non-wetland plant communities, including old forest.

The VPC Project will operate for a minimum of 50 years. Following Decommissioning of the facility it is likely that another facility will take its place, and the site will remain an industrial site for Port operations.

The footprint of the VPC Project infrastructure extends from the west side of Ridley Island to the east side. The marine terminal for exporting products from the facility is on the west side, and the rail infrastructure delivering products to the facility is on the east side.

The Application reported that the VPC Project is based on basic engineering, assumptions made will be reviewed during future detailed engineering studies, and all components and dimensions are approximate and may be subject to change based on the outcome of those studies. The Application included preliminary drawings for the overall site plan, vessel mooring and berthing arrangements, jetty elevation, vessel loading system, and typical liquid propane gas containment tank.

The natural terrain will be modified and leveled for the facility. About 500,000 m^3 to 800,000 m^3 of material may be excavated from the 38 hectares facility footprint and deposited in a disposal area to the south about 1.5 km away. The final elevation of the site following site preparation has not been

determined. Vopak estimated this will be between 25 m and 35 m above sea level.

The visual characteristics of the VPC Project components and activities include the following:

- rail tracks – nine tracks for facility operations;
- rail cars – an estimated average of 240 rail cars arriving at the facility per day, and one locomotive;
- storage tanks – up to 15 (individual storage capacity will be determined prior to construction)
- marine jetty – up to 1,200 m long, six m wide, 11 m above the low and four m above the high-water marks, with a 110 m by 30 m loading platform; and
- cargo vessels – an estimated 171 vessels calling at the terminal annually (approximately 14 per month), berthed at the facility for 40 hours on average, two vessels may be berthed at the same time, a 1.9 to 2.3 % increase in vessel traffic along the shipping route.

The greatest change to the visual landscape will occur once the VPC Project is fully built and in operation. Visual Quality and Ambient Light from viewpoints in Port Edward and nearby marine areas will be affected by:

- the removal of trees and vegetation, and change in terrain elevation;
- the presence of buildings and storage tanks (the top of the tallest tank may be about 15 m to 25 m higher than the top of Ridley Island);
- rail operations;
- vessel berthing and cargo loading;
- ship passage along the marine route;
- flaring (maintenance and emergencies); and
- a change in surrounding light levels (light pollution from bright lights, glare, sky glow-cloud illumination).

The Application reported that:

- increases in Visual Quality effects are predicted from most of the viewpoints assessed;
- Visual Quality viewpoints in Port Edward, which already exceed a maximum modification threshold, and nearby marine viewpoints will be the most affected;
- the marine terminal on the west side of Ridley Island, and the vessels berthed there, will not be visible from the three Port Edward Visual Quality assessment viewpoints (the marine terminal and berthed vessels may be visible from other locations);
- there will be detectible change to Visual Quality in the LSA from VPC Project vessel traffic;
- ships will be visible for about 17 minutes from the Metlakatla community in the RSA northwest of Prince Rupert, where there are year-round residences; and

- change in Ambient Light will be detectible; during nighttime operations new sky glow will be visible and potentially measurable, and facility lights will generate light trespass to neighbouring areas and the surrounding environment.

There is no management plan to address effects to Visual Quality. Vopak proposed to mitigate effects by minimizing the footprint of the VPC Project components, limiting site clearing and sight lines to the components, revegetate temporarily cleared areas following construction, and using natural colors on infrastructure. Additional measures were not considered feasible. Vopak proposed to address visual quality during Decommissioning through restoration and revegetation, as necessary.

From some locations in Port Edward, trees along the shoreline of Ridley Island are expected to act as a visual screen and reduce the effects of facility rail operations on Visual Quality. These trees are not under the care and control of Vopak and there would be visual effects if they are removed.

Vopak proposed to mitigate the effects of light pollution during Operations with a Light Management Plan. Specific measures include the use of LED lighting, pointed downward and only used where and when needed, use of sensors to turn off lights at appropriate times where feasible, design a fully enclosed flare and avoid the usage of excessive vehicles and machinery at the site. These measures were expected to minimize light use, light trespass, and sky glow, and be partially effective throughout Operations. Further mitigation, including avoidance measures, was not considered feasible as the operational lighting will be in place for safety, security, and marine navigation purposes.

8.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

The EAO identified the following as the key issues about Visual Quality and Ambient Light effects from review of the Application and the feedback received from members of the public, and technical working group including Indigenous nations.

Members of the public expressed concern about the lack of studies on lighting and assessment of how lighting will affect marine life, and the effects of increased lighting at night on human health.

> Vopak responded that: baseline data on individual fish and invertebrate species was not necessary because the assessment assumed all such species would be present; and, the potential for light to impact human health was considered and levels were determined to be below regulated limits.

Indigenous nations raised concerns about: the methodology used for the assessment (Kitselas); nighttime lighting effects on marine navigation and traditional activities, marine mammals, and breeding bird colonies (Gitxaala, Kitselas, Kitsumkalum); the need for monitoring to show that mitigation has worked (Kitsumkalum); and, effects to Visual Quality in Port Edward from VPC Project rail traffic, and the uncertainty about the elevation of the storage facility site (Gitxaala, Kitsumkalum – members live in Port Edward).

Vopak responded that: the methodology used is typical for such assessments, and consistent with the Terms of Reference/Application Information Requirements; lighting effects on marine mammals was not included in the Application Information Requirements; the nearest breeding bird colonies are 1.5 km away and beyond a recommended 600 m buffer; it would be difficult to assess the effectiveness of light mitigation measures; rail traffic could impact Visual Quality from viewpoints in Port Edward, but this was not considered in the assessment as Vopak suggests that it is a temporary effect that would not change the outcome of the assessment; and, the uncertainty about the elevation of the storage facility site is unlikely to affect the outcome of the assessment.

ECCC noted a data gap with respect to bird collisions and lighting effects and requested a monitoring program to verify the assessment of effects.

Vopak responded that further mitigation for light-induced bird collisions at the facility is not possible without compromising worker safety, but it will report and evaluate any wildlife mortalities observed, including birds that may have died as a result of collision with infrastructure; and if a significant number of bird mortality events are recorded in a single season, it will implement a monitoring program to investigate the magnitude of the effect.

During the review of the Application Vopak reported the following relating to the assessment of Visual Quality effects:

- facility design is progressing, it is anticipated that the footprint will be refined, and if additional area is needed an amendment will be sought;
- construction will be required to extend utilities to the facility;
- individual trees outside the facility footprint will be removed if they pose a threat to worker safety, but this removal is expected to be relatively limited;
- some excavated material may be stored at a location other than the site identified in the Application; and
- the disposal of excavated material is outside the scope of the assessment.

THE EAO'S ANALYSIS AND CONCLUSIONS

The EAO's characterization of the expected residual effects of the VPC Project on Visual Quality, including Ambient Light, is summarized below, as well as the EAO's level of confidence in the determination of effects (including their likelihood and significance).

Table 43*:* Summary of residual effects for Visual Quality and Ambient Light.

Criteria	Assessment Rating	Rationale
Context	Moderate	Ridley Island is designated for industrial development, and the PRPA determines what types of developments will occur. When VPC Project Operations cease there will no longer be effects to Visual Quality along the marine shipping route, but the site will

		likely continue to be used for other industrial purposes.
Magnitude	Low Moderate	Low along the marine shipping route beyond 8 km from the facility. Moderate within 8 km from the facility.
Extent	Local	Effects will be detectable mostly within the LSA.
Duration	Permanent	The facility will operate for a minimum of 50 years, after which the site is likely to continue to be used for industry. The VPC Project will initiate effects that will continue after it ceases Operations.
Reversibility	Irreversible	Terrain will be extensively modified for the facility (e.g. excavated and leveled), and baseline conditions (e.g. bog-wetland) will not be re-established after Decommissioning. After Operations, lighting could in part return to existing conditions (the extent of this is unknown; some infrastructure like the marine jetty may remain in place), but the site will likely continue to be used for other industrial purposes with lighting effects and shipping traffic.
Frequency	Continuous	Effects will occur 100% of the time, day and night, and be continuous through all phases of the VPC Project.
Likelihood	There is a high likelihood that residual effects will occur given there will be permanent changes to baseline conditions, effects cannot be avoided, options to mitigate effects are limited, and the duration of the VPC Project.	
Significance Determination	Impacts to Visual Quality are expected to not be significant. Residual effects will be moderate in magnitude and permanent within the LSA for the facility. The marine terminal will not be visible from the three Port Edward Visual Quality assessment viewpoints.	
Confidence	There is a high level of confidence in the likelihood determination given that the limitations of mitigation and the residual effects are clear and easily understood. There is a low level of confidence in the significance determination given the basic design information for the facility, and uncertainty about: • the footprint of the facility; • the elevation of the facility site after site preparation; • the visual characteristics of the facility; the success of mitigation measures; and • the retention of treed visual screens outside of Vopak's care and control.	

Note: Criteria and assessment ratings are defined in Appendix B: Summary Characterization of Residual Adverse Effects for Valued Components

8.5 CUMULATIVE EFFECTS ASSESSMENT

Vopak identified numerous past, present and reasonably foreseeable future projects and activities with the potential to interact cumulatively with the residual effects of the VPC Project on Visual Quality (19 projects/activities), and Ambient Light (15 projects/activities). Of these other projects/activities, four are located on Ridley Island (Prince Rupert Grain Terminal, Ridley Terminals Inc. Coal Terminal, Ridley Island Propane Export Terminal, and the PRPA's RRUC).

The majority of the interactions with these other projects/activities involve Visual Quality effects associated with increased ship traffic/movement. The interactions with the four projects/activities on Ridley Island also involve visual effects associated with land development, and the presence of more physical infrastructure and Ambient Light (skyglow).

The Application reported that cumulative effects from the VPC Project will occur within the area of LSA, and are expected to:

- change the existing Visual Quality at one assessment viewpoint (Coast Island) adjacent to the marine terminal, and five assessment viewpoints from vessel traffic, increasing about 10 % (including Metlakatla community in the RSA outside of the LSA); and
- increase Ambient Light at the two assessment viewpoints in Port Edward (a low elevation/waterfront and a high elevation location) during VPC Project Operations.

No further mitigation and no follow-up program are proposed by Vopak to address cumulative effects, and Vopak concluded that residual cumulative effects to Visual Quality, including Ambient Light, are considered not significant.

Metlakatla raised concerns about cumulative effects to Ambient Light beyond the LSA. Vopak responded that there is a predicted increase in skyglow but VPC Project lighting is likely not to be discernible from other nighttime operations on Ridley Island beyond the LSA. Kitsumkalum also raised concerns about cumulative effects to Visual Quality from an increase in ship traffic. Vopak responded that the cumulative change in viewscape from ships passing by temporarily is considered not significant.

ECCC noted that the cumulative effects assessments in the Application did not include the PRPA's January 2020 proposed Ridley Island Export Logistics Platform about one km from the VPC Project, which also included expansion the RRUC. Vopak responded that this project was not known and listed in the July 2019 joint provincial Application Information Requirement and federal Terms of Reference for the VPC Project.

The EAO notes that within its RRUC, the PRPA will realign two existing rail tracks and construct seven new rail tracks to be used solely for VPC Project Operations. The Application identified the RRUC as an existing project/activity for the assessment of cumulative effects, but did not report whether, for example, there may be new lighting installed with the construction of the railyard for the facility.

Visual Quality and Ambient Light effects that are moderate in magnitude will likely occur within about eight km of the VPC Project. Within this area, residential land-based receptors occur in the vicinity of Port Edward.

Based on the above, excluding the PRPA's new rail construction for the VPC Project and the PRPA's Ridley Island Export Logistics Platform project, and any future removal of trees along the shoreline of Ridley Island that act as a visual screen, the EAO concludes that there would not be significant residual cumulative effects to Visual Quality, including Ambient Light, from the interaction of the VPC Project with other projects/activities. There is a low level of confidence in this determination given the various factors noted in this chapter.

The EAO understands that engineers and architects have different roles and responsibilities in the design and construction of structures, and that architects may not always be involved in the building of industrial facilities from the perspective of aesthetic appearances, to the extent it might be possible and reasonable to consider this.

8.6 CONCLUSIONS

Considering the above analysis and the conditions identified in the federal Section 67 Determination, the EAO concludes that the VPC Project would not have significant adverse effects on Visual Quality, including Ambient Light.

9. MARINE RESOURCES

9.1 BACKGROUND

This chapter assesses potential impacts to the Marine Resources VC (Chapter 5.4 of the Vopak EEE/Application) from the VPC Project.

The following sub-components were selected for the Marine Resources VC assessment:

- Marine sediment quality;
- Marine water quality;
- Marine habitat;
- Marine fish and invertebrates;
- Marine mammals; and
- Marine birds.

The Application considered the following federal legislation and regulations:

- *Canadian Environmental Protection Act, 1999*;
- *Fisheries Act, 1985*;
- *Species at Risk Act,* (SARA) *2002*;
- *Migratory Birds Convention Act, 1994*; and
- Migratory Birds Regulation, 2018.

SPATIAL BOUNDARIES

The spatial boundaries for the LSA and RSA related to Marine Resources are depicted in Figure 6 and Figure 7 and described further in the table below.

Table 54: Marine Resources VC sub-components local and regional study boundaries.

Sub-component(s)	Local Study Area (LSA)	Regional Study Area (RSA)
Marine sediment quality and marine habitat	The LSA was defined as the VPC Project water lot area and a 500 m buffer around the western portion of the water lot.	The RSA was defined as the boundaries of the ecosystem contained within Pacific Fishery Management Area 4.
Marine water quality	The LSA was defined as marine water within five km from the berth and incorporated 16 PRPA marine water quality stations.	The RSA was defined as the boundaries of the ecosystem contained within Pacific Fishery Management Area 4.
Marine fish and invertebrates	The LSA was defined as the VPC Project water lot area and a 500 m buffer around the western portion of the water lot and one km buffer on either side of the shipping route to account for potential effects on fish behavior from transiting ship underwater noise.	The RSA was defined as the boundaries of the ecosystem contained within Pacific Fishery Management Area 4.
Marine mammals	The LSA was defined as a 6.5 km diameter buffer extending outwards from the shoreline area of the VPC Project to the Kinahan Islands, as well as the area of Porpoise Channel between Lelu Island and Ridley Island and a six km buffer on each side of the shipping route from the berths out to Triple Island.	The RSA was defined as all of PRPA jurisdiction in addition to the shipping route out to Triple Island with a six km buffer.
Marine birds	The LSA was defined as the waters within the Vopak water lot area, 500 m on all sides of the water lot area, and one km on both sides of the proposed shipping route between the marine terminal and Triple Island.	The RSA was defined as the PRPA boundary and 10 km on all sides of the proposed shipping route between the marine terminal and Triple Island.

TEMPORAL BOUNDARIES

Vopak reported that the VPC Project will:

- Take two years to construct;
- Operate for a minimum of 50 years, but that the maximum number of years is not known as that would be dependent upon market conditions; and
- Take 12 months to decommission.

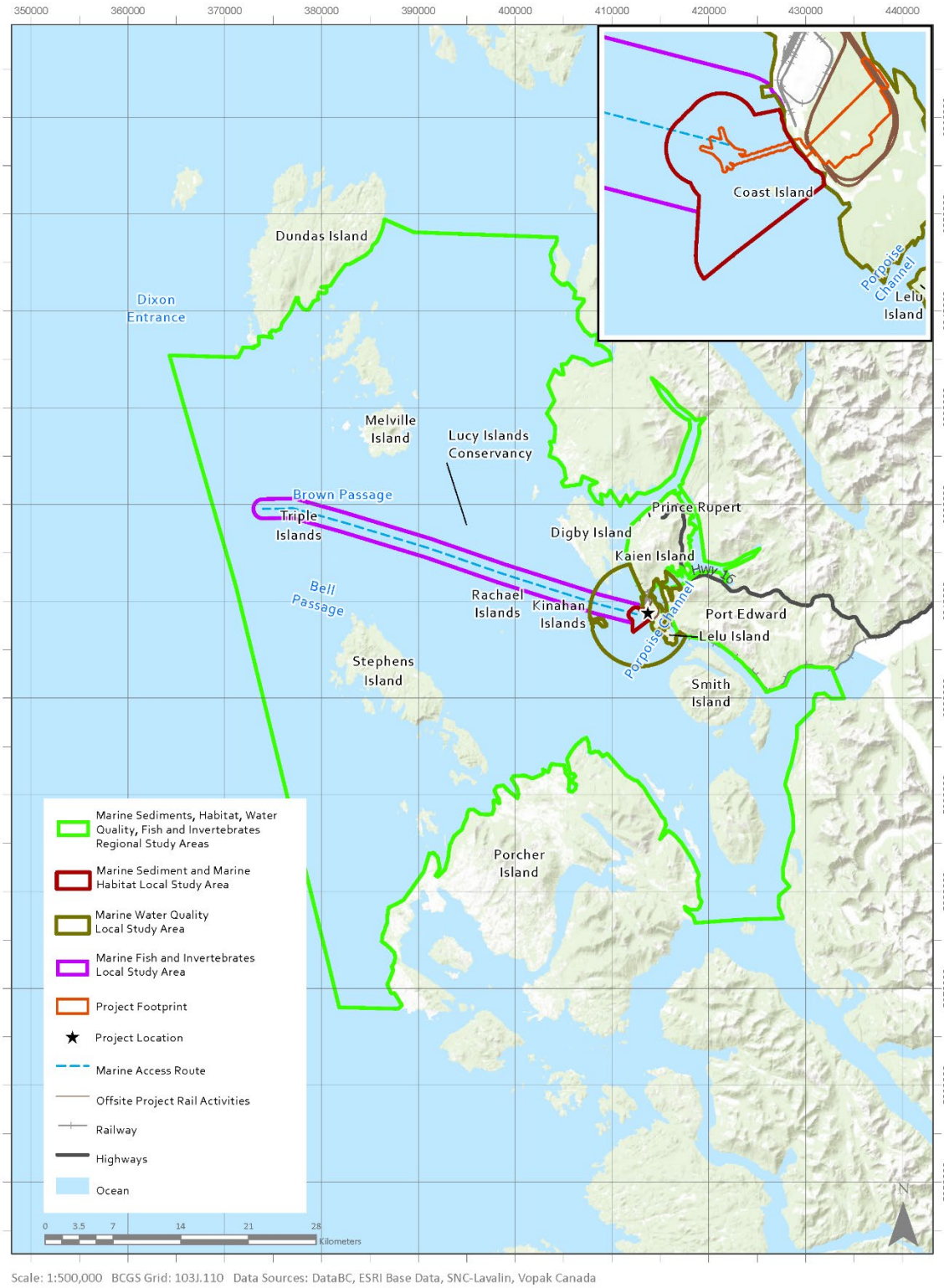

Figure 6: Marine sediment quality, habitat, water quality, and fish and invertebrates study boundaries.

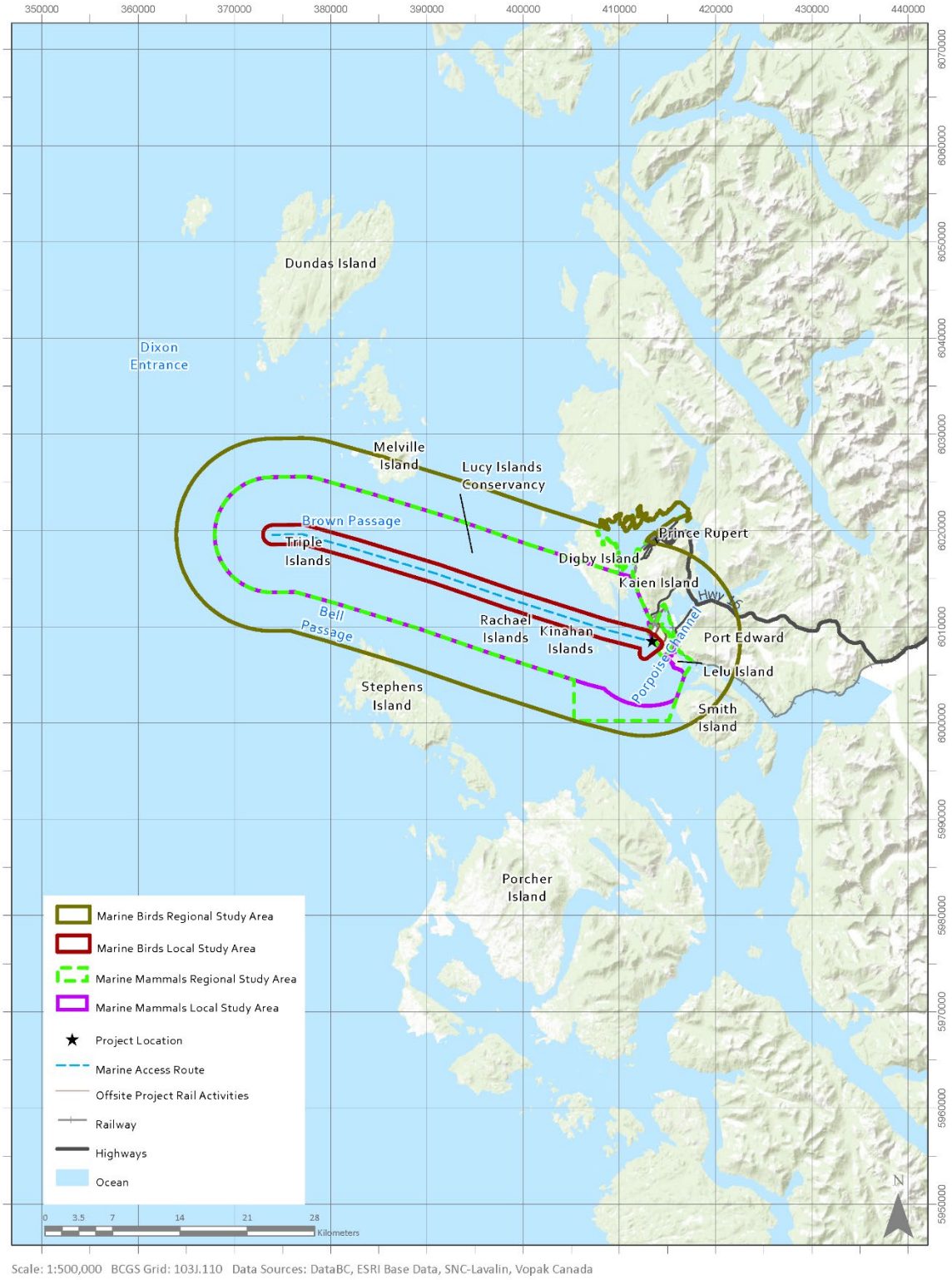

Figure 7: Marine mammals and birds study boundaries.

ADMINISTRATIVE BOUNDARIES

The federal and provincial spatial boundaries vary for the Marine Fish and Invertebrates, Marine Mammals and Marine Birds subcomponents as the boundary of the federal assessment does not include the operation of vessels and other supporting marine traffic along the marine access route between the marine terminal and the pilot boarding location at or near Triple Island. This activity is outside of the federal PRPA administrative boundary.

9.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

This section provides an overview of potential effects and proposed mitigations identified in the Application.

Baseline information on marine resources, study methods and results are provided in the Application (Section 5.4) and the Technical Data Report for Marine Resources VC: Marine Habitats and Marine Fish and Invertebrates Subcomponents (Appendix 5.4-A).

The VPC Project is located in lower Chatham Sound within the Skeena River Estuary which provides highly productive habitat for many species of fish and other marine life. The Skeena River Estuary is a migration corridor for Pacific salmon and eulachon and provides important rearing habitat for juvenile salmon.

The VPC Project marine components include the trestle, fire pump platform, loading platform, twin multi-buoy mooring system berth and protection barriers. Marine habitat within the LSA includes: marine riparian habitat, intertidal habitat, subtidal habitat (e.g., soft sediment and rocky substrate), eelgrass and kelp beds.

The VPC project is within the Chatham Sound Ecologically and Biologically Significant Area identified in the Pacific North Coast Integrated Management Plan Area. Chatham Sound was identified as an Ecologically and Biologically Significant Area due to high productivity resulting from tidal mixing. The biological significance of this area includes:

- A major Pacific Herring spawning area;
- A dense aggregation of green urchins;
- A major Dungeness crab fishing ground;
- A large diversity of shrimp species, including humpback shrimp; and
- Important for the fitness of Walleye Pollock.

Marine mammal species listed on Schedule 1 of SARA potentially occurring in the LSA and RSA are: fin whale; grey whale (pacific coast feeding group populations) humpback whale; killer whale (northern resident and transient); harbour porpoise; and steller sea lion. During the 2019 field survey, humpback whales, harbour porpoise and harbour seals were the only mammals observed in the LSA.

Marine fish listed on Schedule 1 of SARA and potentially occurring in the LSA and RSA are: coastal cutthroat trout; eulachon nass/Skeena stocks; rockfish (bacaccio, canary, rougheye, yelloweye, quillback, darkblotched); green sturgeon; basking shark; bluntnose sixgill shark; tope shark; and spiny dogfish. In addition, those criteria are met by an invertebrate (northern abalone) and the leatherback turtle. While none of the listed fish, invertebrate or other marine species were identified during the 2019 field studies, these species have a high possibility of occurring within the RSA, if not the LSA, specifically: coastal cutthroat trout, eulachon, darkblotched rockfish, rougheye rockfish, yelloweye rockfish and quillback rockfish.

Marine birds listed on Schedule 1 of SARA that were identified during 2019 field surveys in the LSA and RSA are: ancient murrelet; common murre; great blue heron (fannini subspecies); red-necked phalarope; surf scoter; and western grebe.

This section provides and overview of potential VPC Project effects for the Marine Resources VC identified in the Application.

DIRECT INJURY OR MORTALITY

Fish and Invertebrate

Most mobile fish and invertebrates are expected to avoid the area during the construction pile installation process. The installation of piles may potentially result in direct mortality of marine invertebrates within the pile footprints. This will primarily affect sessile and slow-moving invertebrate species such as intertidal barnacles, chitons, bivalves and sea pens, as well as the listed northern abalone whose presence is unconfirmed and requires focused site surveys. Orange sea pens were observed in soft bottom habitats within the footprint of the marine infrastructure. Dense aggregations of sea pens are regarded as biogenic habitat, and removal could result in loss of associated benthic communities.

Other construction-related activities, such as vessel movement, anchoring, and barge spudding (through-deck pilings that temporarily moor a barge), and grounding could also result in the injury, direct mortality, or temporary displacement of marine fish and invertebrates. If upland blasting is required for the trestle approach, there is the potential for blast rock to be deposited in the nearshore habitat areas, which may result in the injury, direct mortality or displacement of fish and invertebrates.

Marine Mammals

Vopak identified a risk of injury or mortality to marine mammals from collisions with VPC Project-related vessels during Construction and during vessel berthing and off-site shipping activities throughout Operations. The risk of vessel strike occurs anywhere where vessels and marine mammals spatially overlap, though risk is greater with increased densities of whales and vessels, and higher vessel speeds. Lethal and severe injuries have been found to be related to ships 80 m or more in length, and with vessels travelling at speeds greater than 13 to 15 knots. Vopak identified a differential risk to vessel strike amongst the various species of marine mammals with baleen whales at a greater risk of being struck by large ships because of their large body size, limited maneuverability, and behavioural characteristics that likely contribute to their vulnerability. Vessel strike had been identified as a threat to fin whales, grey whales, humpback whales and orca.[7]

Entanglement of marine mammals in the marine buoy chains when the berths are vacant was identified as a potential risk for baleen whales. Due to the small spatial extent of the multi-buoy system berths and the proximity to the trestle, Vopak concluded that the risk of entanglement of baleen whales in the mooring buoy chains was low.

Marine Birds

Potential direct mortality risks to marine birds could occur during decommissioning activities due to the potential for destruction of occupied marine bird nests that may be present in or on facility infrastructure.

SEDIMENTATION

Resuspension of Sediment

Through the review of historical data and sediment sampling in 2019, Vopak identified several contaminants of concern that exceeded the Canadian Council of Ministers of the Environment Interim Sediment Quality Guidelines in the marine sediment near the project footprint; the contaminant levels did not exceed the Canadian Council of Ministers of the Environment Probable Effects Levels thresholds. These contaminants were the metals arsenic and copper, the polycyclic aromatic hydrocarbon 2-Methylnapthalene, and dioxins and furans.

Vopak identified that construction activities in the marine environment have the potential to increase the turbidity of marine waters or result in resuspension of marine sediments, leading to localized increases in total suspended solids and contaminant levels. Increased total suspended solids levels, sediment suspension and resuspension of contaminants can result in short-term or chronic effects to marine biota including fish, birds, and marine mammals.

The suction anchors for the multi-buoy mooring system berth would be embedded below the seabed surface to a depth of approximately 6 to 10 m. A limited amount of entrained sediment in the water

[7] (COSEWIC 2005; DFO 2013f; Ford 2014), (Ford 2014) (COSEWIC 2011; DFO 2013g) (Ford 2014; DFO 2016b) respectively

extracted from the pile, was anticipated to result in minimal turbidity, sedimentation, and sediment transport. The resuspension of contaminants was considered with respect to turbidity, sedimentation, and sediment transport. Since the concentration of contaminants did not exceed Probable Effects Levels, Vopak concluded that there are no expected risks to marine habitats or marine fish and invertebrates. Vopak also stated that concerns regarding sedimentation from pile installation, and direct habitat contact from construction barge grounding could largely be avoided or minimized through implementation of appropriate mitigation measures.

Chain Scour

Vopak identified that during the Operation phase of the VPC Project when berths are vacant or during inclement weather, such as large storm events, the mooring buoy chains have the potential to cause episodic disturbance to the marine sediment from scouring. These effects to marine sediments could result in increased total suspended solids and the resuspension of contaminants in the marine environment. During operation when a vessel is loading and attached to the mooring system, the anchors would remain static and the chain would lift off the seabed. If no vessel was at berth, the chain has potential to lie on the seabed resulting in some periodic disturbance to the sea floor; however, the support from the subsurface floating buoy and a surface mooring buoy, would make the area affected small and temporary.

VPC Project Upland Area Erosion and Stormwater Runoff

Vopak identified that construction activities occurring on land near water or in the marine environment have the potential to increase the turbidity of marine waters or result in resuspension of marine sediments, leading to localized increases in total suspended solids levels. Total suspended solids levels and sediment suspension can result in short-term or chronic effects to marine animals including fish, birds, and marine mammals. Soil erosion and sediment discharge to nearshore areas (intertidal and shallow subtidal) could occur during site clearing, grading and fill activities in the upland area resulting in sedimentation related effects on marine habitats, fish and invertebrates.

Marine water quality could be affected by storm water inputs that would drain the VPC Project upland area during general terminal operations and result in increased turbidity and sedimentation in nearshore (intertidal and shallow subtidal) marine habitats and associated marine fish and invertebrates. Vopak asserts that concerns regarding sedimentation during general terminal operations can largely be avoided or minimized through implementation of appropriate mitigation measures.

OVERWATER LIGHTING EFFECTS DURING OPERATIONS

Marine Fish and Invertebrates

Vopak identified in the Application that the proposed marine infrastructure may result in overwater lighting effects to marine fish. Light perception is critically important to juvenile salmon with respect to orientation, schooling, prey avoidance, and migration navigation. Reaction to sudden changes in light

intensity ranges from avoidance to attraction, including disruption of schooling behaviour. Fish encountering sudden changes in light intensity may experience multiple different reactions with resulting behavioural effects. Implications may include disorientation (affecting alongshore movement), disruption of schooling (resulting in higher exposure to predation) and requirement to move to deeper water to avoid lighted areas (resulting in loss of refugia from predators). Strong overwater lighting at night, especially in nearshore areas, could result in disturbance to out-migrating juvenile salmon as well as other nearshore fish species.

The proposed footprints of the twin multi-buoy mooring system berths are located approximately 750 to 1,200 m offshore, in water depths ranging from 10 to 45 m. Fish, such as juvenile salmon, that are most susceptible to shading and overwater lighting effects are not likely to frequent this habitat. As a result, Vopak considered overwater lighting effects on marine fish and invertebrates from vessel berthing activities to be negligible because fish and invertebrates inhabiting these areas can move to deeper water.

Marine Birds

The identified effects of overwater lighting to nearshore fish species including out-migrating juvenile salmon could also affect marine bird habitat through the alteration of prey population diversity, densities, and behaviours. The effect on marine bird habitat would be limited to the VPC Project footprint and immediate adjacent area.

Nighttime lighting during operations could increase the mortality risk of marine birds, as some bird species are attracted to light which could cause some individuals to collide with VPC Project facilities or vessels, particularly during poor visibility conditions. Most fatalities from light-induced collisions are fledglings (juvenile birds) during their first flights. There are no known marine bird breeding colonies close to the proposed VPC Project so interactions of light with fledging marine birds are unlikely. Potential mortality was expected to be greatest during spring and fall migration for species that migrate at night.

UNDERWATER NOISE FROM CONSTRUCTION

Fish and Invertebrates

Impulsive noise generated during construction activities (such as pile driving) has the potential to result in direct mortality or physical injury to fish through exposure to very high amplitude sounds, or from rapid changes in pressure (barotrauma). The accumulation of sound energy from repeated impulsive sounds can also result in mortality or physical injury to fish. Sounds received at lower levels for a longer duration may have similar effects as sounds received at higher levels for a shorter duration.

Noise generated during pile installation and upland blasting activities may potentially result in physical injury or direct mortality to fish. Typical maximum sound pressure levels for pile installation vary substantially and depend on numerous factors such as installation method, pile type and diameter, substrate, and how deep in the sediment piles are being driven. Generally, maximum sound pressure

levels for vibratory pile driving are 165 to 185 decibels (dBa)[8] at 1 m from the pile, while maximum sound pressure levels for impact pile driving are 195 to 220 dBa[9] at 1 m. Current guidelines for preventing injury to fish include dual thresholds of 206 dBa[10] for peak sound pressure levels, and 187 dBa[11] for Cumulative Sound Exposure Level.

Continuous noise of any level that is detectable by fishes can mask signal detection (obscuring of biologically important sounds by other sounds) which can affect fish behaviour. The consequences of masking and any attendant behavioural changes for the survival of fishes are not well understood. Stress impacts from noise can include higher levels of stress hormones, greater metabolic rate, oxygen uptake, cardiac output, parasites, irritation, distress, and mortality rate, worse body condition, lower growth, food consumption, immune response, and reproductive rates.

Marine Mammals

Underwater noise could result in behavioural changes in marine mammals. Considering the effects of underwater noise on marine mammals is important because the intensity, duration and energy levels can affect marine mammal ability to hear, which can cause disturbance and displacement. Hearing loss can be temporary or permanent. While there are no legislated underwater acoustic thresholds for marine mammals in Canada, a single value of has been the guidance for assessing the potential for disturbance of marine mammals 160 dBa[12] and is used as the metric to avoid causing acoustic disturbance, and injury, to marine mammals.

Acoustic disturbance has been identified as a threat to fin whales, grey whales, humpback whales, killer whales, and harbour porpoise. Increased levels of vessel traffic, near-water and in-water works could physically or acoustically disturb marine mammals and lead to displacement. This displacement could result in a change in the marine mammal habitat use which can affect the marine mammal species assemblage on a localized scale.

UNDERWATER NOISE FROM OPERATIONS

Fish and Invertebrates

Vessel berthing and shipping activities during operations could result in an increase in low-frequency underwater noise that could result in disturbance to marine fish. Large vessels generate sound at low frequencies <100 hertz, which have more potential to travel longer distances. There was no direct evidence of mortality or potential mortal injury to fish from ship noise available.

[8] re. 1 micropascal
[9] re. 1 micropascal
[10] re 1 micropascal
[11] re 1 micropascal
[12] re 1 micropascal root mean square

Vessel activity could generate sound levels that cause behavioural responses in fish.

Behavioural disturbances may be particularly relevant for sound-producing fish, such as rockfish, and increased vessel traffic and construction noise may influence rockfish interactions and communication within the LSA and RSA.

Marine Mammals

Marine mammals could be disturbed or displaced during VPC Project operation from vessel berthing or associated off-site shipping activities due to the temporary increase in underwater noise associated with the activities. These activities could affect marine mammal species presence and behaviour, including their prey species distribution or local abundance. In turn, this activity may affect the foraging opportunities for marine mammals.

Vopak noted that while the marine mammals in the LSA are accustomed to small and large vessel traffic, it is uncertain to what extent different species will be disturbed or displaced from ship noise. Also, the noise threshold for continuous sound that may cause a potential behavioural disturbance to marine mammals is not well understood.

ALTERATION OR LOSS OF MARINE HABITAT

Construction of Marine Jetty and Multi-Buoy Mooring System Berths

Construction of the marine jetty infrastructure including the trestle approach, trestle, firewater pump platform, loading platform, protection barriers and twin multi-buoy mooring system berths will result in the alteration and loss of marine habitats. Potentially affected marine habitats include marine riparian vegetation, intertidal, shallow subtidal and deeper subtidal areas.

Construction of the upland trestle approach is estimated to result in the removal of approximately 1,500 square metres (m^2) of marine riparian habitat. The alteration or loss of this marine riparian habitat area will potentially result in the alteration or loss of their associated ecological functions. This area of clearing equates to approximately 35 m of the overall length of 1,165 m of Ridley Island shoreline within the LSA. Vopak concluded that this area of clearing is considered small and direct effects to marine resources are considered negligible. This loss of this marine riparian habitat would also impact shoreline-associated marine birds, such as dabbling ducks, gulls, geese, cormorants, herons, and shorebirds, that use it for foraging and resting.

Construction of the marine jetty would result in the loss of up to 304 m^2 of marine habitat. A total of 302 m^2 of subtidal non-vegetated soft bottom habitat would be lost from the installation of the marine jetty and protection barrier piles (158 m^2) and the installation of the anchor guardian blocks (144 m^2) for the multi-buoy mooring system. This could include the loss of sea pen aggregations which can provide valuable shelter from currents and predators and are known to contribute substantially to species richness. This habitat also provides some foraging opportunities for marine birds.

Approximately two m^2 of rocky intertidal habitat, consisting of bladed kelps and other algae, will be lost due to installation of the trestle piles. Marine habitats, such as bladed kelps and other algae, provide valuable habitat structure and biological productivity that supports a variety of marine birds, marine mammals, and freshwater anadromous fish species.

The installation of the multi-buoy mooring system involves embedding eight suction anchors (approximately 3.0 m in diameter and 3.75 m in length) approximately 6 to 10 m below the seabed. The Application concluded that alteration of the surrounding seabed during installation is expected to be minimal and limited to the area of the suction pile.

Vopak also identified that the construction of the marine infrastructure along with vessel berthing and off-site shipping activities during operations would result in the loss or alteration of marine mammal habitat. The associated off-site shipping activities also have the potential to alter marine mammal habitat quality and quantity through increased turbidity and the physical presence of vessels during the transit across Chatham Sound to the Triple Islands pilot station and while at berth.

Shading Effects of Marine Jetty

Vopak identified the potential effect of shading by the marine jetty infrastructure on the marine habitat underneath. Overwater structures, such as docks and piers, can reduce incident light under the structure, affecting the growth of marine vegetation, such as bladed kelps. The seabed underneath the proposed marine infrastructure consists mostly of fine sediment with no vegetation. Vopak identified the only vegetated areas that could potentially be affected by shading are in the intertidal and shallow subtidal habitats within and directly adjacent to the marine infrastructure footprint.

Decommissioning

The VPC Project decommissioning activities could result in alteration or loss of marine bird habitat due to the removal of the jetty topside and mooring buoys. Vopak expected that marine birds could adapt to using the marine infrastructure for roosting, foraging and possibly nesting. The presence of marine birds associated with facility infrastructure would depend on the condition and degree of use of the facility at decommissioning and the season of the year at which decommissioning will begin.

DISTURBANCE AND DISPLACEMENT OF MARINE BIRDS

Vopak identified that the generation of noise from vehicles, vessels, machinery, and blasting during construction may disturb or displace marine birds within the LSA that are using areas near the activity. Marine areas in proximity to construction of the VPC Project were not observed to be high use areas for marine birds, and thus relatively small numbers of marine birds will potentially be disturbed or displaced. The majority of birds are expected to respond to construction disturbance by relocating to similar habitat in nearby areas away from the VPC Project site.

During operations disturbance and displacement to marine birds may occur from artificial lighting at the terminal, jetty or vessels, noise from the terminal and berthed ships, and physical disturbance from

transiting ships. The effects of lighting and noise from the terminal would be limited to foraging and resting as no marine bird breeding colonies are known to be present in the LSA. Disturbance from ships would likely vary with species, sea conditions, vessel size, engine noise and speed. Disturbance from boat traffic was described as a threat to Marbled Murrelets with smaller, faster recreational vessels that do not remain within predictable shipping lanes having the most impacts while shipping lanes were not described in the list of threats (COSEWIC 2012).

Marine bird nesting colonies were present on islands west of Ridley Island including, Holland Rock, Greentop Island and Lucy Islands. The shipping route was greater than 500 m from these islands, consistent with federal guidelines to avoid disturbance to seabird colonies (ECCC 2017), so disturbance to nesting colonies from VPC Project-associated ship traffic would not be expected.

During decommissioning, disturbance and displacement of marine birds would be associated with noise, artificial lighting, and visual disturbance from people and equipment. The presence of artificial food supplies would cause marine birds to congregate in the vicinity of the VPC Project, altering their natural movement patterns. The extent of disturbance would depend on marine bird presence, which is dependent on the habitats present at the time of decommissioning and the time of year the activities would occur. Vopak expected lower levels of activity and noise were anticipated to occur for shorter periods compared to construction.

The Application proposed mitigation measures including:

- Anchor chain will be supported with a subsurface buoy and a surface mooring buoy;
- Monitor construction activities by qualified persons;
- Schedule construction activities in and around water to occur during a DFO-approved least-risk work window (November 30 to February 15);
- Flag or identify site-specific valued and sensitive habitat areas adjacent to the VPC Project component areas. Where possible, avoid placing vertical spuds or other anchors into valued and sensitive habitat areas;
- Develop and implement a Marine Underwater Noise and Vibration Management Plan, which would include safety zones, underwater acoustic thresholds and monitoring, and construction related vessel operations;
- Prioritization of lower sound emission equipment and use of bubble curtains or other noise-attenuating devices. Avoid concurrent in-water noise-producing construction activities and use soft-starts and ramp-ups, as possible;
- Develop construction-activity specific Stop Work Protocols;
- Avoid lighting shallow nearshore areas, where practical;
- Use smart, low consumptive light-emitting diode lighting;
- Restrict continuous lighting to human and navigational safety;
- Use motion and occupancy sensors;

- Participation in the PRPA Marine Mammal Program or other such programs;
- Vopak vessels will adhere to the Be Whale Wise guidance;
- Develop and implement multi-buoy moorings berth entanglement protocol;
- Establish setbacks and conduct reclamation and re-vegetation;
- Avoid beginning construction during bird nesting season, if possible;
- Maintain clean worksites and collect all waste materials (including food scraps) in appropriate containers for disposal off-site;
- Schedule expected noisy activities during daytime hours; and
- Schedule removal of jetty topside outside of breeding bird season or conduct a bird nesting survey before beginning jetty removal.

9.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

SEDIMENT QUALITY

ECCC recommended that Vopak provide a revised effects assessment using the interim sediment quality guidelines, instead of the probable effects level, in their definition of magnitude.

Vopak provided a Marine Sediment and Water Quality Memo on March 8, 2021, responding to round two comments. The memo provided more information on the dioxin and furan interim sediment quality guidelines exceedances. Vopak defined the probable effects level as representing the lower limit of the range of chemical concentrations associated with adverse biological effects, while the interim sediment quality guidelines represent the range of sediment chemical concentrations below which adverse biological effects are rarely observed.

Vopak reassessed the effects of construction on marine sediment and concluded that while sediment dioxin and furans concentrations fall in the range between the interim sediment quality guidelines and probable effects level, indicating that adverse biological effects may occasionally occur any associated turbidity, sedimentation, and sediment transport effects related to the suction anchor installation are anticipated to be minimal, and spatially and temporally limited. The magnitude of any residual effect remained low.

ECCC recommended that Vopak develop and implement a management plan during construction focused on minimizing sediment disturbance and total suspended solids generation and contaminant re-suspension specifically from in-water works.

Vopak responded that they submitted a Request for Review to DFO, which included mitigations related to turbidity and resuspension of marine sediments. Vopak committed to preparing a new management plan, Marine Water Quality and Sediment Quality Management Plan, specific to in-water works that will include additional mitigations from DFO. Key mitigation measures included

that prior to work, where feasible in consideration of water depths, currents, and feasibility of monitoring, silt curtains will be installed around the work area if turbidity concentrations within five m of the water's surface are anticipated to exceed accepted thresholds.

BIOACCUMULATION

ECCC and Lax Kw'alaams raised concerns about the potential for resuspended contaminants to bioaccumulate. ECCC was concerned that the Interim Sediment Quality Guidelines for polychlorinated biphenyls do not specifically address the potential for adverse effects on higher trophic level organisms (such as killer whales) from bioaccumulation. To indirectly address the uncertainty, ECCC recommended that Vopak implement mitigation to avoid and minimize sediment resuspension of contaminated sediment that includes follow-up monitoring and adaptive management.

Vopak committed to the development of a Marine Water Quality and Sediment Quality Management Plan which includes mitigations suggested by DFO to minimize sediment resuspension during construction activities. Vopak also committed to conduct one sediment survey one year after operation. The results of the survey will determine whether additional monitoring is required. The follow-up plan will include adaptive management measures, and may include additional mitigation measures, such as using an alternate subsurface buoy type or placement or changing mooring procedures to further limit scouring.

PROPELLER WASH CAUSING SEDIMENT RESUSPENSION

ECCC, Gitxaala and Lax Kw'alaams raised concerns around the potential effects of prop wash on marine resources during berthing activities. ECCC noted that the Application said that the vessels would slow when they enter the multi-buoy moorings system with support from the tugs and then vessels may leave without tug support. Gitxaala requested supplemental information regarding the potential resuspension and remobilization of existing contaminants or clarification on how tug activity was considered in the assessment of potential effects from changes in marine sediment.

Vopak confirmed that tugs will provide movement during arrival to and departure from the berth. Escort tug vessels' propulsion drives ride higher in the water compared to tankers and use drives that produce a surface-oriented prop wash that was not anticipated to interact with marine sediment or affect marine water quality.

CHAIN SCOUR

Gitxaala, Kitsumkalum, Lax Kw'alaams, Metlakatla and ECCC raised concerns about impacts from the resuspension of contaminated sediments due to the movement of the mooring buoy chains throughout the operations phase. Metlakatla and Gitxaala requested that the marine sediment monitoring program be conducted over 5-10 years.

Vopak responded that they understand the concern related to potential sediment scouring during operations. Vopak clarified the multi-buoy moorings design, which included a sub-surface buoy on

each of the mooring anchor chains. This design mitigation would decrease TSS and resuspension of sediments and contaminants by limiting mooring chain contact with the sediment. Vopak also committed to performing a sediment survey one-year post construction to determine if any scouring is occurring. If scouring is noted, adaptive management measures will be developed to reduce or eliminate adverse effects.

Vopak does not believe additional monitoring is warranted. However, the monitoring program proposed does include adaptive management, which may include additional surveys, should effects be observed.

EULACHON

Gitga'at and Lax Kw'alaams raised concerns around a potential impact to herring and eulachon from in-water construction occurring during the least-risk window (November 30 to February 15). Gitga'at commented that herring and eulachon begin staging for spawning by February 15 and could be impacted. Lax Kw'alaams commented that eulachon is very common in the region and annual runs occur between January and March. Lax Kw'alaams indicated a preference for surveys to be conducted using video surveys which is less invasive than bottom trawling.

Vopak responded that the least risk construction windows were established by DFO on a regional basis. Herring and eulachon were considered, and in accordance with a commitment made by Vopak to the Working Group, pre-construction fish surveys would be conducted to support better understanding of aggregation areas for eulachon in the marine environment before entering the river system to spawn if pile installation is scheduled within the winter least-risk window (November 30 to February 15). Surveys would be conducted by video survey and scheduled between late January and early February when spawning aggregations are anticipated.

EFFECTS OF CONSTRUCTION NOISE ON HARBOUR PORPOISE

Gitxaala, Metlakatla and Lax Kw'alaams raised concerns about the impacts to harbour porpoise due to noise from construction activities, specifically pile driving. Gitxaala and Metlakatla requested that Vopak provide additional information on how pile driving will not affect harbour porpoise through avoidance behaviour. Lax Kw'alaams noted a preference that the proponent place the bar higher and minimize noise impacts to 120 dBA to prevent the possibility of permanent damage to marine mammals hearing.

DFO recommended that Vopak further develop their follow-up strategy. The strategy could include follow up monitoring to assess the accuracy of the effects assessment and increase the understanding of impacts of the VPC Project on marine mammals. Triggers for adaptive management could be identified. Reporting should also be a component of the plan.

Vopak responded that the VPC Project-related construction activities, including pile driving, were considered to have the potential to affect marine resources and were carried forward in the assessment. Mitigation measures that specifically addressed disturbance or displacement of marine mammals, were presented the Application. The underwater sound threshold exclusion zone limit

for cetaceans was similarly defined in the DFO letter of advice at 160 dBA[13] sound pressure levels. These methods are widely applied to avoid disturbance to marine mammals and have been demonstrated in their effectiveness including within the Port of Prince Rupert where pile installation has taken place, and harbour porpoise occur. If an updated threshold is developed, it would be implemented following an evaluation that included a commitment to avoidance of disturbance to marine mammals.

Vopak would develop a pre- and post-construction monitoring program that will be implemented to verify the assessment of the nature and extent of the residual effects of habitat loss and disturbance and displacement of harbour porpoise from the VPC Project footprint and adjacent waters during construction; Vopak also committed to support multi-stakeholder initiatives, such as the PRPA Marine Mammal Program and other research programs. Vopak will continue to engage with DFO to further develop this program, including triggers for adaptive management and reporting, prior to construction.

CONSTRUCTION UNDERWATER NOISE MODELLING

DFO recommended that Vopak undertake acoustic modelling of impact pile driving and mitigations. The model should evaluate if and what type of bubble curtain array would effectively attenuate noise below injury thresholds to fish or whether a double walled pile or similar containment would be needed. This information would also identify the anticipated radius for marine mammal exclusion zones (at which underwater noise is less than 160 dBA[14]).

Vopak responded that acoustic modelling as recommended would be completed prior to the development of the Marine Underwater Noise and Vibration Management Plan. The suggestions with regard to underwater acoustic monitoring will be incorporated into the management plan and the mitigations used in other projects with large-diameter piles (e.g., Trans Mountain Expansion Project) would be reviewed with site-specific VPC Project applications included as appropriate in consultation with the engineering design. This information will be used to determine the distance radii for the extent of the cetacean exclusion zone prior to the onset of construction using a quantitative method and site-specific details. A conservative approach will be taken, with in-situ monitoring conducted to ensure compliance with the DFO letter of advice.

ABALONE HABITAT

Lax Kw'alaams noted that coralline red algae is a key food source for the species at risk Northern Abalone, preservation of this is exceedingly important to Lax Kw'alaams. Lax Kw'alaams asked if Vopak could relocate any rocks with coralline red algae that would be impacted from construction.

Vopak acknowledged that the preservation of coralline red algae is exceedingly important to Lax Kw'alaams. A low coverage (5-25 percent) of coralline red algae occurs within the approximately

[13] re 1 micropascal root mean square
[14] re 1 micropascal

two square metres of lower intertidal habitat that would be lost from the footprint of two trestle piles. No other marine habitat area with coralline red algae is anticipated to be lost, as the footprints of all other piles and guardian anchor blocks, associated with the mooring buoys, are in non-vegetated, soft bottom subtidal habitat.

Vopak also noted that the small size of the remaining marine vegetation anticipated to be altered or lost from the VPC Project does not warrant restoration efforts or habitat offsetting. Additional relocation and salvage efforts have the potential to create additional disturbance to the seafloor.

Lax Kw'alaams asked if Vopak is planning on screening for abalone prior to construction and if they are discovered does Vopak have plans to salvage the abalone.

Vopak responded that additional abalone surveys following Phase 2 of the Impact Assessment Protocol for Works and Developments Potentially Affecting Abalone and their Habitat would be conducted if pile installation activities occur within potential Northern abalone habitat or if pile installation turbidity and sedimentation effects on adjacent potential Northern abalone habitat cannot be mitigated.

MARINE VEGETATION LOSS

Metlakatla asked if marine components are being included in the Vegetation Management Plan and requested that Vopak mitigate impacts to marine vegetation through relocating vegetation prior to construction or enhance vegetation in a nearby location.

Vopak replied that the overall disturbance to vegetated marine habitats has been greatly reduced from the original design when the VPC Project was previously proposed further south. The current design is only expected to result in the loss or alteration of two m^2 of bladed kelp and other algae.

The small size of the remaining marine vegetation anticipated to be altered or lost from the VPC Project does not warrant restoration efforts or habitat offsetting. Additional relocation and salvage efforts have the potential to create additional disturbance to the seafloor. Therefore, marine vegetation would not be included in the Vegetation Management Plan.

MARINE RIPARIAN HABITAT

Lax Kw'alaams and Metlakatla requested more information on the type of marine riparian habitat that was being lost. Lax Kw'alaams wanted to determine if the habitat being lost is cornerstone habitat which could have profound impacts. Metlakatla also requested information on what marine riparian vegetation will be retained and what compensation measures are being proposed.

Vopak responded that a total of 1,500 m^2 of riparian vegetation above the high-water mark may be removed as part of site clearing to allow for the construction of the trestle approach. Although this riparian vegetation is referred to as marine riparian vegetation, this is due to its proximity to the shoreline and to distinguish it from any riparian vegetation identified along a freshwater body that

is presented in the Application.

The forested areas overlapping the trestle footprint are composed of Western Redcedar/Western Hemlock/Salal forest. This zonal ecosystem is not considered rare/at-risk, is the most common upland forest habitat within the LSA and dominated most forested habitats along the shoreline of Ridley Island.

The length of what could be considered marine riparian vegetation to be potentially removed, located immediately adjacent to the shoreline, is conservatively estimated to be approximately 35 m. This equates to approximately three percent of the overall length of 1,165 m of Ridley Island shoreline within the LSA. Considering a trestle width of only five m, it is anticipated that the area of vegetation required to be removed can be reduced further during construction.

IMPACTS TO MARINE BIRDS FROM LIGHT AND SHIPPING

Kitsumkalum and Lax Kw'alaams raised concerns around impacts on nearby nesting colonies on from the VPC Project. Kitsumkalum was concerned that a large colony of rhinoceros auklets would be impacted by light from the VPC Project and the increased shipping. Lax Kw'alaams asked if the proponent considered the impacts to the colony of rhinoceros auklets due to increased noise and carbon emissions from the increases in marine traffic as they pass by.

Vopak responded that in a synthesis of studies looking at human disturbance effects to 64 nesting colonial waterbirds, including marine birds, and recommended buffer distances of up to 600 m from the colony to minimize potential effects of ground/water-based anthropogenic activities to colonies. The nearest colonies to VPC Project activities are those on Holland Rock and Greentop Island approximately 1.5 km away at the nearest point.

The ship transit emissions were included in the air quality dispersion model for the approximately 15 km route into and from the berths. The modelled air quality impacts specifically from these emissions are well below all government criteria. Ship stack height (approximately 40 m) and the movement of the ships cause rapid mixing and good dispersion of these emissions. Therefore, ship transit emissions will have negligible effect to the auklet colony at Lucy Islands.

Gitxaala and ECCC recommended monitoring bird mortality from light induced collisions to confirm the predictions related to the proposed lighting mitigations. ECCC also noted that they consider there to be a data gap with respect to collisions and lighting effects at coastal facilities, including within the region of the proposed VPC Project. ECCC requested that where there is insufficient data on a potential effect or low confidence in the efficacy of a proposed mitigation a monitoring program be designed and implemented to verify the conclusions of the assessment.

Vopak responded that the residual effects memo characterized the potential for residual effects due to light-induced collisions, and Vopak has put forward reasonable mitigation measures to address this potential effect to the extent they see possible without compromising worker safety. Monitoring for light-induced collisions is not warranted as there is a lack of opportunities for

adaptive management and further mitigation without compromising worker safety.

Vopak will report any wildlife mortality observed by Project personnel, including birds that may have died as a result of collision with Project infrastructure to the Project's environmental staff. Evaluate all records of wildlife mortality for spatial, seasonal, causal, and taxonomic trends on an ongoing basis.

If a significant number of avian mortality events attributable to collision with Project infrastructure (e.g., tanks, buildings, pipes, etc.) are recorded in a single season, Vopak will, with the support of a QEP, develop and implement a formal avian collision monitoring program to further investigate the magnitude of the effect.

MARINE BIRDS

Gitxaala and Metlakatla requested more information on how incremental increases in mortality from the VPC Project might impact non-self-sustaining marine bird populations. Metlakatla requested detailed mitigations to prevent extirpation/extinction. Gitxaala also requested more information on how a not significant conclusion was made for the cumulative effects assessment for marine birds.

Vopak responded that in order to assess resilience and adaptability, residual effects to Marine Birds were examined qualitatively within the context of marine bird populations, status, and habitat availability within the RSA based on reviewing regional, provincial and federal information on marine birds potentially affected by the VPC Project. Significant effects were most likely to be associated with marine bird populations that had low populations and/or limited habitat availability in the RSA, and for which a substantial portion of that population or habitat would be affected by the VPC Project in such a way that would cause the regional population to no longer be self-sustaining. Though residual effects and cumulative effects will affect a wide array of marine bird species, it is not expected that residual effects or cumulative effects will cause regional populations to no longer be self-sustaining.

OPERATION UNDERWATER NOISE

Lax Kw'alaams and Gitga'at raised concerns around the effects of almost continuous underwater noise from operations on fish. Lax Kw'alaams noted that fish are known to have long term avoidance of an area when there is activity occurring in the same location, and the VPC Project will be active long-term.

Vopak responded that vessel activity may generate sound levels that cause behavioural responses in fish. It is challenging to specify the degree of disturbance, behavioural effects, or the distance from the sound source to which behavioural disturbance may occur due to the lack of information on the behavioural response of fish to noise. The vessel activities which could generate these kinds of noise levels and physical disturbance are vessel berthing and departure which are short term and intermittent.

The low levels of noise generated from continuous terminal operations are not expected to result

in long term avoidance of the area. Fish are commonly observed in areas subject to anthropogenic and natural noises, and it should not be assumed that fish will leave even a noisy area even with harmful sound exposure levels. In accordance with a commitment made by Vopak to the Working Group, a pre-construction fish survey will be conducted to better understand fish presence and abundance in winter seasons- the results will be shared with Indigenous nations. Additionally, scientific research monitoring on the relationship between underwater noise and specific types of behavioral disturbance for the diversity of fish species within the RSA will support a better understanding of potential residual cumulative effects.

DFO LETTER OF ADVICE

On September 05, 2020, Vopak submitted a request for review of the VPC Project to DFO. DFO responded in a letter on November 16, 2020, and provided a list of mitigation measures that, if followed, would not require an authorization under the *Fisheries Act* or the *Species at Risk Act*.

Vopak has committed to following the additional mitigations in the DFO Request for Review and Letter of Advice (20-HPAC-00996).

9.4 THE EAO'S ANALYSIS AND CONCLUSIONS

After considering the proposed mitigation measures and PRPA intended conditions of authorization, the EAO concludes that the VPC Project would result in the following residual adverse effects on Marine Resources:

- Effects to marine sediment quality, marine water quality, marine habitats, and fish and invertebrates from sedimentation;
- Effects to fish and invertebrates and marine mammals from underwater noise;
- Alteration or loss of marine habitat, marine mammal habitat and marine bird habitat;
- Effects marine fish and invertebrates and marine birds from lighting; and
- Effects to marine birds from disturbance and displacement.

Table 15: Summary of residual effects on Marine Resources from sedimentation

Criteria	Assessment Rating	Rationale
Context	**Construction:** In-water works: Low to moderate sensitivity Upland works: Low sensitivity **Operations:** Benthic scour: Low to moderate sensitivity Project upland runoff: Low sensitivity	Marine habitats affected by in-water works and benthic scour are assigned a low sensitivity if soft bottom habitat is primarily benthic infaunal communities with sparse distribution of sessile epifauna, as currently anticipated. A moderate sensitivity is applied if three-dimensional habitat created by concentrations of sessile epifaunal species, such as sea pens and sea whips, is present. Marine water quality affected through upland runoff during construction and operations has a high capacity to recover from perturbation.
Magnitude	**Construction:** Low to moderate **Operations:** Low to moderate	While sediment dioxin and furans concentrations fall in the range between the Interim Sediment Quality Guidelines and Probable Effects Levels, indicating that adverse biological effects may occasionally occur. Any associated turbidity, sedimentation, and sediment transport effects during construction and operations are anticipated to be minimal, and spatially and temporally limited with appropriate mitigations. A measurable change from existing baseline conditions is anticipated but is not expected to affect the ongoing viability of Marine Resources. Component management plans are expected to mitigate changes from upland sources during both construction and operations.
Extent	**Construction:** Site specific **Operations:** Site specific	Sedimentation from in-water works is expected to be restricted to the VPC Project's marine infrastructure footprint and immediately adjacent areas. Sedimentation from benthic scour during operations would be restricted to the portion of the mooring area near the anchor chain. Changes to marine water quality from terrestrial runoff during construction and operations is expected to be site specific.
Duration	**Construction:** Short term **Operations:** Long term	Disturbance to Marine Resources during construction is temporary and the area is anticipated to return to pre-construction conditions within two years. Disturbance to Marine Resources has the potential to occur throughout operations.
Reversibility	**Construction:** Reversible **Operations:** Reversible	The effects of sedimentation from construction are expected to be reversible and return to pre-construction conditions within two years. During decommissioning the mooring buoy chains will be removed and benthic scour from the multi-buoy moorings system would no longer occur. Baseline conditions are expected to return within two years of the last disturbance.

Frequency	**Construction:** In-water works: Rare Upland works: Infrequent **Operations:** Benthic scour: Infrequent Project upland runoff: Infrequent	The disturbance of sediment from construction will occur once in different areas of the VPC Project footprint during the installation of the suction anchors and piles. Changes to marine water quality from upland works would occur on multiple occasions at irregular intervals during construction. The effects of sedimentation during operations would occur on multiple occasions at irregular intervals.
Likelihood	There is a high likelihood that sedimentation would occur during construction and from upland runoff during operations. There is a moderate likelihood of the occurrence of sedimentation from benthic scour, although the occurrence would be infrequent as the subsurface buoy would suspend the anchor chain preventing interactions with the seafloor.	
Significance Determination	In consideration of the above assessment and the proposed mitigations, the EAO concludes that the VPC Project would not have a significant adverse effect on Marine Resources from sedimentation.	
Confidence	The EAO's confidence in this assessment is moderate as there are some uncertainties around impacts to Marine Resources from the resuspension of contaminants that are above the Interim Sediment Quality Guidelines.	

Table 16: Summary of residual effects on Marine Resources from underwater noise.

Criteria	Assessment Rating	Rationale
Context	Fish and Invertebrates: Moderate sensitivity Marine Mammals: High resilience	Marine fish and invertebrates' sensitivity to disturbance and recovery from underwater noise varies by the species affected. In general, marine mammals show a resilience and tendency to return to historic habitats once threats or perturbations are removed.
Magnitude	**Construction:** Fish and Invertebrates: Low to moderate Marine Mammals: Low to moderate **Operations:** Fish and Invertebrates: Moderate Marine Mammals: Low	Construction noise levels are not expected to exceed accepted thresholds for injury and mortality to marine fish. As a noise threshold for sound that may cause a potential behavioural disturbance to fish is not well understood and has not been identified, the magnitude of the effect cannot be determined with certainty and has been given a low to moderate rating. Construction noise levels are not expected to cause injury or mortality to marine mammals. The potential for disturbance or displacement due to vessel noise is not well understood for most marine mammal species. A rating of low to moderate is applied to marine mammals during construction as there is uncertainty around the potential for displacement of marine mammals, particularly harbour porpoise during pile driving activities. A rating of moderate has been assessed for marine fish from disturbance during operations as noise from vessel berthing and shipping activity will occur throughout the year, including periods when potentially sensitive species or life history stages are present within the LSA. A rating of low has been assessed for marine mammals during operations because while there would be a change from baseline, it would be considered to be relatively low due to the slow speeds of vessel movements and the VPC Project site is in a region that is already used for trans-oceanic transport as such the marine mammals have familiarity with project-related activities.
Extent	**Construction:** Local to regional **Operations:** Regional	If an injury or direct mortality-related effect does occur, it is expected to be restricted to the LSA. Underwater noise which could possibly disturb fish and marine mammals is likely to extend beyond the LSA, particularly for impact pile installation activity. During operations, underwater noise generated from vessel berthing and shipping activity with the potential to cause behavioural disturbance would be expected to extend beyond the boundaries of the LSA.
Duration	**Construction:** Short term **Operations:** Long term	Noise from construction activities (including pile driving) would be restricted to the construction period. Behavioral disturbances from noise would occur over the duration of operational activities.
Reversibility	**Construction:** Reversible **Operations:** Reversible	As the magnitude of injury, direct mortality and displacement to fish and invertebrates would be expected to be low to moderate, the species should recover to baseline within a year of cessation of the noise source. The impacts to marine mammals from construction noise is expected to cease at the end of the construction period. The potential for disturbance or displacement of marine fish and invertebrates and

		marine mammals would cease with cessation of berthing or off-site shipping activity at the end of the operations phase.
Frequency	**Construction:** Frequent **Operations:** Frequent	Underwater noise will be generated intermittently throughout the construction period. At full capacity, up to 171 vessel transits and berths are expected on an annual basis.
Likelihood	The likelihood of a residual effect to marine fish and invertebrates and marine mammals is moderate to high. Although it is expected that noise levels would not exceed thresholds to injure or kill, the underwater noise modelling has yet to be completed, the size of the marine mammals exclusion zone is not yet determined and there is some uncertainty around impacts to harbour porpoise, so a conservative rating of moderate is applied; these are pre-operations requirements that could result in adjusted mitigations. It is highly likely that underwater noise from construction activities (such as pile driving) and operation activities (such as vessel berthing and shipping activity), would intermittently result in behavioral disturbance to marine fish, invertebrates and marine mammals.	
Significance Determination	In consideration of the above assessment and the proposed mitigations, the EAO concludes that underwater noise would not have a significant adverse effect on marine fish and invertebrates and marine mammals.	
Confidence	The EAO's confidence in the effects assessment for marine fish and invertebrates is moderate. Although there is incomplete understanding of the cause/effect relationship between underwater noise and the injury or direct mortality of the diversity of fish species within the LSA, there is a moderate level of confidence that, with application of appropriate mitigation, the underwater noise levels will not affect the ongoing viability of marine fish species during construction and operations. The EAO's confidence in the effects assessment for marine mammals is moderate to low. There was insufficient data to determine with higher confidence the potential residual effects to harbour porpoise for which coastal developments and anthropogenic activity are recognized threats by the COSEWIC and under SARA. The ongoing viability of marine mammals is not expected to be affected, but there is concern for harbour porpoise.	

Table 17: Summary of residual effects on marine habitat, marine mammals and marine birds due to habitat loss and alteration

Criteria	Assessment Rating	Rationale
Context	Marine Habitat: Low to moderate sensitivity Marine Mammals: High resilience Marine Birds: High resilience	Marine habitats affected by the suction anchor installation are assigned a low sensitivity if soft bottom habitat is primarily benthic infaunal communities with sparse distribution of sessile epifauna, as currently anticipated. A moderate sensitivity is applied if three-dimensional habitat created by concentrations of sessile epifaunal species, such as sea pens and sea whips, is present. Marine mammals generally show a resilience and tendency to return to historic habitats once threats or perturbations are removed. The species present within the LSA generally have a high capacity to resist change and/or recover from that change, as is evidenced by their continued use of the area despite ongoing industrial projects and activities nearby.
Magnitude	Marine Habitat: Low Marine Mammals: Low Marine Birds: Low	The magnitude of effect on marine habitat is expected to be low. Approximately 302 m^2 of non-vegetated, soft bottom subtidal habitat and two m^2 of vegetated, rocky intertidal habitat is expected to be lost. As these habitats are not limited within the LSA or RSA and the total areal loss is relatively small, the residual effect is not anticipated to affect the ongoing viability of marine habitats. There is a measurable alteration to marine mammal habitat from current conditions as no berths previously existed at the project site. Other larger terminals do exist within the PRPA jurisdiction and are proximal to the project site, and carrier vessels do transit a similar route from Ridley Island and the Port of Prince Rupert to the Triple Island Pilot Station. Direct loss or alteration of marine bird habitat is restricted to relatively small areas of riparian, intertidal and subtidal habitats that are not limited in the project area.
Extent	Marine Habitat: Site specific Marine Mammals: Local Marine Birds: Site specific	Loss or alteration of marine habitats is only expected to occur at and around where the piles, suction anchors and guardian blocks are to be installed. Marine mammal habitat alteration is restricted to the project footprint and immediate adjacent areas during berthing maneuvers, and the LSA during associated off-site shipping. The extent of loss or alteration of marine bird habitat is expected to primarily be contained to the project footprint.
Duration	Marine Habitat: Short term to permanent Marine Mammals: Long term Marine Birds: Long term	Disturbance of marine habitat from the installation of the suction anchors is temporary and anticipated to return to baseline conditions within two years. Loss of marine habitat from the guardian blocks is long term as they would remain until project decommissioning. Loss of marine habitat from the marine jetty piles is expected to be permanent as the piles are not proposed to be removed during decommissioning. Alteration of marine mammal habitat would occur over the duration of operational activities.

		Marine bird habitat loss and alteration would occur throughout all project phases.
Reversibility	Marine Habitat: Reversible to irreversible Marine Mammals: Reversible Marine Birds: Partially reversible	Alteration of marine habitat from the installation of the suction anchors is temporary and would be expected to return to baseline conditions after installation. Loss of marine habitat from the guardian blocks is reversible as the blocks would be removed during decommissioning. Loss of marine habitat from pile installation is irreversible as there are no plans to remove the piles during decommissioning. Alteration or loss of marine mammal habitat would cease if the berths and associated marine infrastructure, and vessels are not present. The alteration or loss of marine bird habitat due to effects of overwater lighting would cease with the removal of the lighting during decommissioning. The loss of small areas of riparian, intertidal and subtidal habitats would be irreversible.
Frequency	Marine Habitat: Rare Marine Mammals: Frequent Marine Birds: Rare to frequent	The alteration and loss of marine habitats will occur once during the VPC Project construction phase. At full capacity, up to 171 vessels are expected to berth on an annual basis. The loss of marine bird habitat would occur once during project construction, while localized habitat alteration due to overhead lighting will be continuous to the end of operation. Loss of habitat will occur again when the jetty topside is removed during decommissioning.
Likelihood	There is a high likelihood that marine habitat would be altered and lost during construction of the VPC Project. The likelihood of a residual effect due to the alteration or loss of marine mammal habitats due to vessel berthing activities and associated off-site shipping activities is moderate. The rating of moderate was selected due to the potential effects to harbour porpoise from coastal development and sensitivity to anthropogenic activity. There is a high likelihood that marine bird habitat would be lost or altered during all phases of the VPC Project.	
Significance Determination	In consideration of the above assessment and the proposed mitigations, the EAO concludes that the loss and alteration of marine habitat would not have a significant adverse effect on Marine Resources.	
Confidence	The EAO's confidence in the effects assessment for marine habitat and marine bird habitat is high. The EAO's confidence in the effects assessment for marine mammals is moderate to low. There was insufficient data to determine with higher confidence the potential residual effects to harbour porpoise for which coastal developments and anthropogenic activity are recognized threats. The ongoing viability of marine mammals is not expected to be affected, but there is concern for harbour porpoise.	

Table 18*:* Summary of residual effects for Fish and Invertebrates and Marine Birds from lighting

Criteria	Assessment Rating	Rationale
Context	Fish and Invertebrates: High resilience Marine Birds: Moderate resilience	Fish and invertebrate populations have a high capacity to recover from overwater lighting effects. Given the lack of critical or limiting habitats, rare habitat features, or areas of notably high relative population densities for marine birds within the LSA, marine bird populations are expected to have a moderate capacity to resist change or recover from that change as a result of VPC Project-related changes in mortality risk.
Magnitude	Fish and Invertebrates: Low Marine Birds: Low	With mitigation of overwater lighting in the nearshore area, the magnitude of effect on out-migrating juvenile salmon -the species considered to be most sensitive to overwater lighting effects -is anticipated to be low. Changes to mortality risk for marine birds are expected to be minor and not pose a threat to population sustainability.
Extent	Fish and Invertebrates: Site-specific Marine Birds: Local	Lighting effects to fish and invertebrates would be restricted to the marine project components footprint and immediate adjacent areas. Changes to mortality risk for marine birds would extend beyond the project footprint (associated with ship lighting), but not beyond the LSA because the sources of potential mortality were associated with VPC Project facilities or project activities that would take place within the LSA.
Duration	Fish and Invertebrates: Long term Marine Birds: Long term	Effects to marine fish and invertebrates would occur over the duration of operational activities. Effects to marine birds would be expected to last until completion of the VPC Project decommissioning.
Reversibility	Fish and Invertebrates: Reversible Marine Birds: Reversible	Effects to marine fish and invertebrates would cease immediately when the requirement for operational lighting ceases. Following decommissioning, VPC Project facilities or activities associated with the change in mortality risk will no longer be present, and therefore mortality risk for marine birds will return to baseline levels.
Frequency	Fish and Invertebrates: Frequent Marine Birds: Infrequent	Effects to marine fish and invertebrates would occur during regularly scheduled berthing and loading activities. Potential marine bird mortality occurrences would be expected to occur at multiple, irregular intervals.
Likelihood	The likelihood of the residual effect on fish and invertebrates is moderate. The VPC Project is unlikely to completely mitigate the effects of overwater lighting so a residual effect to marine fish and invertebrates is considered moderately likely to occur. There is a high likelihood that VPC Project lighting would affect the mortality risk of marine birds.	
Significance Determination	In consideration of the above assessment and the proposed mitigations, the EAO concludes that lighting would not have a significant adverse effect on marine fish, invertebrates, or marine birds.	

Confidence	The EAO's confidence in the effects assessment of lighting on marine fish and invertebrates is high. The potential effect of overwater lighting on marine fish is well known and the recommended mitigation is expected to address the potential effect on the most sensitive species which are out-migrating juvenile salmon. The EAO's confidence in the effects assessment of lighting on marine birds is moderate. There is a recognized data gap identified with respect to collisions and lighting effects at coastal facilities, including within the region of the proposed VPC Project.

Table 19: Summary of residual effects on marine birds due to disturbance and displacement

Criteria	Assessment Rating	Rationale
Context	High resilience	The species identified within the LSA generally have a high capacity to resist change and/or recover from that change, as is evidenced by their continued use of the area despite ongoing industrial projects and activities nearby.
Magnitude	Low to moderate	The incremental change to marine bird populations as a result of disturbance and displacement are expected to be minor for most species, though for some species, during construction in particular, it may result in a clearly defined change that is below a level that would pose a threat to the sustainability of those species in the LSA.
Extent	Local	The extent of this effect is expected to go beyond the project footprint but be contained within the LSA.
Duration	Long term	Disturbance and displacement of marine birds is expected to last until VPC Project closure.
Reversibility	Reversible	Marine birds are expected to fully recover upon decommissioning.
Frequency	Infrequent to frequent	Activities causing disturbance and displacement are expected to be most notable during construction but become more infrequent into operation as many species are expected to acclimatize to disturbance sources in this phase.
Likelihood	There is a high likelihood of this effect occurring.	
Significance Determination	In consideration of the above assessment and the proposed mitigations, the EAO concludes that the VPC Project would not have a significant adverse effect on marine birds due to disturbance and displacement.	
Confidence	The EAO's confidence in the effects assessment is high.	

9.5 CUMULATIVE EFFECTS ASSESSMENT

A number of past, present and reasonably foreseeable future projects and activities were considered in the cumulative effects assessment for Marine Resources. The EAO notes that it has low confidence in the below cumulative effects assessments as they do not include the recently proposed Ridley Island Export Logistics Platform which has the potential to impact marine resources.

Marine Water and Sediment Quality

Indigenous nations requested that a cumulative effects assessment be done for both marine water quality and marine sediment quality.

> Vopak produced a residual effects memo that included cumulative effects assessment for marine water quality and marine sediment quality from construction and operations. Vopak noted that water quality monitoring would occur through the PRPA Marine Environmental Water Quality monitoring program. Vopak would also follow the PRPA developed sediment guideline for proponents to survey the effects of mooring buoy chain scour on benthic communities and water quality one year after the start of operations. The results would determine if additional monitoring and adaptive management is required.

Considering the above assessment, the proposed follow up monitoring, and the low magnitude and site-specific nature of the effects, the EAO concludes that there would not be significant adverse residual cumulative effects to marine water quality and marine sediment quality.

Marine Habitat

Vopak assessed the cumulative effects on the alteration or loss of marine habitat and did not identify any additional measures to mitigate potential cumulative effects.

Considering the above assessment, the low magnitude of the residual effect, relatively small area being affected (302 m^2), and site-specific nature of the effect, as well as Condition 9 (Cumulative Effects Management) that will require Vopak to participate in initiatives related to the monitoring, assessment and management of the VPC Project's cumulative effects, the EAO concludes that there would not be significant adverse residual cumulative effects to marine habitat.

Marine Fish and Invertebrates

Vopak assessed the cumulative effects from underwater noise during construction and operations, benthic scour and overwater operations lighting on marine fish and invertebrates. Follow-up monitoring was proposed for benthic scour to confirm the nature/ extent of the mooring buoy chains benthic scouring residual effects, one year after operations would commence; results would determine if additional monitoring and adaptive management is required.

The EAO asked whether any site-specific locations are known in the study areas where higher levels of vessel noise and vibration occur with existing shipping traffic, and if effects assessments considered this in determining residual and cumulative effects.

> Vopak responded that an increase of 5% in marine traffic along the shipping lane is estimated when the VPC Project is in operation. This will result in a less than 1 dBA increase in sound emission, which is generally not considered to be noticeable.

Considering the above assessment, the proposed follow up monitoring, the low to moderate magnitude,

reversibility and site-specific to regional nature of the effects, as well as Condition 9 (Cumulative Effects Management) that will require Vopak to participate in initiatives related to the monitoring, assessment and management of the VPC Project's cumulative effects, the EAO concludes that there would not be significant adverse residual cumulative effects to marine fish and invertebrates.

Marine Mammals

Vopak assessed the cumulative effects to marine mammals from the alteration and loss of marine mammal habitat, the disturbance and displacement of marine mammals due to underwater noise and physical presence of the vessels during berthing and associated off-site shipping activities. Vopak noted that gaps remained in understanding the relationship between underwater noise and marine mammal behavioural response, and that there was insufficient data to determine with higher confidence the potential residual effects to harbour porpoise for which coastal developments and anthropogenic noise are recognized threats. As a follow up strategy, Vopak will participate in multi-stakeholder initiatives such as the PRPA's Marine Mammal Program, and other regionally relevant research initiatives that relate to marine mammals and ocean noise. New mitigation measures will be assessed for implementation during the operation phase, if required, as an adaptive management strategy.

DFO and Kitsumkalum raised concerns about the cumulative effects assessment of marine mammals. DFO noted that the cumulative effects conclusions are not well substantiated and that confidence in cumulative effects conclusions for marine mammals is low.

> Vopak committed to a coordinated monitoring program and participation in research on marine mammal disturbance reduction programs through the appropriate authorities, such as the PRPA's Marine Mammal Program. This research is intended to offset some of the acknowledged scientific uncertainties, enable implementation of adaptive management measures, and allow for collaborative development of marine stewardship strategies as part of multi-stakeholder initiatives.

Considering the above assessment, the proposed follow up strategies, the low magnitude, reversibility and nature of the residual effects of the VPC project, as well as Condition 9 (Cumulative Effects Management) that will require Vopak to participate in initiatives related to the monitoring, assessment and management of the VPC Project's cumulative effects, the EAO concludes that there would not be significant adverse residual cumulative effects to marine mammals.

Marine Birds

Vopak assessed the cumulative effects to marine birds from alteration and loss of marine habitat and disturbance and displacement during all project phases, and light induced collisions during operations. No additional follow-up strategies were proposed for marine birds.

Kitsumkalum and ECCC raised concerns about Vopak's cumulative effects assessment of the increases of marine shipping on marine birds. ECCC did not agree that that habituation to current levels of shipping traffic equates to habituation at twice the level of shipping traffic.

> Vopak agreed that habituation at current vessel traffic levels does not signify that marine birds will

habituate to the same amount when vessel traffic is doubled. The Application identified that cumulative effects due to disturbance and displacement, inclusive of marine shipping vessel traffic, are assessed as low to moderate magnitude depending on the marine bird species, with the highest magnitude associated with more susceptible species. Vopak acknowledged that the classification of 'fully reversible' should be 'partially reversible' to account for some species (those most susceptible to disturbance/displacement) that may not fully habituate to increases in vessel traffic. This re-characterization of the effect did not change Vopak's conclusion on significance.

Considering the above assessment, the magnitude, and the site specific to local extent of the residual effects of the VPC project, as well as Condition 9 (Cumulative Effects Management) that will require Vopak to participate in initiatives related to the monitoring, assessment and management of the VPC Project's cumulative effects, the EAO concludes that there would not be significant adverse residual cumulative effects to marine birds.

9.6 CONCLUSIONS

Considering the above analysis, Table of Conditions, Vopak's proposed mitigations and the federal Section 67 Determination, the EAO concludes that the VPC Project would not have significant adverse effects on Marine Resources.

10. TERRESTRIAL RESOURCES

This chapter provides an assessment of the potential effects of the VPC Project on terrestrial resources, and covers the following Valued Components:

- Soils and Terrain;
- Vegetation and Wetlands; and
- Wildlife and Wildlife Habitat.

10.1 BACKGROUND

The VPC Project is located on Ridley Island, on federal lands administered by the PRPA. The Application identifies the federal and provincial legislation and policy used to guide the assessment of potential adverse effects on terrestrial resources. The federal regulatory guides included:

- federal Policy on Wetland Conservation (1991);
- *Migratory Birds Convention Act* (SC 1994 c. 22), *Migratory Birds Regulation, and policy*; and
- *Species at Risk Act* (SC 2002, c. 29), and policies (*SARA*).

The provincial regulatory guides included various standards and practices for collecting data, and mitigating and assessing effects, such as:

- guides for describing and mapping terrestrial ecosystems;

- Guideline for Amphibian and Reptile Conservation during Urban and Rural Development in B.C. (2014); and
- Guideline for the Selection of Valued Components and Assessment of Potential Effects (EAO, 2013).

SPATIAL BOUNDARIES

The spatial boundaries for assessing effects includes a project's footprints (facilities and workspaces), LSA boundaries, and RSA boundaries.

The LSA and RSA boundaries for soils and terrain were (Figure 8):

- LSA – footprint of the land-based storage facility (38 ha); and
- RSA – Ridley Island (552 ha).

The LSA and RSA boundaries for vegetation; wetlands and wetland function; and, wildlife and wildlife habitat, were (Figure 9):

- LSA – 500 m from the footprint of the land-based storage facility (327 ha); and
- RSA – the provincial Kaien Landscape Unit (50,000 ha).

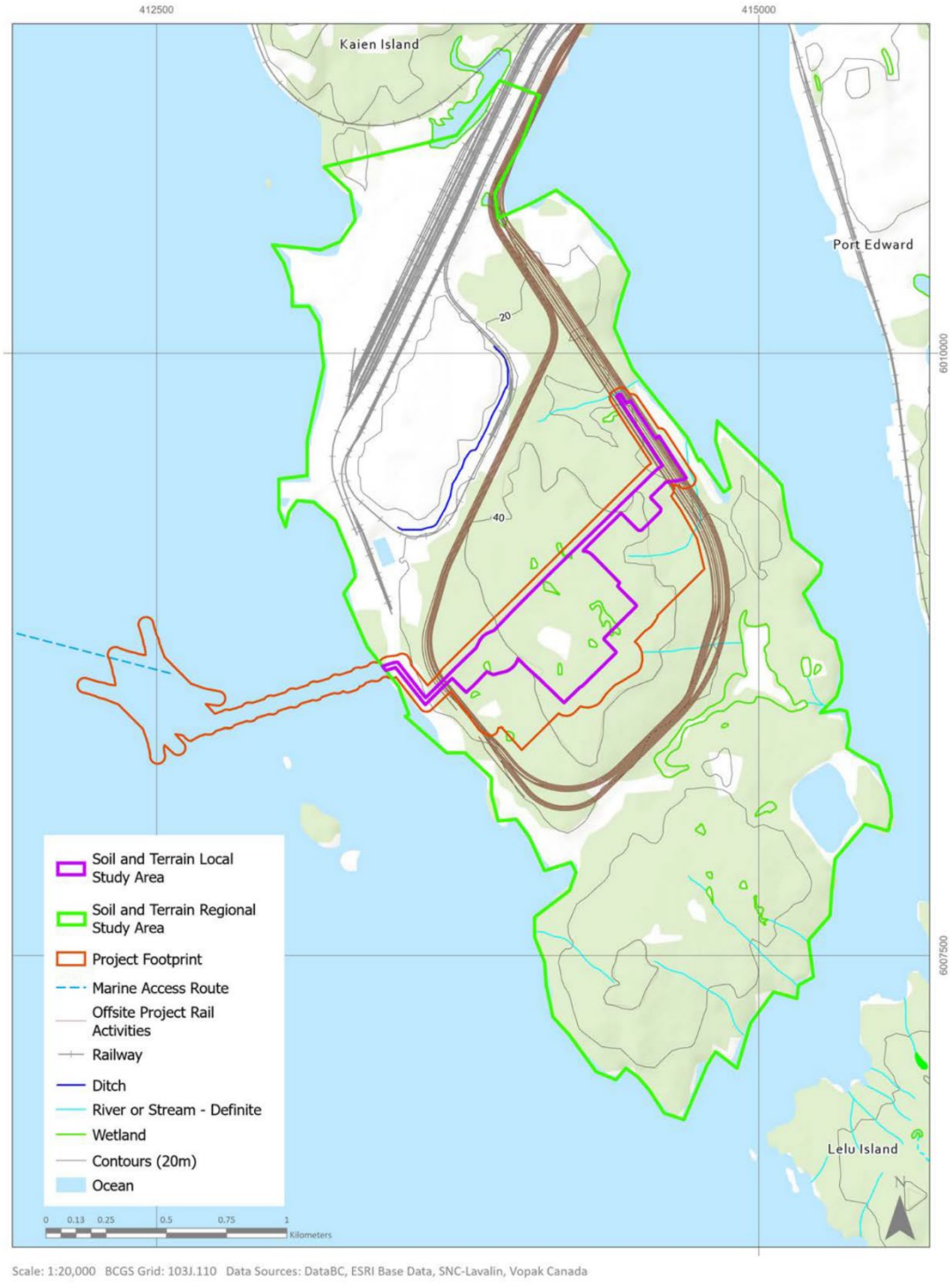

Figure 8: Boundaries for Soil and Terrain

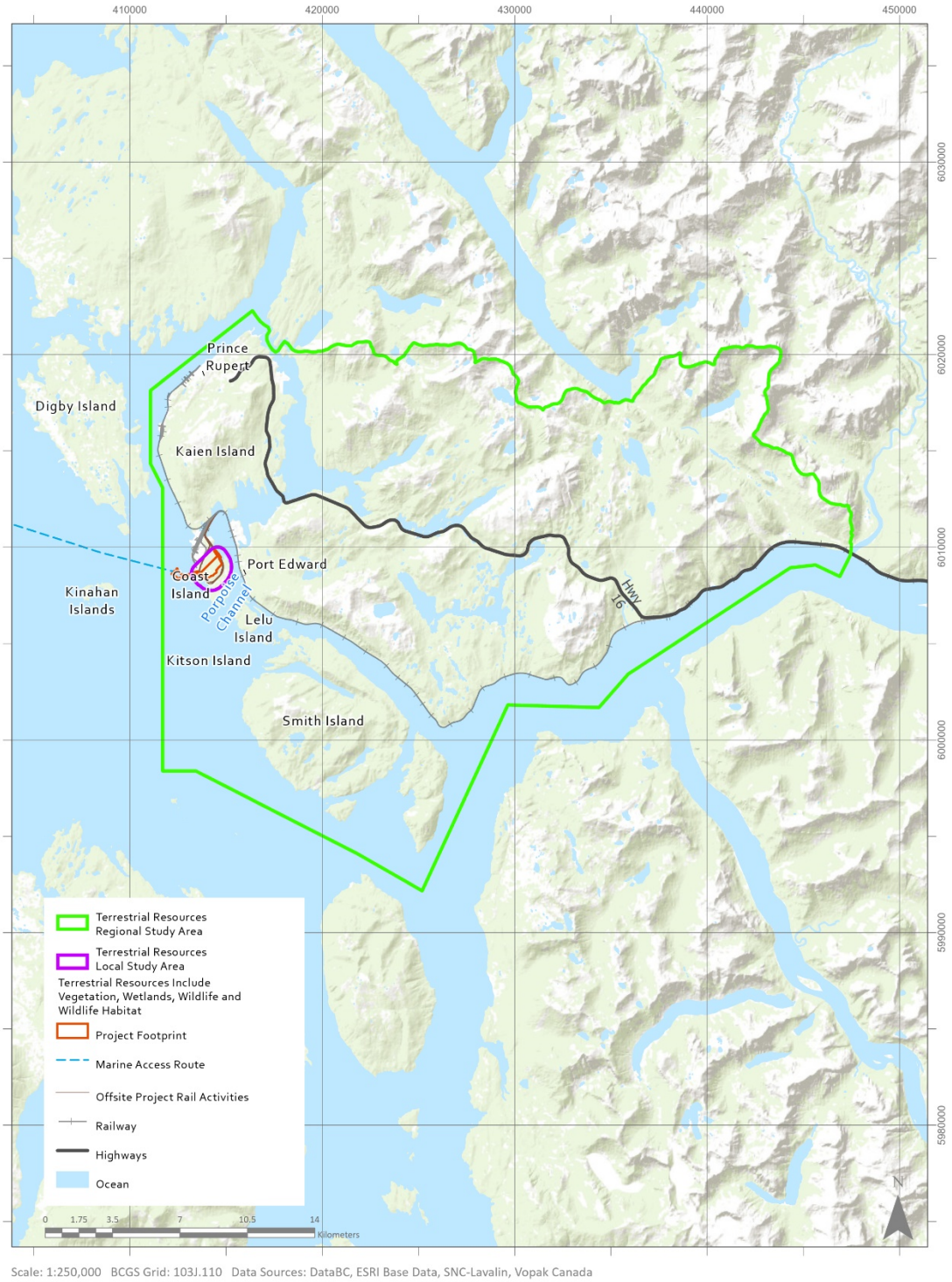

Figure 9: Boundaries for Terrestrial Resources

TEMPORAL BOUNDARIES

Vopak reported that the VPC Project will:

- take two years to construct;
- operate for a minimum of 50 years, but that the maximum number of years is not known as that would be dependent upon market conditions; and
- take 12 months to decommission.

10.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

Over time, Ridley Island, covering approximately 552 ha, may be fully developed for Port operations (PRPA Land Use Plan, September 2020). This industrial area includes existing infrastructure, and activities subject to federal environmental assessment not yet constructed or fully constructed. Development of PRPA infrastructure on Ridley Island is progressing lockstep with the development of new facilities.

Vopak reported that the VPC Project requires additional rail tracks within the PRPA's Ridley Island Road and Railway Utility Corridor (RRUC), and that the PRPA will realign two existing rail tracks and construct seven new rail tracks for facility operations (the facility railyard), which are to be used solely by the VPC Project. The facility will need to be connected to utilities on Ridley Island (i.e., electricity, gas, and water), and will share use of PRPA infrastructure with other facilities (e.g., roads, and excavated material disposal area).

SOILS AND TERRAIN

Ridley Island is low in relief and poorly drained with abrupt changes in elevation. Surficial deposits over bedrock range up to 17 m in thickness. Mild temperatures and high rainfall result in slow decomposition rates of organic matter and wet acidic soils. There is a saturated surface peat layer averaging two m in depth. High water tables and anaerobic soil conditions restrict tree growth. The site of the facility is almost entirely undeveloped, and it is not expected that soils have been contaminated.

VEGETATION AND WETLANDS

The LSA consists of a single variant of the Coastal Western Hemlock biogeoclimatic zone and includes wetland and non-wetland vegetated communities. Most of the undeveloped areas within the LSA are a complex of raised sphagnum bogs and wet coniferous forest with open water but few water courses. The bog-wetland complex, of which there are 115.3 ha, is fed primarily by precipitation and holds water at an elevation above the groundwater table. There are 87.8 ha of non-wetland vegetated communities in the LSA.

There are 17 ecological communities at risk potentially present in the biogeoclimatic zone variant. There are three provincial blue-listed and two red-listed ecological communities at risk known or likely present in the LSA. One blue-listed (not threatened but of concern) community and small microhabitat occurrences

of the two Red-listed (endangered or threatened) communities at risk were identified or tentatively identified in the LSA.

WILDLIFE AND WILDLIFE HABITAT

Mammals observed on Ridley Island include black-tailed deer, grey wolf, river otter, cougar, black bear, porcupines, and bats. The coal terminal and other existing infrastructure on Ridley Island restricts small mammal and amphibian movement to/from Ridley Island and the VPC Project area. Larger mammals such as deer, bears, wolves, beaver, and otters are expected to swim between Ridley Island and the mainland or Lelu Island regularly. These species may also move through the developed areas along roads etc. under cover of darkness.

Seven species of bats were observed foraging in the LSA during surveys, the silver-haired bat, California myotis, long-eared myotis, little brown myotis, long-legged myotis, Yuma myotis, and hoary bat. Two more species are potentially present, Keen's myotis and big brown bat. Bats roost in forested habitat within the LSA and outside the LSA. It appears unlikely that there are natural features on Ridley Island where bats overwinter (hibernate).

Little brown myotis is listed as endangered under *SARA*. The damage or destruction of residences (e.g., a den, nest, or similar place) occupied by individuals of wildlife species listed as endangered or threatened is prohibited. In June 2021, ECCC determined that a *SARA* permit is required for little brown myotis for the VPC Project to proceed, and it is a Federal Authority with decision-making responsibilities.

Four amphibian species were found in the LSA during surveys, western toad, roughskin newt, northwestern salamander, and long-toed salamander. Construction of the RRUC has created a substantial barrier between adult toads inside the RRUC and breeding locations outside the RRUC (e.g., the disposal area for excavated material). The bog habitats common throughout the LSA are considered low suitability habitat for western toad breeding due to the low pH (i.e. higher acidity) of the water. Western toad surveys on Ridley Island over time suggest that populations inside the RRUC are not self-sustaining and the area could be a population sink for toads breeding outside the RRUC.

70 species of songbirds are known in the regional area, and 36 were recorded in the LSA. No species-at-risk were observed during surveys in the LSA. Barn swallows (*SARA* Threatened, provincial blue list), common nighthawk (SARA Threatened) and great blue heron (provincial blue list, SARA Special Concern) were observed incidentally, and band-tailed pigeons (*SARA* special concern, provincial blue list) have been reported on Ridley Island in the past. Northern saw-whet owl, Canada geese, and mallard ducks were also observed during surveys, as were marine birds.

Habitat suitability was mapped in the LSA for six species, the little brown myotis, marbled murrelet, wester screech-owl, common nighthawk, olive-sided flycatcher, and western toad. The majority of the LSA contains low or nil suitability habitat for all six species. Moderate suitability habitat in the LSA exists for little brown myotis (20 %), marbled murrelet (0.5 %), wester screech-owl (20 %), and olive-sided flycatcher (16 %). Surveys suggest that little brown myotis roost in forested habitat within the LSA in relatively low abundances. Critical habitat under *SARA* for marbled murrelet is present outside the LSA on the southeast

corner of Ridley Island. Western screech-owl and olive-sided flycatcher were not detected during surveys. There were two observations of common nighthawk, which are considered rare regionally, in habitat with potential to support nesting.

The PRPA's RRUC forms a loop around the VPC Project site. The site extends from one side of the RRUC to the other, bisecting the area inside the RRUC and leaving two patches of mostly undisturbed land on either side. Excavation and site preparation for the VPC Project will alter the natural terrain and hydrological patterns.

The VPC Project will operate for a minimum of 50 years or more. Following decommissioning of the VPC Project, it is likely that another facility would take its place, so the site is likely to remain an industrial site for Port operations, and not be reclaimed to restore natural conditions. Even if the site were to be reclaimed at some point, it would not be possible to recreate the existing natural conditions.

SOILS AND TERRAIN

An estimated 511,125 m^3 of organic soil and overburden will be excavated from the 38-ha infrastructure footprint and deposited in a disposal area at the south end of Ridley Island about one km away. An additional estimated 293,577 m^3 of rock will be generated from cutting and blasting bedrock to level the site. This will be used on-site as fill where possible. It is anticipated there will be excess rock that will be deposited in the disposal area or another area identified by the PRPA. The amount of rock that will be used versus disposed of has yet to be determined. Material from commercial sources may also be used as fill in preparing the site for the facility. The natural terrain at the site ranges in elevation from 20 m to 45 m above sea level. The elevation after site preparation is complete has not been determined. Vopak estimates this will be between 25 m and 35 m above sea level.

VEGETATION AND WETLANDS

Of the 87.8 ha of non-wetland vegetated communities in the LSA, the VPC Project will result in the loss of 2.37 ha (2.7 %), including 1.3 ha of old forest and one 0.56 ha provincial blue-listed ecological community at risk. No rare plants were observed during surveys.

The VPC Project footprint will bisect the bog-wetland complex isolated within the RRUC, and change the elevation of the terrain, drainage, and hydrological patterns, leaving two smaller patches of bog-wetland on either side of the footprint. Of the 126.6 ha of wetlands within the LSA, the VPC Project will result in the loss of 33.2 ha (26 %) of wetlands, including two red-listed fen-wetland communities that are too small in area to map. Indirect effects/degraded wetland functions will occur in up to 61.7 ha of wetlands adjacent to the VPC Project footprint (49 % of wetlands in the LSA).

92 percent of the vegetated areas that will be directly affected are wetlands. The Application reported the following direct effects from the loss of wetlands:

- lost hydrological functions that will alter the flows of the few outlet streams in the LSA;
- effects to the future biochemical function of the bog to store carbon;

- removal of wildlife habitat functions; and
- removal of habitat for rare plant associations.

The Application reported the following indirect effects to wetlands adjacent to the facility footprint:

- introduction and or spread of invasive plant species;
- introduction of sediment; and
- alteration of hydrology and water quality.

WILDLIFE AND WILDLIFE HABITAT

The Application reported the following potential effects on wildlife and wildlife habitat:

- alteration or loss of wildlife habitat;
- change in mortality risk to wildlife; and
- disturbance and displacement of wildlife.

Loss of habitat includes migration, breeding, and winter habitat for numerous bird species, living habitat for numerous mammals and amphibians and breeding habitat for amphibians, and foraging and roosting habitat for bats.

Loss of wetland habitat in the LSA will reduce foraging habitat for multiple bat species, including little brown myotis, and reduce the abundance of bats foraging in the LSA and on Ridley Island. There will be a loss of bat roosting habitat within the VPC Project footprint, and this loss could reduce the abundance of little brown myotis roosting in the LSA.

The loss of wetland habitat could affect migratory and non-migratory birds that use it for migration, breeding, over-wintering, and other life requisites. Overall, the relative abundance and species diversity of songbirds in the LSA and on Ridley Island is expected to decline because of habitat loss.

Loss of bog-dominated wetland habitat will affect amphibian populations in the LSA and on Ridley Island, particularly northwestern salamander commonly found breeding in open water areas. Loss of this habitat is expected to affect western toads that use it during the breeding and non-breeding periods.

The introduction and or spread of invasive plant species which are present in the LSA, and sedimentation, could alter habitats adjacent to the VPC Project footprint.

Wildlife mortality may occur during Construction, Operations, and Decommissioning. Mortalities of amphibians will occur during site clearing and preparation activities. Salvage operations may themselves lead to injury and reduced survival and are considered an imperfect measure to mitigate wildlife mortality. Impacts may occur to populations where salvaged individuals are introduced. (Re, Best Management Practices of Amphibian and Reptile Salvages in British Columbia, 2016).

There could be an increase in the risk of mortality to wildlife from vegetation clearing and site preparation

(e.g., birds and bats), collisions with vehicles (e.g., mammals, amphibians, birds), and collisions with VPC Project infrastructure (e.g., birds). Wildlife attractants can cause human-wildlife conflicts and lead to mortalities.

Vopak proposes to mitigate adverse effects by developing and implementing Environmental Management Plans for Construction, Operations, and Decommissioning, that have component plans for site restoration, soil management, vegetation management, and wildlife management. These and other plans are, for example, to include best management practices for:

- delineating construction areas;
- managing stockpiles of soil;
- controlling erosion and sedimentation;
- preventing the spread of invasive and noxious plants;
- restoring disturbed sites following construction;
- wildlife timing windows for site clearing to avoid harming wildlife;
- salvaging amphibians;
- managing disturbance from light;
- managing wildlife attractants; and
- installing perimeter fencing to deter large wildlife from entering the facility.

Vopak also proposed to develop and implement a Wetland Function Compensation Plan for those wetlands within the VPC Project footprint that will be lost, and the wetlands adjacent to the footprint that are indirectly affected. The Plan is to be developed in accordance with federal wetland policy (ECCC recommends a compensation ratio of at least 2:1). Vopak's conceptual Plan includes a:

- supporting the expansion of local trails which go through or are adjacent to wetlands, to replace the loss of access to wetlands for traditional use, recreation, aesthetic, and educational values;
- purchasing carbon credits to compensate for the loss of wetland carbon capture and storage functions; and
- wetland securement, restoration and/or enhancement to replace the loss of wetland habitat functions.

Vopak proposes to undertake the measures within the RSA, and implement them within three to five years of the start of construction. Though the Province will have no oversight of the Plan, the measures in the Plan may occur on provincial Crown land and be subject to Provincial authorizations.

10.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

The EAO identified the following as the key terrestrial resource issues from review of the Application and the feedback received from members of the public, and technical working group including Indigenous

nations.

Members of the public expressed concern about increased railway traffic outside of Ridley Island and impacts to wildlife such as from collisions and accidental spills of contaminants.

> Rail activities outside of the administrative boundaries of the PRPA are not within the scope of the environmental assessment. Vopak provided supplemental information about the potential impacts of increased rail traffic related to the VPC Project (an increase of approximately 16% or 876 trains per year). Vopak reported that the change in numbers of moose-rail collisions would not be detectable at the population level, and there would be a potential increase of main track derailments of 0.4 to 0.5 per year.

Indigenous nations expressed concerns that disruption of baseline hydrological patterns could affect bog-wetlands adjacent to the storage facility (Kitsumkalum); and, Construction and Operations could disturb and displace wildlife (Kitsumkalum, Lax Kw'alaams).

> Vopak responded that the adjacent bog-wetlands will remain, but more trees will grow in them, and disturbance and displacement of wildlife is expected to be reversible.

ECCC requested an assessment of hydrological effects to the bog-wetland complexes adjacent to the VPC Project footprint, and that compensation include both lost and altered wetlands; requested monitoring of light-induced bird collisions with facility structures to verify the assessment of effects; and, recommended that Vopak develop a metal leaching and acid rock drainage management plan for excavated materials.

> Vopak responded that in a worst-case scenario, functions in up to 61.7 ha of wetlands adjacent to the footprint could be affected, and while such indirect effects are unlikely they will be considered in the Wetland Function Compensation Plan. Vopak responded that further mitigation for light-induced bird collisions at the facility is not possible without compromising worker safety, but it will report and evaluate any wildlife mortalities observed, including birds that may have died as a result of collision with infrastructure; and if a significant number of bird mortality events are recorded in a single season, it will implement a monitoring program to investigate the magnitude of the effect. Vopak responded that a metal leaching and acid rock drainage sampling plan will be developed prior to Construction, and a management plan developed if sampling identifies an issue.

During the review of the Application Vopak reported the following relating to the assessment of terrestrial resource effects:

- facility design is progressing, it is anticipated that the footprint will be refined, and if additional area is needed an amendment will be sought;
- construction will be required to extend utilities to the facility;
- individual trees outside the facility footprint will be removed if they pose a threat to worker safety, but this removal is expected to be relatively limited;

- some excavated material may be stored at a location other than the site identified in the Application but still on PRPA lands; and
- the disposal of excavated material is outside the scope of the assessment as the disposal site is located off-site in the PRPA disposal area.

10.4 THE EAO'S ANALYSIS AND CONCLUSIONS

The EAO's characterization of the expected residual effects of the VPC Project on terrestrial Valued Components after mitigation is summarized below, as well as EAO's level of confidence in the determination of effects (including their likelihood and significance).

Most of the effects on terrestrial Valued Components, as well as the principle mitigation for those effects, are related to wetlands and the plant associations, wildlife habitat and wildlife species associated with those wetlands. For this reason, the EAO's characterization of residual effects (Table 20) focuses on wetlands.

Table 20: Summary of residual effects for Wetlands

Criteria	Assessment Rating	Rationale
Context	Low	Ridley Island is designated for industrial development, and the PRPA determines what types of development will occur. Most of the wetland types that will be lost are not classified as ecologically important (red-listed at-risk).
Magnitude	Moderate	26% of wetlands within the LSA will be lost. Effects to wetlands will extend beyond those that are lost to adjacent wetlands (up to 49% more of the wetlands in the LSA). The magnitude of amphibian mortalities is not known.
Extent	Local	Effects will not extend beyond the LSA and Ridley Island.
Duration	Permanent	The facility will operate for a minimum of 50 years, after which the site is likely to continue to be used for industry.
Reversibility	Irreversible	Terrain will be extensively modified for the facility and it will not be possible to re-establish baseline conditions.
Frequency	Continuous	Effects to the functions of bog-wetland complexes adjacent to the facility will continue during Operations.
Likelihood	There is a high likelihood that residual effects will occur given there will be permanent changes to baseline conditions, and effects cannot be avoided or fully mitigated.	
Significance Determination	Impacts to wetlands, and the plant associations, wildlife habitat and wildlife species associated with those wetlands, are expected to not be significant. While residual effects will be moderate in magnitude, permanent, irreversible, and continuous, the EAO gave greater weight to federal policies for wetland conservation, migratory birds, and species at risk that apply to federal lands.	
Confidence	There is a high level of confidence in the likelihood determination given that the limitations of mitigation and the residual effects are clear and easily understood. There is a low level of confidence in the significance determination given the basic design information	

	about the facility, uncertainty about the footprint, magnitude of residual effects, and that the conceptual Wetland Function Compensation Plan would be finalized and implemented within three to five years after the start of construction. The EAO understands that detailed site design will be reviewed by the PRPA and other applicable Federal Authorities, based on their respective jurisdictions/mandates.

Note: Criteria and assessment ratings are defined in Appendix XX: *Summary Characterization of Residual Adverse Effects for Valued Components*

10.5 CUMULATIVE EFFECTS ASSESSMENT

Vopak identified 27 past, present and reasonably foreseeable future projects and activities with the potential to interact cumulatively with the residual effects of the VPC Project on vegetation, wetlands, wildlife habitat and wildlife. This was influenced by the large size of the RSA (50,000 ha). Of these other projects/activities, four are located on Ridley Island (Prince Rupert Grain Terminal, Ridley Terminals Inc. Coal Terminal, Ridley Island Propane Export Terminal, and the PRPA's RRUC).

Vopak did not identify specific mitigation for cumulative effects and assumed that landscape-level planning processes conducted by the Province have identified Ridley Island for industrial development, and accounted for that in conservation planning. Vopak concluded that cumulative effects to these terrestrial Valued Components are considered not significant.

Lax Kw'alaams expressed concern that the 50,000 ha RSA did not allow for meaningful assessment of effects to wildlife local to Ridley Island.

> Vopak responded that the RSA was appropriate for assessing effects.

ECCC noted that the cumulative effects assessments in the Application did not include the PRPA's January 2020 proposed Ridley Island Export Logistics Platform about one km from the VPC Project, which also included expansion of the RRUC.

> Vopak responded that this project was not known and listed in the July 2019 joint provincial Application Information Requirement and federal Terms of Reference for the VPC Project.

There are an estimated 175 ha of wetlands remaining on Ridley Island. The VPC Project will result in the loss of 33.2 ha of wetlands and indirect effects/degraded wetland functions in up to 61.7 ha of wetlands adjacent to the VPC Project footprint. The RSA includes a wide range of wetland types such as alpine wetland.

In addition, Condition 9 (Cumulative Effects Management) will require Vopak to participate in initiatives related to the monitoring, assessment and management of the VPC Project's cumulative effects.

Excluding the PRPA's Ridley Island Export Logistics Platform project, the EAO concludes that there would not be significant residual cumulative effects to Vegetation, Wetlands, Wildlife Habitat, and Wildlife from

the interaction of the VPC Project with other projects/activities. There is a low level of confidence in this determination given the Wetland Function Compensation Plan is conceptual, will and would be finalized and implemented three to five years after the start of construction. The EAO does have some confidence however, given that Vopak has worked closely with PRPA, ECCC and Indigenous nations to develop the conceptual Wetland Function Compensation Plan to date.

10.6 CONCLUSIONS

There is some uncertainty as to what the final physical footprint of the VPC Project facility and related works, and indirect effects in adjacent areas, will be.

Regarding little brown myotis, the federal Guidelines for Permitting Under Section 73 of the *Species at Risk Act* recommends that applications include an explanation of any uncertainty associated with impacts and the effectiveness of any proposed mitigation measures.

Indigenous Nations (e.g., Gitxaala and Metlakatla) expect the wetland function compensation to account for and address the effects that occur, and that there will be monitoring of its effectiveness.

There are federal policies for wetland conservation, migratory birds, and species at risk on federal lands which apply to the VPC Project. Considering this, the above analysis, Table of Conditions and the federal Section 67 Determination, the EAO concludes that the VPC Project would not have significant adverse effects on Vegetation, Wetlands, Wildlife Habitat, and Wildlife.

11. FRESHWATER FISH AND FISH HABITAT

11.1 BACKGROUND

This chapter assesses potential impacts to the Fish and Fish Habitat VC due to the VPC Project.

The following sub-components were selected for the Freshwater Fish and Fish Habitat VC assessment:

- Groundwater and surface water quality; and
- Freshwater fish and fish habitat.

The VPC Project is located on Ridley Island, on federal lands administered by the PRPA. The Application identified the federal and provincial legislation and policy used to guide the assessment of potential adverse effects on freshwater fish and fish habitat. The federal regulatory guides included:

- *Canadian Environmental Protection Act* (1999);
- *Fisheries Act* (1985);
- *Species at Risk Act* (2002);
- *Migratory Birds Convention Act* (1994); and

- A Protocol for the Derivation of Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 2007);

The provincial regulatory guides included various standards and practices for collecting data and assessing effects, such as:

- Fish Collection Methods and Standards, 4.0 (Resources Inventory Committee, 1997);
- Overview Fish and Fish Habitat Assessment Procedure (Resources Inventory Committee, 1999);
- British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture. Summary Report (B.C. Ministry of Environment, 2017).

SPATIAL

The LSA is the Vopak Land Lot area and includes the path of surface watercourse flowing out of the VPC Project area. The RSA includes all the freshwater bodies on Ridley Island.

TEMPORAL BOUNDARIES

Vopak reported that the VPC Project will:

- Take two years to construct;
- Operate for a minimum of 50 years, but that the maximum number of years is not known as that would be dependent upon market conditions; and
- Take 12 months to decommission.

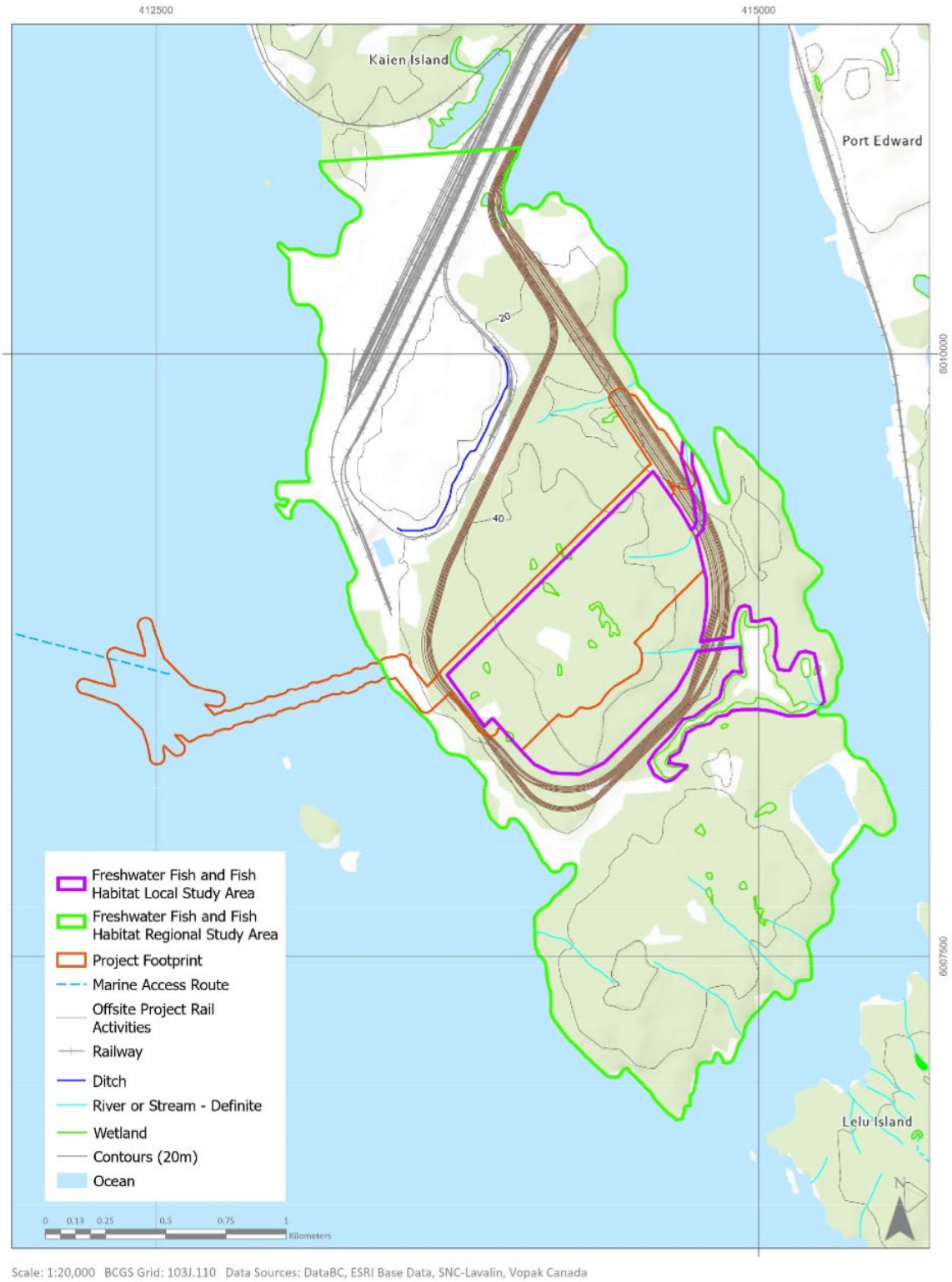

Figure 10: Spatial boundaries for the Freshwater Fish and Fish Habitat VC

11.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

This section provides an overview of potential effects and proposed mitigations identified in the Application.

Baseline information on freshwater fish and fish habitat, study methods and results are provided in the Application (Section 5.7 and Appendix 5.7-A).

The LSA consisted of an extensive sphagnum (peat moss) bog, located in the centre and southern portions of Ridley Island, and a number of freshwater ponds that were located outside the bog ecosystem within the LSA. Vopak's field studies determined that all eight sites sampled for fish in the bog complex did not have fish present, likely due to poor water quality, including acidic conditions, and being mostly stagnant shallow water. Of the two freshwater wetlands that were sampled on the periphery of the bog, both were determined to have fair habitat and water quality for fish but only one was found to contain fish which was located in the middle of the island near the southern-most point of the LSA. This was found to contain only threespine stickleback (*Gasterosteus aculeatus*). The freshwater wetlands did not have direct connectivity to other watercourses nor the ocean but were connected to the ocean prior to the area being developed.

One stream (referred to as the southwest stream) that flows near the VPC Project but is outside of the LSA was included in the assessment at the request of members of the Working Group. The southwest stream flows directly into Chatham Sound and was considered a potential habitat for salmon with fair overwintering, spawning, rearing and migration potential. Fish sampling in the stream found threespine stickleback and pacific staghorn sculpin (*Leptocottus armatus*). Vopak noted that less than 10 percent of the average flow in the southwest stream is expected to have originated from the LSA.

CONSTRUCTION

Project construction would affect groundwater and surface water quality due to site clearing, site grading, blasting, fill and construction of the VPC Project facilities. The cutting and removal of trees and brush, draining of water, and stripping of organic and soil material would all result in the exposure of sediments. The exposed sediments could enter watercourses through sediment run-off and erosion during heavy rain events. Also, the stripping of organic material and vegetation, and construction of the VPC Project facilities on land would alter the hydrology of wetlands within and potentially adjacent to the VPC Project footprint.

Effects to freshwater fish and fish habitat during construction are related to activities that would result in the alteration, loss, or degradation of fish habitat, or cause fish mortality. The potential direct effects to freshwater fish and fish habitat would be specific to the small, isolated open water freshwater wetland. The identified potential direct effects to fish and fish habitat were the loss of habitat due to the placement of any materials proximate to where the isolated fish were observed, and physical injuries to fish due to blasting. Potential indirect effects included changes to water quality should soils be placed near the open water wetland. The indirect effects to fish habitat could also occur in the southwest stream in the RSA.

OPERATIONS

There is the potential for effects to groundwater, surface water and fish habitat quality during operations from general terminal maintenance and storm water management. There could be a release of deleterious substances (e.g., fuel, oil) during operational maintenance work. Run-off during heavy rain events could occur if imported sediments (including sands and gravels) are left exposed during maintenance activities.

DECOMMISSIONING

Alterations to groundwater and surface water quality and fish and fish habitat could occur from the removal of tanks, buildings, and utilities infrastructure. Removal of this infrastructure could disturb organic material that would have built up around the infrastructure, such as nutrients, sediment, or contaminants, in turn affecting the groundwater and surface water quality, and fish and fish habitat.

The Application proposed a number of mitigation measures including:

Construction:

- Design VPC Project footprint to avoid freshwater streams, ponds and other water bodies, where possible;
- Use erosion control devices (e.g., silt fences, berms, ditches) and erosion protection (e.g., mats, staking, re-sloping);
- Use blasting mats to minimize the generation of dust during blasting, and blasting charges used will be sized to avoid potential percussion injuries to sticklebacks within freshwater wetland in LSA;
- Identify areas for temporary stockpiling and dewatering of overburden, which will be located well away from surface water bodies;
- Place all soils in an existing organics storage area on Ridley Island designated by PRPA;
- Establish setbacks around water bodies; conduct water quality monitoring; employ dust control measures; limit the extent of temporary disturbance; conduct progressive reclamation, where possible, and re-vegetation of disturbed areas; and
- Prohibit fuel and hazardous materials to be stored or refueled within 30 m of a freshwater body.

Operations:

- Design and construct chemical storage, transport, containment facilities and pipelines to meet appropriate standards and regulations. Pipelines will be visually inspected on a regular basis. Spill prevention measures will be implemented at transfer points avoiding contamination to surface water or groundwater; and
- Water quality in both storm water lagoons would be monitored prior to discharge into the existing PRPA Rail Road Utility Corridor drainage system.

Decommissioning:

- Restore surface drainage conditions to a state that is congruent with the surrounding water management environment by re-creating the manmade ditches across the footprint to the depth of the surface water.

11.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

TEMPORARY STOCKPILING LOCATIONS

ECCC recommended that Vopak provide information on temporary stockpiling activities, specifically:

1. The proposed or potential location(s) of temporary stockpiling and dewatering of overburden, and of temporary stockpiling and storage of imported fill;
2. Clarify where run-off from stockpiling and water from dewatering will enter the receiving environment; and
3. Identify measures that would be in place to ensure that run-off from stockpiling and discharge from dewatering would not have an effect on aquatic receptors.

> Vopak responded that the proposed locations for the temporary stockpiling of materials during construction would be on VPC Project areas which are not on the critical path for construction. As materials are required or placed, they would be taken or stored close to the area where they are required, should foundations or equipment not be in place. This would minimize effort in moving materials around the site. The main areas would be the methanol and clean petroleum products tank pit areas, the liquefied petroleum gas refrigeration area, and the pressurized storage bullet area. The blasting and civil works in these areas would be among the first activities at site, making them ideal stockpile locations.
>
> These areas would be part of the VPC Project's developed area and would be sloped in a way that water would follow the intended drainage paths of the VPC Project. Vopak would monitor all project discharges, including monitoring water quality in the lagoons prior to discharge into the RRUC drainage system, and implement adaptive management as needed.

ANTICIPATED STORM WATER RUNOFF MODELLING

Gitxaala requested more information on how much stormwater runoff was used to determine mitigation measures for the VPC Project. Gitxaala commented that the assessment contained no information regarding the amount of surface water or stormwater to be used in determining the appropriate level of planning. Gitxaala also requested that Vopak provide details specific to commitments to be included in management plans to ensure that mitigation is effective and integrated before a determination on the potential effects of the VPC Project could be made by Federal, Provincial, and Indigenous decision-makers.

Vopak responded that they chose mitigation that was technically and economically feasible, as well as being applicable to the VPC Project and followed the EAO guidance. The Application identified uncertainty and timing related to the effectiveness of the identified mitigation measures. Mitigation specific to freshwater fish and fish habitat has been demonstrated to be effective in similar situations, and Vopak believed it would be effective for the VPC Project. Vopak would also implement monitoring and follow-up programs, as proposed in the Application.

At this stage of VPC Project planning, specific details of the management plan have not yet been determined. Additional details might include commitments to stop-work requirements, inclusion of adaptive management processes, and the use of independent monitors during construction.

Vopak will engage with relevant government agencies, Indigenous nations and the Working Group members on the development of the management plans described in Section 10 of the Application.

LIMITED TIMING OF SAMPLING

Kitsumkalum noted that the timing and duration of field sampling is important as the larger tides, especially with heavy precipitation, can create connectivity for fish species from tidal waters to non-fish bearing watercourses in and around Prince Rupert. Kitsumkalum also commented that more field sampling would be of benefit and that a spring and summer survey within a one-year period does not capture the true baseline data.

ECCC recommended that Vopak provide a rationale as to how the existing data captured seasonal variation in the LSA, given that limited surface water baseline sampling was conducted.

Vopak responded that the information outlined in the Working Group-approved work plans for the Freshwater Fish and Fish Habitat VC noted that sample periods would follow seasonal conditions, and the 2019 data did reflect the freshet (that is, the flooding of the river due to heavy rains or melted snow) (mid-June 2019) and low flow seasons (late August 2019) as required. The water quality data was used to corroborate pre-existing data for the LSA, demonstrating the new data did reflect current conditions.

The seasonal variation data from the LSA showed that lower temperatures and higher dissolved oxygen levels were observed during freshet, and higher temperature and lower dissolved oxygen levels occurred during late August, the low flow period.

Vopak acknowledged that additional field sampling would be of benefit however, it had met the requirements of the AIR. Based on the types of fish fauna, types of habitat, and lack of habitat connectivity, additional surveys were not required to characterize the Freshwater Fish and Fish Habitat LSA.

The freshwater surveys covered all potentially fish-bearing water bodies in the LSA and fishing effort was applied at two different times of the year. These water bodies were connected through groundwater only, with no potential for fish migration between them or to the ocean.

Vopak noted that the fish presence/absence results for freshwater wetlands sampled in 2019 were consistent with previous findings and identified only the freshwater wetland in the middle of the island near the southern-most point of the LSA as a fish-bearing freshwater wetland. All other existing freshwater wetlands and ephemeral freshwater streams throughout the area were rated as poor fish habitat due to water quality parameters below the protection of aquatic life guidelines, low habitat complexity, and lack of connectivity to other watercourses. Previous studies have also indicated Ridley Island contains unsuitable fish habitat, particularly in the bog ecosystem.

CHARACTERIZING RESIDUAL AND CUMULATIVE EFFECTS (MEMO)

Both Gitxaala and Kitselas requested a residual and cumulative effects analysis be done for any identified negligible effects that were not zero for the Freshwater Fish and Fish Habitat VC.

Vopak provided a memo that included a summary of residual effects characterizations and a cumulative effects assessment for the effects of both construction and operations activities on freshwater fish and fish habitat. In the memo, no additional mitigations were proposed by Vopak.

SETBACKS

Kitselas and Metlakatla both noted that while Vopak committed to establishing setbacks around freshwater bodies prior to construction, no information was provided on the distance of the setbacks or what guidelines might be used to establish the setbacks. Both Indigenous nations requested that this information be provided to complete the effects assessment.

Vopak responded that typical construction setbacks from water bodies are 15 m but may vary based on available space from infrastructure. Standard best practices for sediment and erosion control will be employed in concert with the setbacks.

Vopak also clarified in a memo to Metlakatla that Vopak has committed to preestablishing setbacks according to the guidance outlined in the BC Riparian Areas Protection Regulation and associated methods manual.

ROAD MAINTENANCE

Lax Kw'alaams requested that Vopak confirm whether road maintenance activities were evaluated in the assessment. Road maintenance might include patching and filling of potholes, which could introduce additional hydrocarbons into the environment, brushing and grubbing and pesticide control on the edges of the roads, brushing and grubbing can lead to increased erosion events which would increase sediments inputs and pesticide inputs into the water. Over the proposed life of the VPC Project, these inputs can accumulate and could potentially have negative impacts on the environment.

Vopak confirmed that these specific issues were evaluated under general terminal operations. The VPC Project operations could have an effect on groundwater and surface water quality from general terminal operations, such as the potential release of harmful substances. As a result, the potential adverse VPC Project-related effect was carried forward to the effects assessment. With

successful implementation of mitigation, no residual effects were identified. Therefore, the potential residual effect was not carried forward.

Lax Kw'alaams considered the issue closed during a meeting with EAO but continued to note that there is the possibility for an underestimation of potential effects.

11.4 THE EAO'S ANALYSIS AND CONCLUSIONS

After considering the proposed mitigation measures and conditions, the EAO concludes that the VPC Project will result in the following residual adverse effect on Freshwater Fish and Fish Habitat:

- Effects to freshwater fish and fish habitat during construction and operations.

Table 21: Summary of residual effects for freshwater fish and fish habitat.

Criteria	Assessment Rating	Rationale
Context	High resilience	Freshwater fish and fish habitat that could be affected by the VPC Project activities during construction and operations are resilient to changes from baseline conditions.
Magnitude	Low	Minimal alteration to fish and fish habitat would be expected during the VPC Project construction and operation activities.
Extent	Site specific	Restricted to the VPC Project components footprint and immediate adjacent areas during construction and operations.
Duration	Construction: Short term Operations: Long term	Effects of a disturbance would be temporary, and the area is anticipated to return to pre-construction conditions within two years of a disturbance. The construction phase is expected to last 2 years while the operations phase is expected to last minimum 50 years.
Reversibility	Reversible	The habitat is anticipated to return to pre-construction conditions before or after decommissioning phase.
Frequency	Rare	Effects to freshwater fish and fish habitat will occur rarely during the VPC Project construction and operation phases.
Likelihood	There is a low likelihood of this effect occurring given the limited extent of the fish habitat and the proposed mitigations.	
Significance Determination	In consideration of the above assessment and the mitigations proposed, the EAO concludes that the VPC Project will not have a significant adverse effect on freshwater fish and fish habitat.	
Confidence	The EAO has a high confidence in the above assessment. While there remains minor uncertainty regarding the predicted effectiveness of the proposed mitigations, the Indigenous nations will be reviewers on management plans under federal jurisdiction and the EAO understands that their development will be conditional requirements of the PRPA authorization.	

11.5 CUMULATIVE EFFECTS ASSESSMENT

Vopak identified three other projects whose residual effects have the potential to interact cumulatively with the VPC Project's residual effects to the Freshwater Fish and Fish Habitat VC. These three projects are located within the Freshwater Fish and Fish Habitat VC RSA and have proposed construction components potentially resulting in changes to freshwater fish and fish habitat quality.

Vopak identified that while there is potential for temporal overlap of residual freshwater fish and fish habitat changes from residual effects at other projects, there is no potential for spatial overlap. The low magnitude changes to fish and fish habitat will be localized to the VPC Project footprint and the nearest proposed project is approximately one km away, and the threespine stickleback found in the wetland is completely isolated.

Given the low magnitude, rare frequency, and site-specific extent of the predicted residual effect and isolation of this fish bearing freshwater wetland, as well as Condition 9 (Cumulative Effects Management) requiring Vopak to participate in initiatives related to the monitoring, assessment and management of the VPC Project's cumulative effects, the EAO concludes that there will not be significant residual cumulative effects to freshwater fish and fish habitat during Construction and Operations of the VPC Project from the interaction of the VPC Project with other reasonably foreseeable projects. The EAO lower confidence in this aspect of assessment as the Vopak cumulative effects assessment did not include the recently proposed Ridley Island Export Logistics Platform which includes changes to the existing Rail Road Utility Corridor and which might impact the fish bearing wetland.

11.6 CONCLUSIONS

Considering the above analysis and the Table of Conditions and the federal Section 67 Determination, the EAO concludes that the VPC Project would not have significant adverse effects on Freshwater Fish and Fish Habitat.

12. SOCIAL AND ECONOMIC EFFECTS

12.1 BACKGROUND

Potential economic and social effects related to the VPC Project were assessed as they are deemed to be important by Indigenous nations, the public and other stakeholders. The following four Value Components (VCs) were selected:

- Economic Conditions;
- Community Services and Infrastructure;
- Community Well-Being; and
- Marine Use and Navigation.

Table 22: Valued Components and Indicators and/or Factors for Assessment

Valued Component	Indicators	Linked VCs
Economic Conditions	• Economic activity (e.g., employment, source of basic income, business counts) • Employment (e.g., unemployment rate, labour force, participation rate, wages, education level) • Population income (e.g., median income, prevalence of low income) • Local government revenues and financial burdens. • Consumer access to goods and services (e.g., diversity of local chamber of commerce membership)	• Community Services and Infrastructure • Community Well-Being
Community Services and Infrastructure	• Population and demographics • Demand and supply of infrastructure and services (e.g., health care usage rates, government investment) • Core housing need indicators (e.g., affordability, adequacy, suitability, vacancy rates)	• Economic conditions • Community Well-Being • Human health
Community Well-Being	• Indicators for Community Well-Being will be based on those used in linked VCs • Community Well-Being is a function of peoples' physical and mental health as well as their social, economic and environmental health. The Community Well-Being VC will rely on indicators used by the other VCs	• All other VCs are linked to the Community Well-Being VC sections of Part B

Marine Use and Navigation	• Extent and area of navigable channel and/or safety zone affected by the VPC Project • Shipping traffic in Prince Rupert harbour • Marine vessel types • Data on marine uses along shipping channel (i.e., fishing, commercial, recreational, and Indigenous fisheries and aquiculture) • Data on other uses (e.g., recreational boating routes, marine park locations	• Visual Quality • Marine Resources • Community Well-Being • Human Health

ECONOMIC

The Economic Conditions VC is related to and compared to several government requirements, including:

- Guidelines for Socio-Economic and Environmental Assessment - Land Use Planning and Resource Management Planning;
- Ministry of Jobs, Trade and Technology 2019/20 - 2021/22 Service Plan; and
- Ministry of Labour 2019/20 - 2021/22 Service Plan.

SOCIAL

The three social VCs are related to and have been compared to several government requirements, including:

- Northern Health Authority's Health and Medical Service Plan Best Management Guide for Industrial Camps;
- *Public Health Act*;
- *Fisheries Act;*
- *Emergency Health Services Act*;
- *Canada Shipping Act*;
- *Canadian Navigable Waters Act; and*
- *Canada Marine Act.*

The temporal boundaries for the assessment of Economic Conditions, Community Services and Infrastructure, Community Well-Being and Marine Use and Navigation included a two-year construction period, an operation period from a minimum of 50 years, and a decommissioning period of one year (with consideration of lag effects up to five years).

ECONOMIC

The RSA and LSA for the assessment of Economic Conditions consisted of the communities within the mainland portion of the North Coast Regional District and Kitimat-Stikine Regional District. Within these districts, the assessment focused on Prince Rupert, Port Edward, and nearby communities with close

economic ties to Prince Rupert and Port Edward, including Terrace but also outlying communities accessible by boat from Prince Rupert, including Metlakatla, Lax Kw'alaams, Gitxaala, Kitselas, Kitsumkalum and Gitga'at (see Figure 11).

SOCIAL

The Community Services and Infrastructure LSA consisted of communities of Port Edward and Prince Rupert (including Prince Rupert Airport), Highway 16 up to and including Northwest Regional Airport (Terrace, Kitimat) and Mills Memorial Hospital (Terrace). The RSA encompasses the North Coast Regional District and Kitimat-Stikine Regional District, as well as the LSA (see Figure 12).

The Community Well-Being, Marine Use and Navigation RSAs and LSAs consisted of the communities inside the mainland portion and the North Coast Regional and Kitimat-Stikine Regional Districts. Within these districts, the assessment focused on Prince Rupert, Port Edward, and nearby communities with close economic ties to Prince Rupert and Port Edward (see Figure 11 and Figure 12).

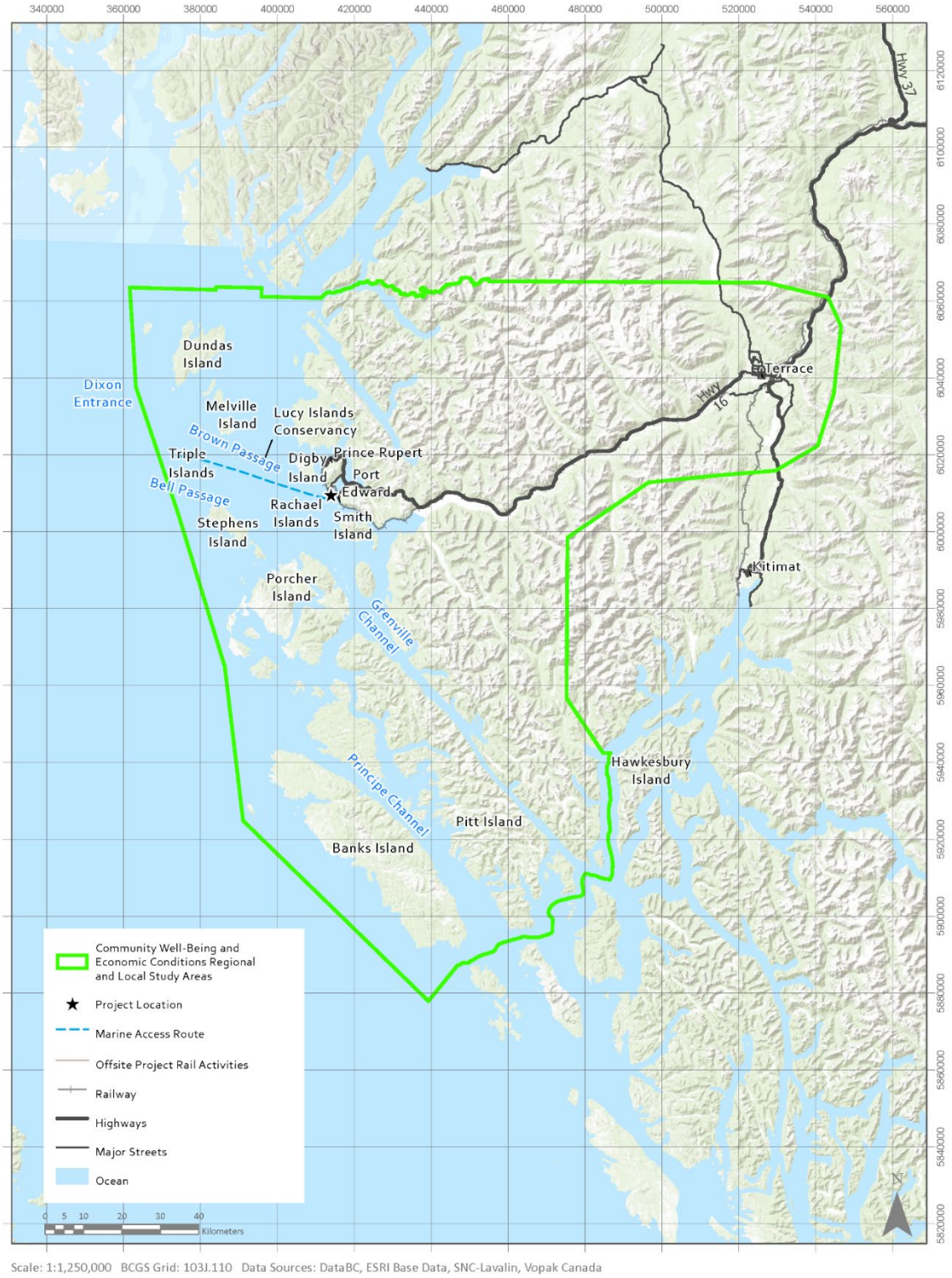

Figure 11: Community Well-Being and Economic Conditions Study Area

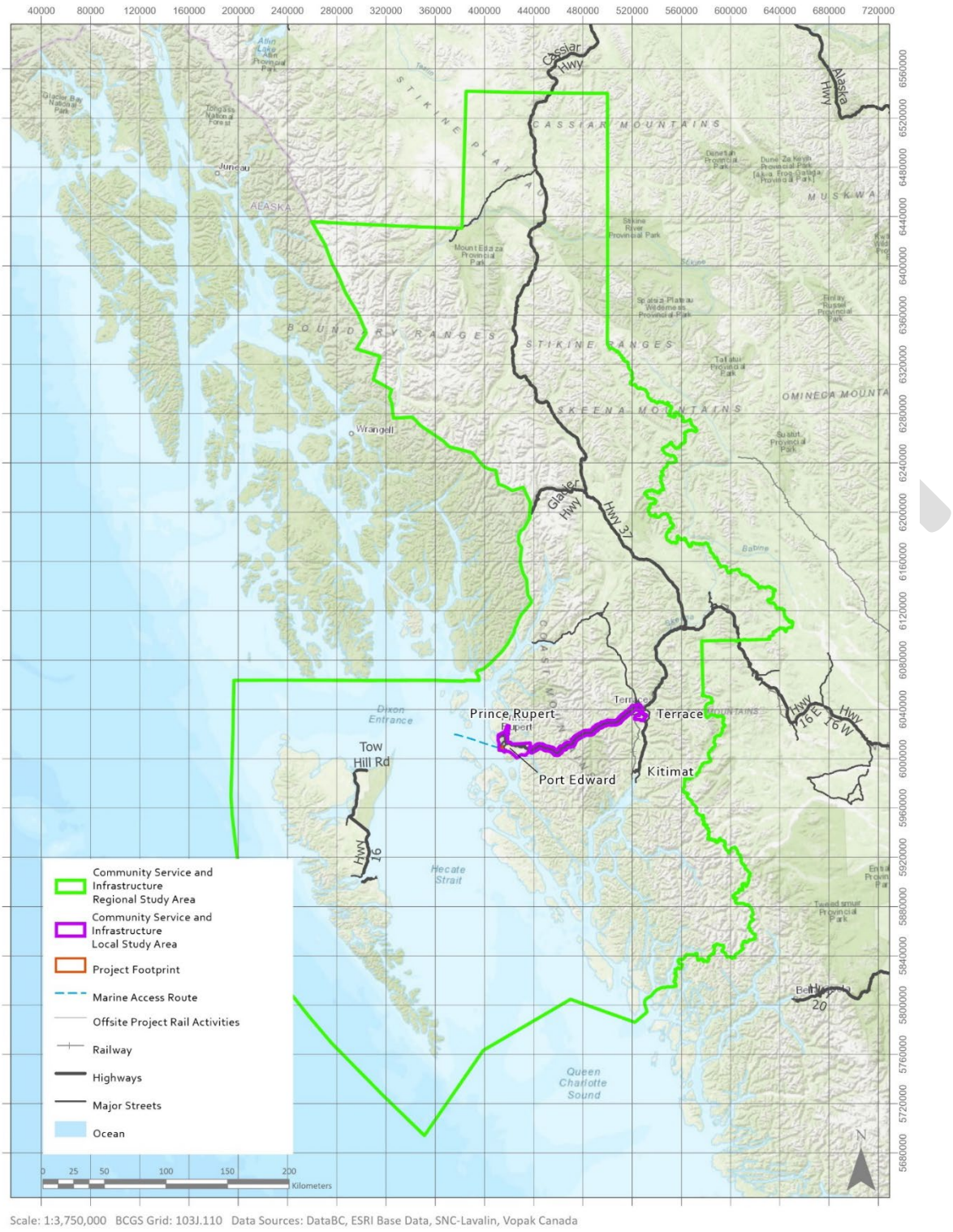

Figure 12: Community Services and Infrastructure Area

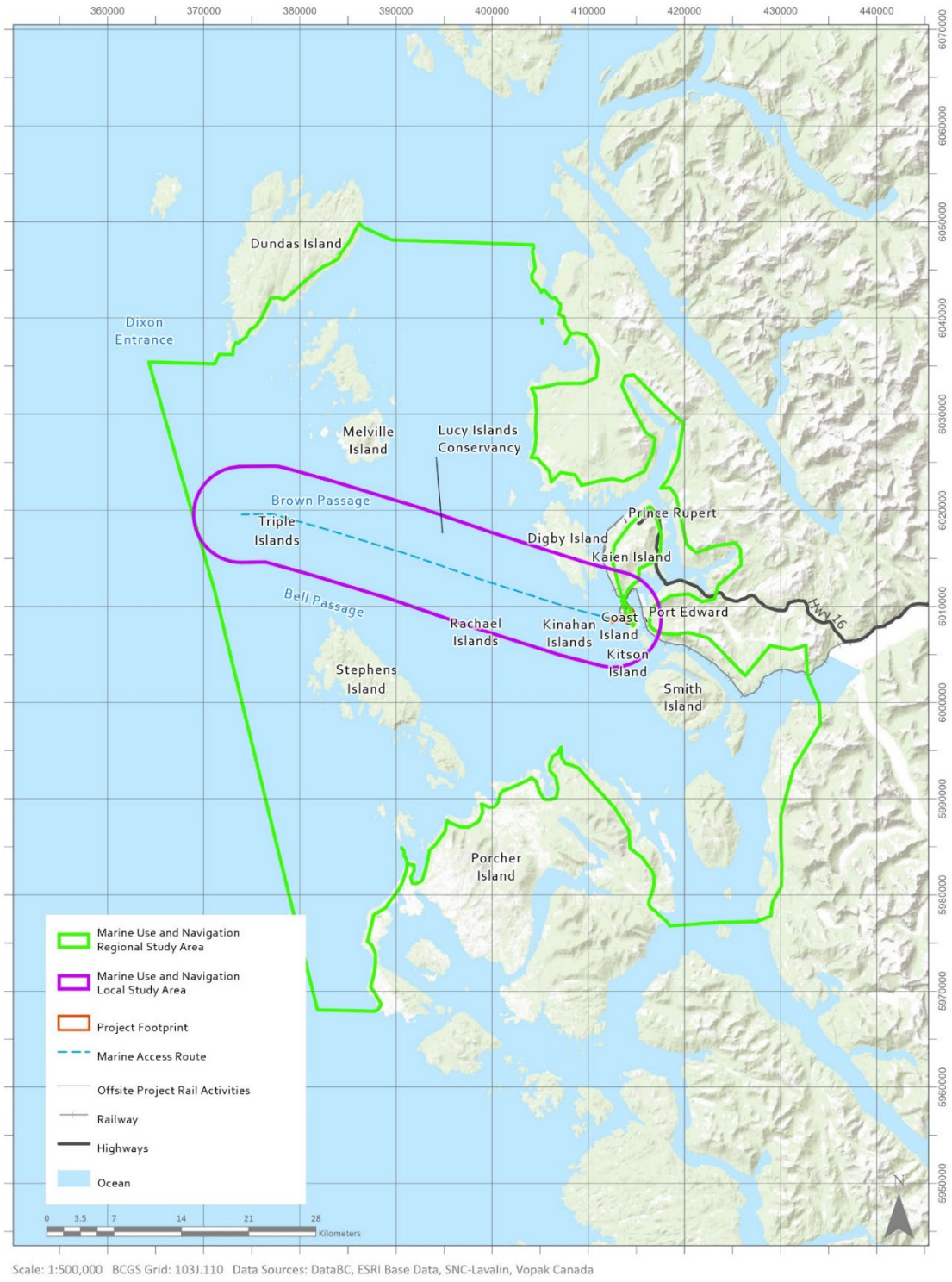

Figure 13: Marine Use and Navigation Area

12.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

The baseline was informed by primary and secondary sources of data. Primary data included interviews conducted by the proponent. Secondary data included census and other statistical data, information from past EAs and relevant studies, local government Official Community Plans and other relevant information. The baseline information used to develop the effects assessment of economic and social conditions is listed in Section 13 of the Application.

Traditional Knowledge and Traditional Land Use was primarily obtained from studies completed by Indigenous nations for the VPC Project, supported by information obtained through Indigenous engagement, and through publicly available secondary sources. This information was used in the assessment of economic and social conditions.

ECONOMY

In the Application, Vopak noted that historically, the economy of the region has been based in natural resource extraction primarily fishing and forestry. More recently, the economy has shifted towards shipping, tourism and major resource project development, but is still heavily focused on natural resources. The Port of Prince Rupert is a key port for western Canada and North America and is linked to major centres by rail. Fishing remains important in the region, and major project development (e.g., LNG Canada, Coastal Gas Link) is currently a substantial economic driver.

SOCIAL

In the Application, Vopak referenced a 2015 City of Prince Rupert report that stated the municipality would like to attract new industry but voiced concerns that its infrastructure was already depleted, and without significant upfront funding, industry growth would not be viable. The report also noted the results of a 2015 survey of member municipalities, which estimated significant increases in costs if major projects occurred nearby.

The Application stated that the region has very limited excess rental housing supply with almost half of Terrace residents renting and spending 30% of income or more on rent. At this point there is very limited capacity for renters, and the options available are often furnished properties to target project workers. Prince Rupert, Terrace and Prince Edward each recently completed studies confirming the low supply of rental properties, and the negative effects that project workers have on local low-income earners and seniors in need of rental properties. The Town of Prince Rupert suggests there is one project worker living in town for every three living in a camp. To assist current housing challenges, new seniors housing projects are under construction in Prince Rupert, Port Edward and by the Metlakatla First Nation to reduce impacts from project workers living in nearby communities.

The Application noted that in 2019, 574 commercial and cruise vessels docked in Prince Rupert, there were 2080 BC Ferries roundtrips to Digby Island and approximately 230 BC Ferries sailing as part of coastal routes. The Indigenous nations located in the region, as discussed later in Part C, generally use the travel

routes for access to marine and terrestrial harvesting locations, cultural sites and to maintain connectivity between communities. Local commercial fisheries, managed by the DFO, take up less than 0.01% of the RSA and 0.06% of the LSA. Vopak stated that interviewees noted minimal recreational fishing occurs in the VPC Project area. Indigenous nations voiced concerns regarding access to resources with limited ability to access former travel routes. Interviewees believed that the proposed VPC Project area is not used for tourism and recreation purposes.

ECONOMIC CONDITIONS

Vopak identified several potential effects to the Economic Conditions VC during all phases of the VPC Project.

The two potential effects during Construction are:

- Changes to employers' financial well-being as a result of potential labour competition; and
- Changes to consumer access to goods and services.

The two potential effects during Operations are:

- Changes in labour competition which could affect local businesses; and
- Changes in consumer access to goods and services.

The four potential effects during Decommissioning are:

- Eventual loss of employment after many years of operation-related employment;
- Eventual loss of business activity after many years of operation-related activity;
- Eventual loss of spin-off economic activity after many years of operation-related employment; and
- Contraction in the region's business community, with associated effects on consumers and their access to goods and services, and possibly the redirection of local businesses to consumers.

COMMUNITY SERVICES AND INFRASTRUCTURE

The three potential effects during Construction are:

- Effects on rental housing availability and pricing;
- Changes in health care quality; and
- Changes to traffic volume and safety.

The one potential effect during Operation is:

- Changes to traffic volume and safety.

The one potential effect during Decommissioning is:

- Changes in health care quality.

The Application stated that the approximately 250 workers required per year during construction will place

an incremental demand on health care resources through accidents, communicable disease outbreaks at the work site or work camp and day-to-day health care needs - despite supports provided by Vopak and the work camp operator. Vopak anticipates a total of 39 and 125 workers per year, respectively, during operation and decommissioning, which will again increase the demand on the health care resources.

With respect to effect on rental housing, the Application estimated that during the construction phase, approximately one-third of the construction workforce (approximately 70 workers) will be obtained from the region's labour supply. Approximately 180 temporary construction workers will be drawn from outside of the region. This is expected to be comparable in magnitude to the range of historical annual variation. During operation and decommissioning Vopak anticipates a required nine and approximately 63 of the workers, respectively, to be drawn from outside of the region.

The potential effect on traffic volume and safety was raised during both construction and operations. LNG Canada has identified a 26% rise in traffic between Terrace and Kitimat associated with their project in Kitimat, and former major projects in the Kitimat and Terrace areas have also been associated with increases in traffic. While traffic concerns have been raised for the region in the past, there are fewer road crashes than the province-wide average and the increase in highway traffic from the VPC Project will be minimal (2.6 to 3.2%). The local RCMP projected little impact from increased populations on the road traffic near Terrace.

COMMUNITY WELL-BEING

The Application assessed the impact on Community Well-Being during each of the VPC Project stages. Vopak determined through this assessment that all construction, operation and decommissioning activities had the potential to affect Community Well-Being. In addition, Community Well-Being could be affected by potential accidents and malfunction in any of the three phases of the VPC Project.

The potential project effects for the activities in each of these phases were as follows:

- Effect of all VPC Project phases on well-being outcomes;
- Change in economic and social, environmental and cultural factors of well-being; and
- Effects from potential accidents and malfunctions.

With respect to potential accidents and malfunctions, Section 6: Assessment of Potential Accidents and Malfunctions of the Application provides an assessment of effects.

MARINE USE AND NAVIGATION

The two potential effects during Construction are:

- Change in marine use; and
- Change in navigation.

The three potential effects during Operation are:

- Change in marine use;
- Change in navigation; and
- Effects of wake waves.

The three potential effects during Decommissioning are:

- Change in marine use; and
- Change in navigation.

The Application determined the change in marine use during construction will occur due to construction of the marine jetty and birth. During operation three activities will affect marine use: vessel berthing, cargo loading, and associated off-site rail and shipping activities. Lastly, during decommissioning removal of jetty (e.g., topside and piles), unless the facility is leased to another company, would affect marine use.

Navigation was identified in the Application as having the potential to be impacted by construction of the marine jetty and births during all phases. As part of the construction phase, construction of the marine jetty and berths will both affect navigation. Vessel berthing, cargo loading, and associated off-site rail and shipping activities will all affect navigation during operation. During decommissioning, navigation will be affected by the removal of the jetty topside.

In addition, Marine Use and Navigation could be affected by potential accidents and malfunctions in any of the three phases of the VPC Project; Section 6: Assessment of Potential Accidents and Malfunctions of the Application provides an assessment of effects. The EAO's Assessment of effects for Accidents and Malfunctions can be found in Section 15 of this Assessment Report.

The primary mitigation measures that have been proposed in the Application to address the potential effects to Economic Conditions, Community Services and Infrastructure, Community Well-Being and Marine Use and Navigation effects are provided below in Table 23:

Table 23: Mitigation Measures to Address Potential Effects to Valued Components

Valued Component	Potential Effect	Mitigation Measures
Economic Conditions	• Consumer access to goods and services	• Engage with local chambers of commerce
	• Financial well-being of businesses	• Work with local and Indigenous employment entities to communicate where to find employment and training opportunities • Engage with local chambers of commerce • Develop a local content strategy to increase the potential of local Indigenous and local community businesses being involved on/employed by the VPC Project • Provide cultural awareness training for employees with respect to Indigenous culture, in alignment with the six Tsimshian nation Working Group members • Participate in local career fairs
	• Loss of employment, business activity and economic activity during and/or after decommissioning	• Clearly communicate anticipated timing of decommissioning to facilitate: ○ suppliers' ability to plan for loss of Vopak's purchases ○ local governments' ability to plan ○ engage with chambers of commerce to address concerns
Community Services and Infrastructure	• Effects on rental housing	• Use a work camp for its staff and contractors • A 14-day working, 7 days off work schedule • Engage with government and housing stakeholders • Financial support for social housing
	• Effects on the health care service quality	• Require and support work camp operators' adherence to health-related laws and policy and safety practices • A 14-day working, 7 days off work schedule • Provide health care in the work camp and encourage home community care use • Plan for demands on local services and infrastructure • Prohibition of alcohol and other drugs • Require work camp operators to prohibit workers to leave the camp unless there is an emergency • Develop plans to discuss opioid overdose • Develop and implement measures to reduce and contain communicable disease outbreaks and other health issues • Include specific protocols related to COVID-19 (while pandemic considerations remain active)

	• Effect on traffic volume and safety	• Construction Traffic Management Plan to manage traffic volume and safety on PRPA lands • Require work camp operators to prohibit workers to leave the camp unless there is an emergency • Mandatory use of shuttle buses to and from the work camp • Reduce traffic volume by maximizing usage of barges and rail to transport materials/equipment used during construction Prohibition of alcohol and other drugs
Community Well-Being	• Effect on well-being outcomes	• Hire an Indigenous liaison • Use a work camp for its staff and contractors • A 14-day working, 7 days off work schedule • Engage with governments and housing stakeholders • Financial support for social housing • Planning for demand on services and infrastructure • Prohibition of alcohol and other drugs • Provide health care in the work camp and encourage home community care use • Require work camp operators to prohibit workers to leave work camp unless there is an emergency • Develop plans to discuss opioid overdose • Mandatory use of shuttle buses to and from work camp • Use of barges and rail to transport materials/equipment used during construction
Marine Use and Navigation	• Change in marine use	• Develop and implement a Marine Access and Vessel Communications Plan and a Light Management Plan • Authorizations from the PRPA will be required for any construction, works, demolition or development • Usage of the marine safety zones under jurisdiction of the PRPA during construction • Clearance under trestle spans that is sufficient to allow for continued navigation of smaller vessels (e.g., kayaks) • Transit speed to be in accordance with the PRPA and Collision Regulations • Mitigation included as measures for Ambient Light in Section 5 of the Application • Install navigational aids on jetty structures • Use escort vessels to confirm the route is clear and safe • Use tugboats for safe transit and berthing

	• Wake waves	• The wake waves of the large vessels and their escort tugs travelling to and from the VPC Project were estimated in the Application to be well within the range of naturally generated wind waves. Vessel speed will be reduced as they approached shoreline and the estimated wake produced is not expected to affect the shoreline
	• Change in navigation	• The same mitigations as listed above for change in marine use • Require vessels to establish and maintain radio communication with the Canadian Coast Guard's marine communications and traffic services • Vopak to vet vessel specifications in advance

12.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

ECONOMIC CONDITIONS

The following key issues related to Economic Conditions were identified, based on the EAO's review of the Application and with feedback from members of the public, the Working Group, ECCC and Indigenous nations:

ASSURANCE OF LOCAL EMPLOYMENT

Several Indigenous nations would value for Vopak to set employment targets for each project phase in order to drive both Vopak and its sub-contractors to maximize local benefit, and, to reduce the social-economic impacts of transient worker numbers. Vopak was asked to provide additional detail on how they and their subcontractors intend to meet the projected local uptake by phase.

Vopak responded that their employment process would be the same in each phase of the VPC Project. Additionally, Vopak would look at skills and training opportunities to increase the potential ratio of local involvement in the VPC Project. Vopak anticipates that around 30% or more of the construction workforce and 77% of the operations workers respectively will be from the local region.

Furthermore, Vopak stated they are willing to set local employment targets, but that these targets would need to be informed by additional information gathering prior to each phase.

In the Application, Vopak stated they would implement a Training Management Plan which will train Indigenous and other local people for jobs. In addition, this plan would include other initiatives such as career fairs, an intent to work with local employment services and actions to

establish cultural awareness training for employees with respect to local Indigenous/Tsimshian culture.

INCREASE IN MARINE TRAFFIC

Concern was expressed by Indigenous nations and the broader Working Group regarding impacts to tourism and marine activities (recreational and commercial fishing) and the increase in marine traffic, as the Application states that there would be no meaningful effects. The Application also suggested that the importance of marine tourism has grown over time. It was unclear why Vopak believed marine tourism and activities would not be impacted and/or reduced by the VPC Project.

Vopak responded to this concern by stating that the economy of the region was shifting "more towards shipping, tourism, and major project development" and away from natural resource extraction. This meaning that growth in all three economic sectors could occur independently. Vopak stated that marine tourism may be affected by the VPC Project, however, it was determined in the Application that, while labour competition will raise costs to business and may result in a small amount of expansion, this will be offset by the potential net benefits to business and increased revenues, therefore a "meaningful effect" is not expected.

Vopak noted that Section 5.9.1 examines fishing in detail and concludes no significant impact; therefore, not requiring further consideration of effect to recreational and commercial activities.

IMPACT ON LOCAL BUSINESSES AND TRADITIONAL ACTIVITIES

The broader Working Group and Indigenous nations raised concerns that Vopak has low confidence in the ability to gauge effects on local businesses and traditional activities. Vopak was asked to explain their potential impact on local businesses or Indigenous nations' economies (e.g., harvesting, sharing and trading of traditional goods). Vopak was also asked if it will establish Supplier Engagement Workshops to proactively connect with interested businesses.

Vopak responded that their characterization of low confidence was because the evidence available to assess potential effects on businesses was limited and/or was low in consistency. However, Vopak remains committed to maximizing local participation on the VPC Project, including feasible purchasing from local suppliers. Vopak is a member of the Prince Rupert Chamber of Commerce and has regularly engaged with the Executive Director and Directors there. Vopak plans to engage the local business community to better understand what services are available, those businesses' individual capacity, and the forms of communication that would be most effective to provide updates and receive feedback.

Vopak reiterated its commitment to the specific mitigation measures listed in the Application that are designed to avoid or minimize potential socio-economic effects. Vopak asserts that the socio-economic effects of the VPC Project are the result of many interrelated factors, not all of which relates to the VPC Project. Vopak intends to establish an internal committee, the Community Services and Infrastructure Committee, which would be composed of at least two Vopak representatives, and multiple community representatives (e.g., municipalities of Prince Rupert and

Port Edward, representatives of local businesses, local residents, Indigenous nations, Northern Health, First Nations Health Authority, emergency services).

The committee will carry out a member-established mandate, and report on implementation monitoring of predicted effects and mitigation effectiveness. Vopak will host a workshop for local businesses to learn about opportunities on the VPC Project and how to become involved, as construction nears. Vopak also agreed with the EAO's request that any business representatives selected to the aforementioned Committee should be prioritized for those individuals that have broad and cross-sector mandates, if available, to ensure that a maximum number of business community voices are 'at the table'.

Vopak acknowledged that Indigenous economic activity combines harvesting, sharing and trading of traditional foods, and wage-based work. Indicators of traditional economic activities (e.g., harvesting, sharing and trading of traditional foods) was addressed in Section 8 of the Application. Market economic activity itself is addressed by the Economic Conditions VC.

ISSUES WITH HOUSING

Indigenous nations noted that while some positive economic effects may be experienced with the VPC Project, housing issues are already a concern in the area and lower income individuals could be negatively affected by increases to rent and houses prices caused by the VPC Project.

In response, Vopak proposes hiring approximately one third of the workers required for construction from the local talent pool, which could offset additional housing demand, as these individuals already reside in the area, and require the remaining two-thirds of individuals hired from outside of the region to stay in work camp while on rotation. The in-camp workers will be required to remain in camp during their off-duty hours.

Vopak also commits to local government engagement to understand how Vopak can support local social housing projects to help alleviate pressure on low-income households. To address the potential effects of VPC Project during Construction on rental housing, Vopak stated they will provide financial support to social housing as a mitigation measure with the involvement of external parties, including Indigenous nations, BC Housing and City of Prince Rupert, Northern Health and the First Nations Health Authority.

IMPACTS TO LOCAL GOVERNMENT SERVICES AND INFRASTRUCTURE

During Application Review, the City of Terrace stated that local government services and impacts to municipal infrastructure are largely ignored in the Application. Terrace also noted that industrial projects outside their municipal boundaries have still impacted them from increased crime rates, enforcement challenges, added parks and recreation costs, staff capacity challenges and increased maintenance requirements for existing infrastructure. Terrace requested that its lands be included in the LSA as the airport and hospital (which are not owned by the City of Terrace) have been included as key service providers yet Terrace itself remains excluded from the EA scope.

Vopak acknowledged that major projects have the potential to cause many service and

infrastructure issues; however, Vopak focused its assessment on those issues that it determined to be the most serious through engagement with the Working Group prior to Application submission. The LSA is relevant to the three community services and infrastructure receptors (i.e., housing, health care, traffic).

The City of Terrace, as well as the airport and hospital, were considered as part of the RSA. Vopak also committed to ongoing engagement with the City of Terrace.

Vopak noted that local economic benefits to municipalities and others from the VPC Project include:

- local expenditures;
- local procurement opportunities;
- local employment;
- local tax revenue, and;
- community investment initiatives.

It is Vopak's position that these mitigation measures will assist to address Terrace's concerns, including those listed in the Application, Section 5.9.2.6.5.

Throughout the EA Application Review process, Vopak has had ongoing engagement with Working Group members including Indigenous nations, local officials and the general public to discuss and adapt mitigations based on each parties' respective concerns.

As noted above, Vopak has committed to the formation of a Community Services and Infrastructure Committee.. The Community Services and Infrastructure Committee members will have the opportunity to discuss social effects related to the VPC Project and will be engaged in identifying the metrics to be monitored, such as employment targets. During Operations, Vopak will directly engage with both residents and business owners. In addition, Vopak's Indigenous Interest Management Plan will work to address Indigenous socio-economic conditions. While employment loss will be a concern following decommissioning of the VPC Project, Vopak will engage Indigenous nations, Prince Rupert and Port Edward to seek input to minimize negative effects and maximize transition. The EAO is of the view that the five effects listed above that are linked to Economic Conditions are addressed for the purposes of the EA.

Condition 10: Socio-Economic will require Vopak to provide socio-economic engagement summary reports related to economic conditions – two reports during Construction and one report after the start of Operations.

COMMUNITY SERVICES AND INFRASTRUCTURE

The following key issues related to Community Services and Infrastructure were identified, based on the EAO's Application Review and with feedback from the Working Group and Indigenous nations:

NECESSITY FOR COMMUNITY AND INFRASTRUCTURE MITIGATION PLANNING

Vopak determined in the Application that a Community and Infrastructure Plan to monitor VPC Project effects would not be required. This raised questions among Working Group members and required clarification, given that the VPC Project will have interactions with local services and community infrastructure.

Rather than a specific Community and Infrastructure Plan, Vopak will establish a committee, the Community Services and Infrastructure Committee. Vopak will organize the committee's activities and will resource the committee to carry out the intended member developed mandate effectively. In addition to at least two Vopak representatives, the committee will include multiple community representatives (e.g., municipalities of Prince Rupert and Port Edward, representatives of local businesses, local residents, Indigenous nations, Northern Health, First Nations Health Authority, emergency services).

Government agencies, Indigenous nations, local communities and other members of the Community Services and Infrastructure Committee will be engaged in the development of the committee charter. The charter would identify committee organization, including roles and responsibilities, engagement and information sharing between participating organizations, describe the potential socio-economic effects to be monitored, approach to monitoring, including metrics, frequency, and responsibilities (i.e., what will be monitored and how), reporting, including frequency and distribution, and approach to adaptive management.

In addition, Vopak will develop and implement project-specific management plans that pertain to indicators relevant to Community Services and Infrastructure (e.g., Health and Safety Management Plan, Construction Traffic Management Plan). These management plans will include VPC Project-specific mitigation measures that have been identified within Section 10 of the Application to minimize the potential adverse effects of the VPC Project on the indicators of rental housing, health care service quality, and traffic volume and safety.

IMPACTS TO REGIONAL HEALTH CARE SERVICES

During Application Review engagements, Vopak affirmed its intention to rely on the Northern Health care system, which is already overburdened by current demands. It was noted that personnel with First Aid training and a nurse practitioner would be hired for the Vopak-utilized work camp to offset the impact on Northern Health. During Application Review, the EAO requested Vopak to justify why the proposed mitigations did not include a resident doctor at the work camp and clarification as to why additional personnel at the camp itself would not negatively impact public health services in the region.

Vopak responded that multiple mitigation measures were identified to minimize potential adverse effects during the construction phase on the Community Services and Infrastructure VC, and specifically the indicator of quality of health care in the Application. The commitment to personnel with First Aid training and a nurse practitioner at the work camp was based on consultation with Northern Health to date. Vopak will engage with local health service providers to plan for the VPC Project demands during construction, where impacts are likely the greatest of all phases, and this

will include ongoing engagement with Northern Health representatives on the Working Group. Vopak will also comply with requirements of Northern Health with respect to minimum health care resources in work camps once such requirements are established. A Health and Medical Services Plan will be developed with the assistance of qualified individuals and work to incorporate Northern Health emergency response roles. Separately, Vopak will develop an Emergency Response Assistance Plan. In addition, Vopak's Indigenous Interest Management Plan will be developed with the assistance of health and medical services experts to address potential effects.

The EAO asked Vopak to comment on the following scenario: if Northern Health provided a health services provision outline that resulted in greater expenditures and increased medical personnel from Vopak (to remove any burden on local health services) than Vopak currently proposes, would Vopak accept this proposal and fund a qualified third party to confirm that the Northern Health resources are not utilized by Vopak.

Vopak acknowledged that Northern Health's capacity for engagement, planning and implementation was limited, and more so currently, with unprecedented challenges arising from the COVID-19 pandemic. Vopak noted that non-local staff will be using an existing industrial work camp, located Port Edward, that will, at a minimum, have established on-site health and safety programs that meet WorkSafe BC requirements. Vopak committed to developing and implementing a Health and Medical Services Plan, as recommended by Northern Health.

Vopak intends to use experienced qualified professionals to prepare the Health and Medical Services Plan, respond to Northern Health's review of the Health and Medical Services Plan, and assist through the Community Services and Infrastructure Committee, as required. Vopak does not believe that a third party would be necessary to confirm that the VPC Project had a negligible effect on Northern Health resources as long as the individual(s) involved are qualified to conduct the required work.

Indigenous nations queried as to how Vopak will be able to implement an enhanced community health and safety monitoring program, when some of these Working Group members felt that the baseline information within the Application lacked data specific to Indigenous interests.

In response, Vopak proposes an Indigenous Interests Management Plan, which will be developed with Indigenous nations to avoid, minimize, reduce and offset potential effects to Indigenous interests (e.g., harvesting rights, governance systems, cultural identity, health, socio-economic conditions).

Vopak also has provided a detailed overview of how it will engage with Indigenous nations and other relevant Working Group members on associate Management Plan development, to ensure that local perspectives, Indigenous well-being and other important criteria form the basis of the Indigenous Interests Management Plan.

As noted above, Vopak's proposed Health and Medical Services Plan, as well as the Emergency Response Assistance Plan, as part of the Health and Safety Management Plan, will help reduce pressure on Northern Health during Construction, Operations and Decommissioning. This plan will incorporate Northern Health's

emergency response roles. In addition, Vopak's previously noted Indigenous Interests Management Plan will work to address Indigenous health concerns. The EAO has determined that the increase in workers throughout all phases of the VPC Project has the potential to affect regional health care services.

Similar to how it relates to Economic Services, Condition 10: Socio-Economic will require Vopak to provide three socio-economic engagement summary reports related to community services and infrastructure, as well as health and medical services during Construction and after the start of Operations.

COMMUNITY WELL-BEING

The EAO, Working Group members, and public commentors collectively identified these issues related to Community Well-Being conditions:

BASELINE DATA

Indigenous nations and the broader Working Group voiced concerns regarding the accuracy of baseline data used to describe Community Well-Being, particularly Indigenous well-being.

In response, Vopak stated that the Application utilized provincial effects assessment guidelines. Vopak referenced a subsection of Section 5.9 where they identified factors contributing to Community Well-Being in the Hinterland Regions and Indigenous-specific Community Well-Being. Vopak also acknowledged that, despite mitigation application, residual effects will be present; Vopak then addressed these residual effects in Section 5.9 of the Application. With respect to data volume, Vopak noted they had taken a conservative approach to assess the worst-case scenario.

METHOD OF ASSESSMENT

Indigenous nations stated that monitoring for potential harm to Indigenous Community Well-Being in the area affected by the VPC Project is insufficient. Vopak was requested to identify the factors that will be used to measure Indigenous Community Well-Being and to provide plans as to how Vopak will address or offset potential harm if unavoidable impacts are encountered.

Vopak found that effects on Community Well-Being are predicted to be low, and cumulative effects are predicted to not be significant except for vulnerable populations. Vopak will engage with Indigenous nations to participate in local or regional initiatives designed to promote solutions to various issues contributing to Community Well-Being. Vopak's Health and Medical Services Plan as well as Community Services and Infrastructure Committee, in which the Indigenous nations will be invited to participate, will assist with improvement of Community Well-Being. This committee will have the ability to assist with addressing issues, such as effects to vulnerable populations, through monitoring of the effectiveness of mitigation measures, such as both health care and housing. Vopak will also have an Indigenous Liaison who will coordinate engagement in development and implementation of the VPC Project's commitments and conditions with Indigenous nations.

DURATION OF EFFECT

The Application determined the effect to be considered long-term. It was thought that this should be considered to be permanent as more than 50 years of residual effects will be permanent for many members of Indigenous communities due its multi-generational impact.

> Vopak responded that the construction-related effects will be both beneficial and adverse with the net adverse effects being minimal as changes in the regional population over this time will occur on their own.

VULNERABLE POPULATIONS

Indigenous nations noted a lack of mitigation strategies to reduce impacts on vulnerable populations and an absence of explanation regarding how they would be impacted by the VPC Project. Almost half of the North Coast Regional District population is considered to be vulnerable; however, the Application determined that the potential effect of the VPC Project is still not considered significant. A request was made for a working group/committee to be established, including agencies and Indigenous nations to evaluate vulnerable populations. In addition, Northern Health stated that Vopak provided a lack of sufficient information to conclude the VPC Project effects will not cause a change in the well-being of vulnerable populations.

> The Application acknowledged that well-being outcomes for vulnerable populations are currently beyond threshold (i.e., unsatisfactory) relative to the rest of the province and the country. Mitigation will address VPC Project-specific effects but well-being outcomes for vulnerable populations will remain beyond threshold. The VPC Project is not expected to increase the disproportion of well-being for vulnerable populations. However, the level of confidence is low due to the volume of data being provided from vulnerable populations.
>
> The Community Services and Infrastructure Committee that will be established by Vopak will have the ability to focus on potential effects to concerns, such as vulnerable populations, and monitor the effectiveness of Vopak's implementation of the mitigation measures to address these concerns. These include reducing potential effects on housing and health care, which will in turn reduce potential effects on Community Well-Being. If unexpected adverse effects are found to be occurring, Vopak will apply the appropriate adaptive management measures.

Vopak's Community Services and Infrastructure Committee will provide an opportunity for Indigenous nations, Prince Rupert, Port Edward, the PRPA and other organizations to address topics of concern that are raised, including those regarding Community Well-Being. The EAO is of the view that the above concerns regarding impacts to Community Well-Being are addressed for the purposes of the EA. The Community Services and Infrastructure Committee will provide an effective VPC Project participation opportunity for Indigenous nations, Prince Rupert, Port Edward, PRPA and other organizations to address topics of concern regarding Community Well-Being.

Similar to how it relates to Economic Services and Community Services and Infrastructure, Condition 10: Socio-Economic will require Vopak to provide socio-economic engagement summary reports related to

Community Well-Being – two reports during Construction and one report after the start of Operations.

MARINE USE AND NAVIGATION

The following key issues related to Marine Use and Navigation conditions were identified, based on the EAO's review of the Application and with feedback from the public, Working Group members, and ECCC:

MARINE USE EFFECT DURATION

Concerns were raised by Indigenous nations within the Working Group, and the EAO, regarding the accuracy of stating that an effect is "fully reversable" once an impact ceases. This characterization fails to account for the intergenerational impact that loss of use to an area may create. Additional information was requested regarding Vopak intended engagement with local municipalities, fisheries, tourism and other affected parties to adjust operational activities, and where practical, to reduce loss of use impacts and support intergenerational traditional practices.

Vopak noted that public access to Ridley Island is prohibited by the PRPA and requested that concerns of access restrictions be directed to the PRPA. The potential effects on marine use associated with the jetty are related to vessel traffic/marine impediments to traffic in the LSA due to the presence of:

(1) VPC Project support vessels during construction and decommissioning, and;

(2) a safety zone around marine structures during construction and operation.

Vopak asserts that they do not have the jurisdiction to restrict marine traffic. The PRPA is capable of restricting marine navigation under the *Canada Marine Act*, for the VPC Project. This traffic restriction authority includes the establishment of safety zones. A project-Specific Navigation Safety Zone will be established by the PRPA prior to the operation of the VPC Project facility and will be informed by operational information provided by Vopak.

Vopak committed to the development of a Marine Access and Vessel Communications Plan in the Application. The management plans would be developed in consultation with relevant government agencies, Indigenous nations, the Working Group, and other key stakeholders. Additionally, Vopak has, and will continue to, establish effective communication tools to ensure that the public is able to communicate feedback, concerns and complaints directly with Vopak regarding the VPC Project. This includes informing communities of scheduled vessels coming into the terminal, including date, type of vessel and origin of vessel.

MARINE MANAGEMENT ORGANIZATIONS

The Application suggests that adherence to PRPA vessel procedures will result in "negligible" impacts associated with increased vessel traffic. To contribute to a net reduction in vessel impacts over time, the EAO asked Vopak to join marine management organizations for the VPC Project area, and to adhere to best management practices as they are developed over time, such as the Technical Review Process of

Marine Terminal Systems and Transshipment Sites[15], this being a voluntary review process focused on vessel safety and operation in Canadian waters along shipping routes.

> Vopak responded that products stored by Vopak and later associated with off-site shipping will not be their responsibility. Instead, vessel practices will be the responsibility of Vopak's customers and within the care of those shipper's and/or the customer's shipping agency. Vopak will not be an active member of marine management organizations). However, Vopak will participate in associations such as the Green Marine and the Port Environmental Stewardship Committee, for the better management of marine protection initiatives and environmental stewardship. Vopak later agreed to request that its customers' associated shippers voluntarily participate in the Technical Review Process of Marine Terminal Systems and Transshipment Sites. In addition, as part of the management plans, vessels will be required to adhere to the *Be Whale Wise* guidance as well as minimize carrier time in the births.

MARINE RESOURCES AND ACCESS

Indigenous nations note concerns related to marine resources and fish that are harvested for food, ceremonial and cultural information for knowledge transfer purposes in the area. There is concern that increased port activity and rail along the Skeena River will increase Indigenous activity impacts. In addition, potential accessibility issues were noted, in particular related to the VPC Project marine trestle, which will have a potential risk during poor weather conditions.

As stated in Part A of this Assessment Report, Gitxsan and the Office of the Wet'suwet'en representatives submitted separate letters to the EAO during a public comment period, citing marine (and rail) concerns with potential effects to marine resources, notably fish.

> Vopak notes in the Application that the VPC Project is not anticipated to create a change or disruption that widely restricts or degrades present marine uses to a point where the activities cannot continue at the current levels and for which the change will not be mitigated. The VPC Project would follow PRPA requirements, including procedures intended to maintain safe recreational marine use while allowing for shipping traffic to exist.
>
> Vessel passage under the jetty will be restricted during all VPC Project phases. Permanent marine safety zones will be established around the jetty and berth to separate fishing and recreational activities from the VPC Project activities. To reduce this effect, as part of Vopak's Marine Access and Vessel Communication Plan navigation restrictions and routing advisories will be communicated to the marine community as required. Vopak will work with the CCG to provide Notices to Shipping and Notices to Mariners. Vopak will also strive to respect public and traditional access to marine resource users.

[15] https://tc.canada.ca/en/marine-transportation/marine-safety/termpol-review-process-2019-edition-tp-743-e

Transport Canada stated that Vopak does not have the authority to restrict navigation and that this authority is reserved for the PRPA.

Vopak acknowledged Transport Canada's comment and agreed that it does not have the jurisdiction to restrict marine traffic. The Project-Specific Navigation Safety Zone would be established by the PRPA prior to VPC Project operation and informed by Vopak activities. A maximum value is not available at this time. The PRPA informed Vopak that the requirements of the navigational safety zone will be determined following the results of a risk assessment. This will be reflected in the appropriate management plans that will be developed with Working Group member inputs, particularly Indigenous nations.

Vopak has committed to implement multiple management plans in Section 10 of the Application to address these potential marine effects.

These management plans include:

(1) a Marine Access and Vessel Communications Plan for each phase of the VPC Project, including:

- travel corridors;
- vessel schedules;
- respecting public and traditional access to marine resource users;
- communication of incoming vessels with local communities and user groups;
- usage of tugboats for safe transit and berthing; and
- usage of escort vessels to confirm route is clear and safe, as well as ensuring other vessels do not intrude on safety zones.

(2) an Indigenous Interest Management Plan. The Indigenous Interests Management Plan will require Vopak to engage with Indigenous nations to address potential effects to specific concerns such as harvesting rights, access and travel, cultural identity, Indigenous health, and Indigenous socio-economic conditions.

The EAO believes that the increase in shipping traffic and access changes throughout all phases of the VPC Project have the potential to affect commercial and recreational travel and fishing, as well as Indigenous nation member access to marine resources.

12.4 THE EAO'S ANALYSIS AND CONCLUSIONS

This section presents the EAO's analysis and conclusions on the VPC Project's potential adverse residual social and economic impacts. The EAO evaluated the potential effects by considering Construction, Operations and Decommissioning activities that could result in social or economic effects. Effects specific to Indigenous interests are outlined in greater detail in the Part C sections of this Assessment Report.

After consideration of the mitigations, the EAO identified the following residual effects:

- A strain on Northern Health services to accommodate an increase in population from VPC Project-related workforce during construction, operation and decommissioning; and
- Reduced access to marine travel routes and marine resources.

Table 24: Summary of Residual Effects for Northern Health Services Capacity

Criteria	Assessment Rating	Rationale
Context	Low	Health care services are acutely sensitive to a change in existing conditions.
Magnitude	Low to Moderate	Although the anticipated increase in population is considered comparable to range in annual variation, any additional services required of an already overburdened health care system will be notable. The influx of temporary workers into the region and jobs available to residents could lead to increased demand on these services.
Extent	Local to regional	The effects on health care services will impact the mainland area of the entire North Coast Regional District as the Prince Rupert Regional Hospital is the only facility servicing the regional district.
Duration	Long-term	Population-related effects to regional health care services are anticipated to be most notable during construction as that is when the approximately 250 persons per year will be required for the VPC Project. However, reduced effects are anticipated to continue throughout operations with an increase occurring during decommissioning.
Reversibility	Reversible	Effects from the VPC Project on health services will be reversed upon closure.
Frequency	Continuous	Continuous effects on health services are anticipated through construction and operations.
Likelihood	There is a high likelihood that the VPC Project will introduce new residents to the work camp and local community with an increase in health and safety risks.	
Significance Determination	In consideration of the above analysis, Condition 10: Socio-Economic and the mitigation measures proposed by Vopak, which require Health and Medication Services Plan, to be developed prior to Construction and Operations, the VPC Project is not expected to have significant adverse residual effects on health and medical services.	
Confidence	The EAO's confidence in this assessment is moderate as there are a number of unknown variables that may influence the degree to which the VPC Project will impose adverse residual effects to regional and local services. These include the ability of Vopak's Health and Medical Services Plan: • To successfully identify and adaptively manage effects that could lead to increased demand on health services; and • To address the demand placed on health services being dependent, in part, on individual circumstances and choices of the workforce and their accompanying family members, as well of those of community members not associated with the VPC Project and interactions with broader social and economic factors (e.g., COVID-19).	

Table 25: Summary of Residual Effects for Marine Routes and Resources

Criteria	Assessment Rating	Rationale
Context	Moderate	Access to marine routes and resources are moderately sensitive to changes in existing conditions as alternative routes and resource locations are available.
Magnitude	Low to moderate	A minor exclusion zone area will be affected. However, this will impact marine recreation and commercial routes and access to resources (e.g., fishing). Additional disruption will occur along the shipping lane. The magnitude will be seasonally dependent with an increase in traffic/access to resources in warmer seasons and less non-VPC Project traffic in colder seasons.
Extent	Local	The effects on access to marine routes and resources would be limited to the VPC Project LSA.
Duration	Long-term	These effects will occur for the lifetime of the VPC Project.
Reversibility	Partially reversable	While direct VPC Project-related effects will be reversable, permanent changes to marine resources and increase in local traffic from VPC Project-related population growth may occur.
Frequency	Continuous	The VPC Project will impact access to marine resources and vessel routes continuously around the terminal area as well as up to 171 vessels in transit yearly.
Likelihood	There is a high likelihood that the VPC Project will introduce an increase in marine traffic and restriction to marine areas from the navigation safety zone.	
Significance Determination	The VPC Project is not expected to have significant adverse residual effects on marine resources and routes based on the above analysis.	
Confidence	The EAO's confidence in this assessment is high as there is a significant number of similar projects to provide data and information directly relevant to the VPC Project's effect on marine routes and resources.	

12.5 CUMULATIVE EFFECTS ASSESSMENT

There are a number of past, present and reasonably foreseeable projects and activities in the RSA that have the potential to act cumulatively with the VPC Project's residual effects, which include effects on Northern Health services capacity and marine routes and resources.

In the Application, Vopak concluded that a collection of terminals, shipping activities, industrial facilities, and pipeline projects (all in varying stages of development) could produce social effects with the potential to act in combination with the potential residual effects resulting from the VPC Project. These projects are

listed in Table 5.9-60 of the Application.

To minimize the effect of the VPC Project, Vopak stated a willingness in their Application to engage with other major project proponents, local and senior governments, health care providers and health care stakeholders to participate in the socio-economic monitoring/ management activities that have been initiated by LNG Canada; this intent of Vopak's engagement would be to enable broader planning and collaboration.

The PRPA would require Vopak to adhere to a number of federal conditions should the VPC Project be approved. The PRPA's conditions will include a Marine Operations Plan during Construction, and vessel berthing planning/procedures during Operations to address impacts that will include marine routes and resources. The PRPA would not have requirements in place to address concerns regarding health services capacity beyond the VPC project operations site on Ridley Island.

The VPC Project will have a cumulative effect on the Northern Health services capacity, given the currently limited capacity of Northern Health and the numerous potential future projects located in the region. The likelihood for this cumulative effect is moderate given Condition 10: Socio-Economic and Vopak's proposed mitigations including the Health and Medical Services Plan, and the Community Services and Infrastructure Committee.

With respect to cumulative effects on marine routes and resources, the EAO asserts that the VPC project will have a cumulative effect on the ability to harvest resources and use current marine routes in the RSA, along with the numerous potential future projects located in the region. The likelihood for this cumulative effect is moderate given Condition 9 (Cumulative Effects Management) which will require Vopak to participate in initiatives related to the monitoring, assessment and management of the VPC Project's cumulative effects, though the nature of that participation is yet to be determined at the time of writing this Assessment Report.

Vopak has proposed the following plans to address adverse social and economic effects of the VPC Project:

- A Marine Access and Vessel Communication Plan during Construction to address marine traffic and travel corridors and public and traditional access to marine resources;
- A Health and Medical Services Plan, as part of the Health and Safety Management Plan, during Construction, Operations and Decommissioning to incorporate Northern Health emergency response roles;
- An Emergency Response Assistance Plan, as part of the Health and Safety Management Plan;
- Establish a Community Services and Infrastructure Committee, build a Charter with member inputs and operate it according to the Management Plan Engagement Memo;
- Address concerns regarding topics such as labour, employment, training, cultural awareness, as part of the Operations Environmental Management Plan;
- A Marine Access and Vessel Management Plan during Decommissioning;

- Engage with chambers of commerce and communicate timing of Decommissioning, as part of the Decommissioning Environmental Management Plan; and
- Indigenous Interest Management Plan during Construction to provide cross-cultural awareness training, provide economic opportunities to Indigenous nations and address Indigenous interests.

Accordingly, the EAO concludes that significant cumulative effects are not expected as a result of the VPC Project interacting with the effects of other past, present and reasonably foreseeable future projects and activities.

12.6 CONCLUSIONS

Considering the above analysis, Table of Conditions and Vopak's committed mitigations/management plans, the EAO concludes that the VPC Project would not have significant adverse effects on Economic Conditions, Community Services and Infrastructure, Community Well-Being and Marine Use and Navigation.

13. HERITAGE AND ARCHAEOLOGY

13.1 BACKGROUND

Heritage and Archaeology was selected as a VC due to the importance of these resources to Indigenous nations, the public, and other stakeholders, as well as regulatory requirements, and for conservation/scientific importance. Archaeological sites have been identified in past studies within the boundaries of the VPC Project site. Potential effects to physical and cultural heritage, including habitations, trails and cultural landscapes, are considered in Part C of this Report.

The Application assessed effects on the Heritage and Archaeology VC using two indicators, which included the number of affected sites (e.g., culturally-modified trees [CMTs], subsurface materials) and the locations of recorded and unrecorded archaeological sites and areas of archaeological potential.

Archaeological sites are the physical remains of past human activity. Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), physical or cultural heritage includes any structure, site or thing that is of historical, archaeological, paleontological or architectural significance (Canadian Environmental Assessment Agency 2015). In BC, all archaeological sites that pre-date AD 1846 and heritage wrecks (vessel or aircraft) abandoned for two years or more are protected by the *Heritage Conservation Act* (HCA; 1996), whether on provincial Crown or private lands. Sites designated by the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development's (FLNRORD) Archaeology Branch, including burials and rock art sites, are protected regardless of age.

CEAA 2012 aims to protect heritage resources on federally administered lands from adverse effects caused by a designated project (Canadian Environmental Assessment Agency 2015). Aside from CEAA (2012),

there is no federal legislation pertaining to the protection and management of archaeological materials or sites on federal lands, outside of lands owned or managed by Parks Canada. Although CEAA 2012 requires considerations of potential adverse effects to archaeological resources from proposed projects, it does not provide direction as to the nature of those considerations or guidelines pertaining to the management or mitigation of those effects.

PRPA has indicated that for archaeological assessments conducted on federal lands under the administration of the PRPA, the processes and methodologies recommended by the BC Archaeology Branch are employed. Additionally, PRPA noted that it consults with Indigenous communities regarding preferences for managing heritage and archaeological resources on a project-by-project basis.

Given the VPC Project is located on federal lands, Vopak did not conduct the assessment under a provincial HCA Heritage Inspection Permit. Vopak did, however, conduct the assessment in a manner consistent with BC Archaeology Branch's 1998 Archaeological Impact Assessment (AIA) Guidelines, which provides guidance for the evaluation and mitigation of potential impacts to heritage resources.

The Metlakatla Stewardship Office has developed a Metlakatla Culturally Modified Tree Policy (2016). The Metlakatla CMT Policy suggests a protective buffer zone for CMTs of a minimum of 1.5 times the dominant tree stand height to minimize possible blowdown of standing CMTs. Exceptions to this recommendation are subject to site-specific prescriptions jointly developed with Metlakatla.

The Metlakatla Stewardship Office has also developed an Archaeological Chance Find Procedure (2016).

SPATIAL BOUNDARIES

The Local Study Area (LSA) consisted of a 63-hectare (ha) area of the northern portion of the Project's land lot. Including the Project footprint, rail racks, and laydown areas, and the marine footprint. A buffer of 30 metres (m) was applied to potential areas of disturbance.

The Regional Study Area (RSA) included Ridley Island, the Project water lot area, and the western portion of the marine footprint. Vopak applied a 30-metre buffer to potential areas of disturbance. Refer to Figure 14 for the Heritage and Archaeology LSA and RSA.

TEMPORAL BOUNDARIES

Vopak reported that the VPC Project would:

- take two years to construct;
- operate for a minimum of 50 years, but that the maximum number of years is not known as that would be dependent upon market conditions; and
- take 12 months to decommission.

TECHNICAL BOUNDARIES

The intertidal and offshore islet survey for the terrestrial AIA was carried out close to but not at the lowest

tide of the day, therefore some of the lowest-lying intertidal areas were not surveyed. Several Areas of Potential with high potential were not fully investigated during the terrestrial AIA due to environmental factors which impeded the ability to carry out subsurface testing. Vopak -also noted that even the most thorough AIA may not identify all archaeological resources that may be present.

Potential constraints identified by Vopak for the Marine Overview Assessment included the availability of accurate marine casualty reports; availability of local knowledge specific to wrecking events within and near the LSA; and significant sediment deposition from the Skeena River that may have capped sites, rendering them invisible from simple ocean-floor surface inspection video and photo data.

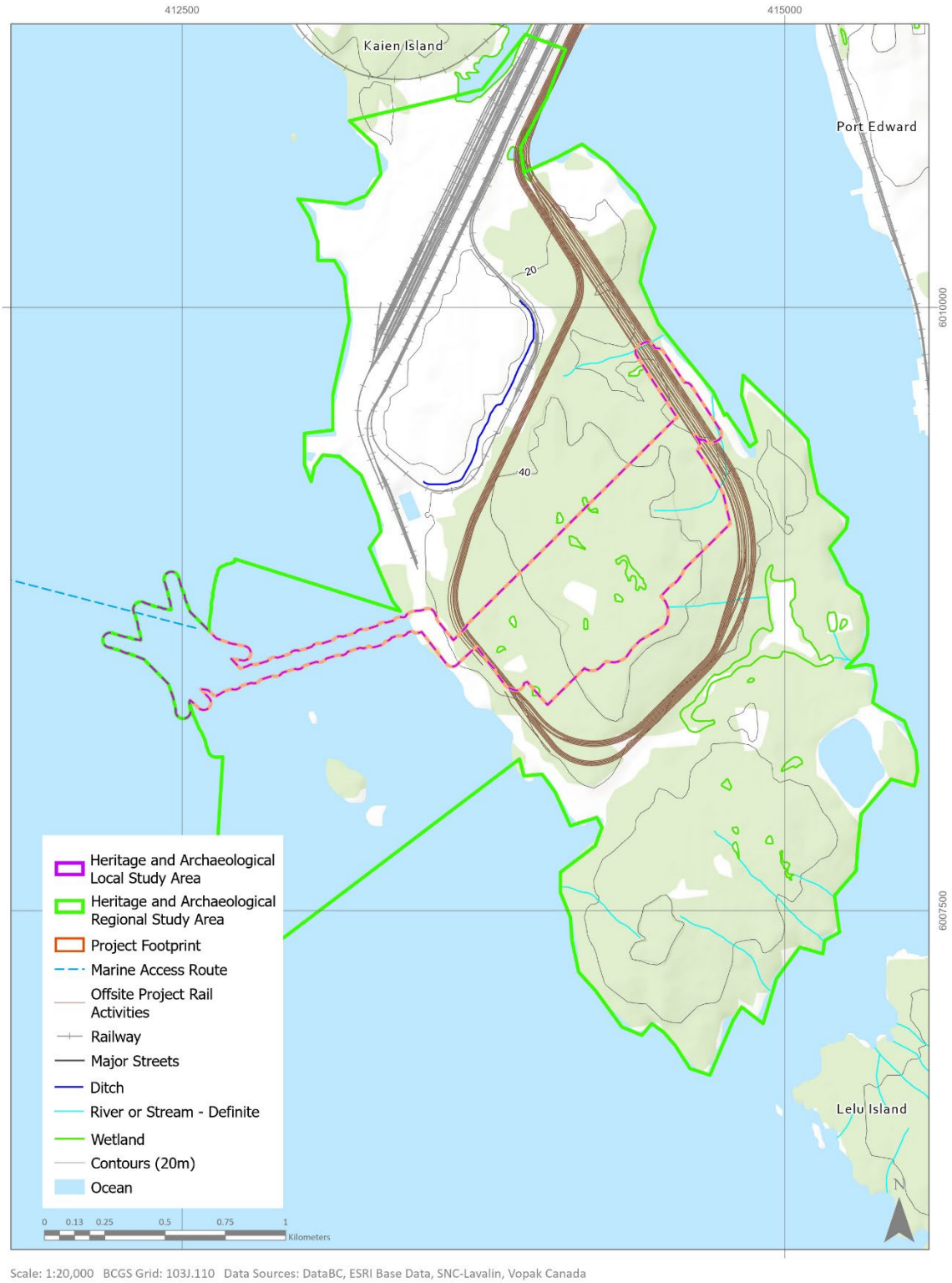

Figure 14: Heritage and Archaeology LSA and RSA

13.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

Vopak conducted baseline studies for archaeological resources, which included a desktop Archaeological Overview Assessment (AOA) followed by an AIA for the terrestrial environment and a desktop archaeology Marine Overview Assessment for the marine environment. Vopak's assessment was also informed by Indigenous Knowledge provided by the Indigenous nations during the ongoing engagement between Vopak and Indigenous nations as outlined in Vopak's Indigenous Consultation Reports posted to the EAO's website.[16]

TERRESTRIAL ARCHAEOLOGICAL IMPACT ASSESSMENT

Vopak's terrestrial AIA was informed by a desktop AOA. The AOA identified 27 permitted and non-permitted archaeological studies conducted for Ridley Island since 1983. As a result of these studies, 28 previously recorded registered archaeological sites are located on Ridley Island and within the RSA. The sites are categorized by burials, CMTs, cultural depressions (cache pits/house pits), cultural shell deposits (shell middens), historic sites and subsurface cultural materials. Of these 28 sites, two sites are located within the LSA and seven others are located with 250 m of the LSA. These nine sites are registered under the HCA with an additional site excluded from the count as it is assigned Legacy Status[17].

Vopak also completed an archaeological potential assessment consisting of the preparation of ortho-photo maps, overlain with Light Detection and Ranging data, which identified previously recorded archaeological sites close to the LSA. These maps assisted in the assessment of archaeological potential following BC's AIA Guidelines. Project areas were rated according to their archeological potential and were assigned a rating of low to high potential. The following landscape characteristics were associated with areas of high archaeological potential:

- Level or gently sloping terrain.
- Close to watercourses (including the pre-urban coastline and pre-urban creeks and streams);
- Well-drained ground;
- Distinct landforms such as terraces; and
- Paleo landforms associated with older shorelines.

[16] https://projects.eao.gov.bc.ca/p/5b61e3726952ca0024cf687c/documents

[17] Sites are assigned Legacy status to indicate they are not protected, usually because they have been destroyed or they do not meet the criteria for protection under the HCA (BC Archaeology Branch 2017).

The AIA was conducted for the LSA in 2019 and areas of the VPC Project footprint and LSA that were revised due to project design changes and not previously captured in the 2019 AIA were assessed in 2020. The purpose of the AIA was to evaluate and confirm previously recorded sites, identify areas of archaeological potential and to locate and record additional archaeological sites within the LSA. The AIA included representatives for the Gitxaała, Kitselas, Kitsumkalum, Lax Kw'alaams, and Metlakatla, who assisted with the fieldwork. A summary of field work results was shared with all six Indigenous nations.

The AIA focused on the assessment of areas of moderate to high archaeological potential derived from background research and the AOA. Thirteen Areas of Potential were identified during baseline studies conducted in 2019 and 2020. Nine Areas of Potential were identified during the desktop assessment and four Areas of Potential were identified in-field. Nine of the 13 Areas of Potential could not be investigated fully due to environmental factors that did not permit the subsurface testing methods outlined for the study (Areas of Potential 3, 4, 5, 6, 8, 9, 10, 11, and 12).

In total, Vopak recorded 10 new archaeological sites during surveys carried out (GbTn-163 to GbTn-172) and two previously recorded sites were revisited (GbTn-60, GbTn-93). These sites consist of eight CMT site locations (comprised of 39 CMTs), two cultural depression sites, one rockshelter site (including two rockshelters), and one lithic and petroform site.

Seven terrestrial archaeological sites registered under the HCA were identified in the LSA, which includes a 30 m buffer around VPC Project infrastructure. Two terrestrial archaeological sites protected by the HCA are situated within 100 m of the LSA. Sites within the LSA are anticipated to be directly and indirectly affected by the VPC Project while sites within 100 m of the LSA are anticipated to be indirectly affected. Areas of Potential 3, 4, 5, 6, 8, 9, 10, 11 and 12 are all within the LSA and are anticipated to be directly affected by VPC Project Construction. Refer to Table 5.10-6 of the Application for more information regarding these terrestrial archaeological sites.

MARINE OVERVIEW ASSESSMENT

Vopak completed the Marine Overview Assessment to identify potential submerged traditional, historic and pre-contact heritage sites. The following marine landscape characteristics are associated with areas of high archaeological potential for sites that were previously on extinct shorelines, now inundated by rising sea levels:

- Submerged landscapes associated with level or gently sloping terrain, usually offshore of terrestrial archaeological sites;
- Proximity to relic terrestrial watercourses (including pre-urban coastline and pre-urban creeks and streams);
- Previously well-drained ground located on distinct inundated landforms such as terraces;
- Previously shallow intertidal areas that may have evidence of early resource procurement sites comprised of perishable material (wooded stakes) associated with fish weirs; and
- Previously shallow intertidal areas that may have evidence of early petroforms like canoe runs or clam garden walls.

According to Vopak, the VPC Project footprint does not appear to intersect with special points of interest on the landscape such as river mouths or estuaries, which are places where terrestrial archaeological survey would typically be focused. Steep drop-offs result in a very narrow band of previously exposed land in the 0 to 6.3 m below sea level interval. Coast Island and associated shoals and reefs may have connected during periods of lower relative sea level. While this larger offshore islet mass would be considered an area of archaeological concern, the likelihood of encountering inundated or submarine archaeological deposits within the LSA was considered by Vopak to be low.

Vopak identified three potential effects to the Heritage and Archaeology VC due to the VPC Project during construction:

- Loss of or damage to CMTs from site clearing, including soil storage;
- Loss of or damage to heritage and archaeological resources from site grading, including blasting, and deposition of fill; and
- Loss of or damage to heritage and archaeological resources from construction of the marine jetty and berths.

No potential effects were identified by Vopak during Operations and Decommissioning.

The Application proposed the following mitigation measures:

- A Construction Environmental Management Plan will be developed in advance of Project Construction, and will include an Archaeological Resources Management Plan to be developed with input from Indigenous nations, including a Chance Find Management Plan;
- Vopak will employ avoidance as the primary mitigation measure for impacts to archaeological and heritage resources;
- If avoidance is not possible, Vopak proposes minimizing potential impacts by;
    - Developing a minimum of 30 m windfirm buffer around CMT sites indirectly affected as a result of site clearing (i.e., within 30 m of the Project footprint) in alignment with the Metlakatla CMT Policy, which recommends a protective buffer zone of a minimum of 1.5 times the dominant tree stand height to minimize possible blowdown of standing CMTs and the tallest average tree on Ridley Island is 20 m;
    - Monitoring during construction at Areas of Potential where site avoidance is not possible due to Project design; and
    - Providing on-site personnel with chance-find training as identified in Vopak's Archaeological Resources Management Plan prior to any ground disturbing or site clearing activities.
- For CMT sites summarized in Table 5.10-6 of the Application that cannot be avoided and will be directly affected by site clearing, Vopak is proposing stem round collection as an offset measure to obtain archaeological data for CMTs that will be removed. Vopak acknowledged that while this is a destructive process that will change the cultural landscape of Ridley Island, it is a best-practice method for the reliable collection of period-dating information for CMTs in the forest stands that can be otherwise difficult to obtain if conditions are not ideal. Vopak's view is that the loss or alteration

of CMTs as a result of potential Project effects is offset by data collection, adding to the understanding of the archaeological record.

Vopak concluded that the proposed mitigation measures will be effective in protecting or minimizing impacts to heritage and archaeological resources in the LSA during Construction.

13.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

Based on a review of the Application and with feedback from the Working Group and Indigenous nations, the following key issues related to the assessment of Heritage and Archaeological Resources were identified:

- Residual and cumulative effects assessment; and
- Archaeological resource management.

RESIDUAL AND CUMULATIVE EFFECTS ASSESSMENT

In its Application, Vopak concluded no residual effects on heritage and archaeology due to the proposed mitigation and, therefore, did not characterize residual effects or complete a cumulative effects assessment. Indigenous nations noted that offsetting the removal of CMTs with data collection does not fully mitigate potential effects related to the physical, spiritual and cultural importance of CMTs on the surrounding landscape.

In response, Vopak acknowledged that where an effect is not considered to be fully eliminated after mitigation measures are applied, there is a possibility that it may act cumulatively. Accordingly, Vopak provided a memo[18] for the potential effects of the loss of or damage to CMTs from site clearing, including soil storage, which characterized the residual effect and also assessed cumulative effects.

Vopak also noted that the additional information related to the spiritual and cultural importance of archaeological resources are provided in Section 8 of the Application.

ARCHAEOLOGICAL RESOURCE MANAGEMENT

In its Application, Vopak proposed an Archaeological Resources Management Plan to be developed for the VPC Project with input from Indigenous nations, which would include chance find procedures. Indigenous nations noted the importance of developing the Archaeological Resources Management Plan as early as possible and in a collaborative manner.

Metlakatla requested that Vopak implement Metlakatla's CMT Policy for those CMT sites that cannot be avoided. Metlakatla noted that unidentified archaeological resources may be present in the LSA extending into the RSA, and referred Vopak to Metlakatla's Archaeological Chance Find Procedure, which provides

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guidance for chance finds of archaeological resources during a project's construction activities. Metlakatla also requested that the community be able to access the VPC Project site for cedar collection in advance of Vopak's clearing activities. Furthermore, Metlakatla proposed mitigation for Vopak to monitor windfirm buffers specific to the CMTs. Other Indigenous nations expressed similar sentiments.

> Vopak provided a memo[19] responding to Metlakatla's suggested mitigation measures. Vopak responded that Metlakatla's CMT Policy was considered in the development of the assessment and identification of proposed mitigation. Vopak also noted that Metlakatla's Chance Find Procedure will be considered in the development of the Archaeological Resources Management Plan. Vopak further responded that monitoring of windfirm buffers is not warranted as the observations do not differentiate potential VPC Project effects from natural decaying effects.

Indigenous nations provided additional input to Vopak's proposed mitigation measures. Gitxaala proposed mitigation to be undertaken in advance of the removal of CMTs such as digital data collection, models, public education, and accessible reporting and community knowledge collection. Gitga'at sought additional information regarding how archaeological resources are documented, monitored and protected. Kitselas and Gitxaala emphasized the importance of monitoring and adaptive management in archaeological resource management. Kitsumkalum recommended that Vopak provide funding for the Museum of Northern BC in Prince Rupert to the CMTs and other collected archaeological resources.

> In response to these and other concerns from Indigenous nations regarding archaeological resource management, Vopak committed to engaging with Indigenous nations early on the development of the Archaeological Resources Management Plan, which would include mitigation to be undertaken in advance of the removal of CMTs that cannot be avoided during Construction. Vopak also responded that it is committed to investing in the local communities and would be happy to consider such initiatives.

The EAO understands that the federal Section 67 Determination would include requirements for Vopak to develop an Archaeological Resources Management Plan with input from Indigenous nations. Vopak also provided a memo[20] regarding how it will engage with Indigenous nations on the development of management plans including the Archaeological Resources Management Plan.

13.4 THE EAO'S ANALYSIS AND CONCLUSIONS

The EAO evaluated the potential effects by considering Construction, Operations and Decommissioning activities that could affect heritage or archaeological sites both on land and in the marine environment.

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19 https://projects.eao.gov.bc.ca/api/public/document/6074b158c91ed900227fdad8/download/20210308_Memo_VopaksResponsetoMetlakatlaFirstNationProposedMitigations.pdf

20 https://projects.eao.gov.bc.ca/api/public/document/60edbabac69c5e0023a12492/download/2021.07.13_MEM_VPC_Management_Plan_Engagement.pdf

The EAO understands that the federal Section 67 Determination would require that Vopak develop an Archaeological Resources Management Plan for the VPC Project with input from Indigenous nations, which would also include mitigation for CMT management and chance-find procedures. Vopak would also be required to implement the mitigation identified in its Summary of Mitigation Measures Table.

After considering the mitigation measures, the EAO identified the following residual effects:

- Loss of or damage to known or yet unknown archaeological resources during Construction, Operations and Decommissioning.

The EAO's characterization of the residual effects of the VPC Project on archaeological resources are summarized in Table 26 below and reflect the EAO's level of confidence in the analysis (including likelihood and confidence).

Table 26: Summary of residual effects for archaeological resources.

Criteria	Assessment Rating	Rationale
Context	Low	Archaeological resources have a low resiliency or are acutely sensitive to a change in existing conditions.
Magnitude	Moderate to High	Residual effects to CMTs and other archaeological resources that cannot be avoided are anticipated to be high in magnitude. For those CMTs that can be avoided but may experience indirect effects, the magnitude is expected to be moderate.
Extent	Local to regional	Residual effects to CMTs and other archaeological resources are primarily confined to the LSA although will extend into the RSA for specific CMT sites located within 30 m of the LSA.
Duration	Permanent	The residual effect is permanent for the CMTs that cannot be avoided during Construction. For those CMT sites which can be avoided but may still be indirectly impacted by wind as a result of clearing, indirect effects may be permanent if windfirm buffers are not effective.
Reversibility	Irreversible	Residual effects to archaeological resources are considered irreversible.
Frequency	Once to continuous	Residual effects to CMTs that cannot be avoided during Construction or newly encountered archaeological resources during Construction will occur once. Residual effects to CMTs that can be avoided and may be affected indirectly by wind or windfall could occur continuously during Construction, Operations and Decommissioning.
Likelihood	The likelihood that there would be impacts to archaeological resources due to the VPC Project is considered high.	
Confidence	The EAO's confidence in this assessment is high for those CMTs that cannot be avoided, and moderate for those CMTs that can be avoided but may experience indirect effects given the uncertainty regarding the effectiveness of windfirm buffers. The EAO acknowledges that there is potential for unknown archaeological resources to be encountered during Construction, Operations and Decommissioning. The implementation of the Archaeological Resources Management Plan including chance-find procedures will help to mitigate potential impacts and the EAO concludes a moderate confidence in the assessment related to these potential resources.	
Significance	In consideration of the federal Section 67 Determination requiring Vopak develop an Archaeological Resources Management Plan prior to Construction and with input from Indigenous nations, which is anticipated to include mitigation for CMT management, chance find procedures, and a process for adaptive management, the EAO concludes that the VPC Project would not have significant adverse residual effects on the Heritage and Archaeological Resources VC.	

13.5 CUMULATIVE EFFECTS ASSESSMENT

Indigenous nations disagreed with Vopak's assessment that concluded no potential residual effects and therefore no potential cumulative effects. Metlakatla noted that the loss to or access of heritage and archaeological resources within the LSA contributes to a cumulative loss of physical and tangible heritage sites in Metlakatla's traditional territory, which results in impacts on cultural identify, transmission of knowledge and health and well-being.

In response to these concerns, Vopak's residual effects memo noted that 29 CMTs have been documented within the Heritage and Archaeology RSA, including those documented within the LSA. Vopak's review of past and present projects and certain and reasonably foreseeable projects suggests that of these sites, seven CMT sites in the RSA have likely been impacted by past project construction (six sites) or may be impacted by future project construction (one site) accounting for 24.1% of all CMT sites on Ridley Island within the Heritage and Archaeology RSA (refer to Table 8 of Vopak's Residual Effects Memo).

Construction of the VPC Project is anticipated to result in an additional 24.1% of CMT sites to be impacted either directly (three sites) or indirectly (four sites).

Vopak did not identify additional measures to mitigate potential cumulative effects and committed to working with Indigenous nations on the development of the Archaeological Resources Management Plan to identify additional mitigation as appropriate.

13.6 CONCLUSIONS

Considering the above analysis and the conditions identified in the Certified Project Description and the federal Section 67 Determination requiring Vopak develop an Archaeological Resources Management Plan, the EAO concludes that the VPC Project would not have significant adverse effects on the heritage and archaeology.

14. HUMAN HEALTH

14.1 BACKGROUND

Human Health was selected as a VC based on concerns submitted by the Working Group, Indigenous nations and the public regarding air quality, noise and lighting, as well as potential marine food contamination.

The VPC Project has the potential to adversely affect Human Health through changes to soil, sediment, water, air, country foods, noise, and light. Vopak's Application evaluated potential VPC Project effects to Human Health using a Human Health Risk Assessment (HHRA) with inputs from the following linked VCs:

- Air Quality (Section 5);
- Noise (Section 7);
- Visual Quality (Section 8);
- Marine Resources (Section 9);
- Soils and Terrain (Section 10);
- Terrestrial Resources (Vegetation) (Section 10); and
- Freshwater Fish and Fish Habitat (Section 11).

The assessment of potential impacts to Human Health supports the assessment of potential Social and Economic Effects (Section 12) and informs Part C of this Report.

The provincial regulatory responsibility for Human Health lies with the B.C. Ministry of Health (HLTH), as well as the B.C. Ministry of Environment and Climate Change Strategy (ENV). Health Canada provides expertise in the Department's possession to support the assessment of impacts on human health from projects under the Impact Assessment Act, 2019, and *Canadian Environmental Assessment Act, 2012*. For the VPC Project's EA, the Working Group consisted of representatives from Health Canada and ECCC as well as ENV and the Northern Health Authority.

Relevant federal and provincial guidelines (also listed in linked VC Chapters) were used to inform and guide Vopak's assessment of VPC Project effects to Human Health and are listed below:

- British Columbia Approved and Working Water Quality Guidelines (Criteria) Reports for drinking water, irrigation and recreation and aesthetics;
- British Columbia Ambient Air Quality Objectives (AAQOs);
- British Columbia Ministry of Environment Air Quality Dispersion Modelling Guideline;
- British Columbia Oil and Gas Commission Noise Control Best Practices Guideline;
- *Canadian Environmental Protection Act, 1999;*
- Canadian Council of Ministers of Environment Canadian Ambient Air Quality Standards;
- District of Port Edward Noise Control Bylaw No. 520;
- Federal Contaminated Site Risk Assessment in Canada: Guidance on Human Health Preliminary Quantitative Risk Assessment Version 2.0;
- Health Canada's Environment Guidelines for Canadian Drinking Water Quality
- Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise;
- Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality, Noise and Drinking and Recreational Water Quality;
- Health Canada's Useful Information for Environmental Assessments;
- Health Canada's Federal Contaminated Site Risk Assessment in Canada, Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals;
- Health Canada's Supplemental Guidance on Human Health Risk Assessment for Country Foods;
- Health Canada's Federal Contaminated Sites Risk Assessment In Canada, Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors, Version 2.0;
- Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment;
- Health Canada's Human Health Risk Assessment for Ambient Nitrogen Dioxide;
- Prince Rupert Port Authority Noise Monitoring Program; and
- Guidance as captured in other linked VCs (noted in Section 14.1: Background above).

SPATIAL BOUNDARIES

The spatial boundaries for the Human Health VC effects assessment (see Figure 15) include the combined LSA and RSA boundaries of the following VCs:

- Air Quality;
- Noise;
- Visual Quality;
- Marine Resources (Marine Fish and Invertebrates, Marine Sediment Quality);
- Soils and Terrain; and
- Terrestrial Resources (Vegetation).

TEMPORAL BOUNDARIES

The temporal boundaries for the Human Health VC effects assessment are:

- Construction: two years;
- Operations: minimum of 50 years, but the maximum number of years is not known as that would be dependent on market conditions; and
- Decommissioning: 12 months.

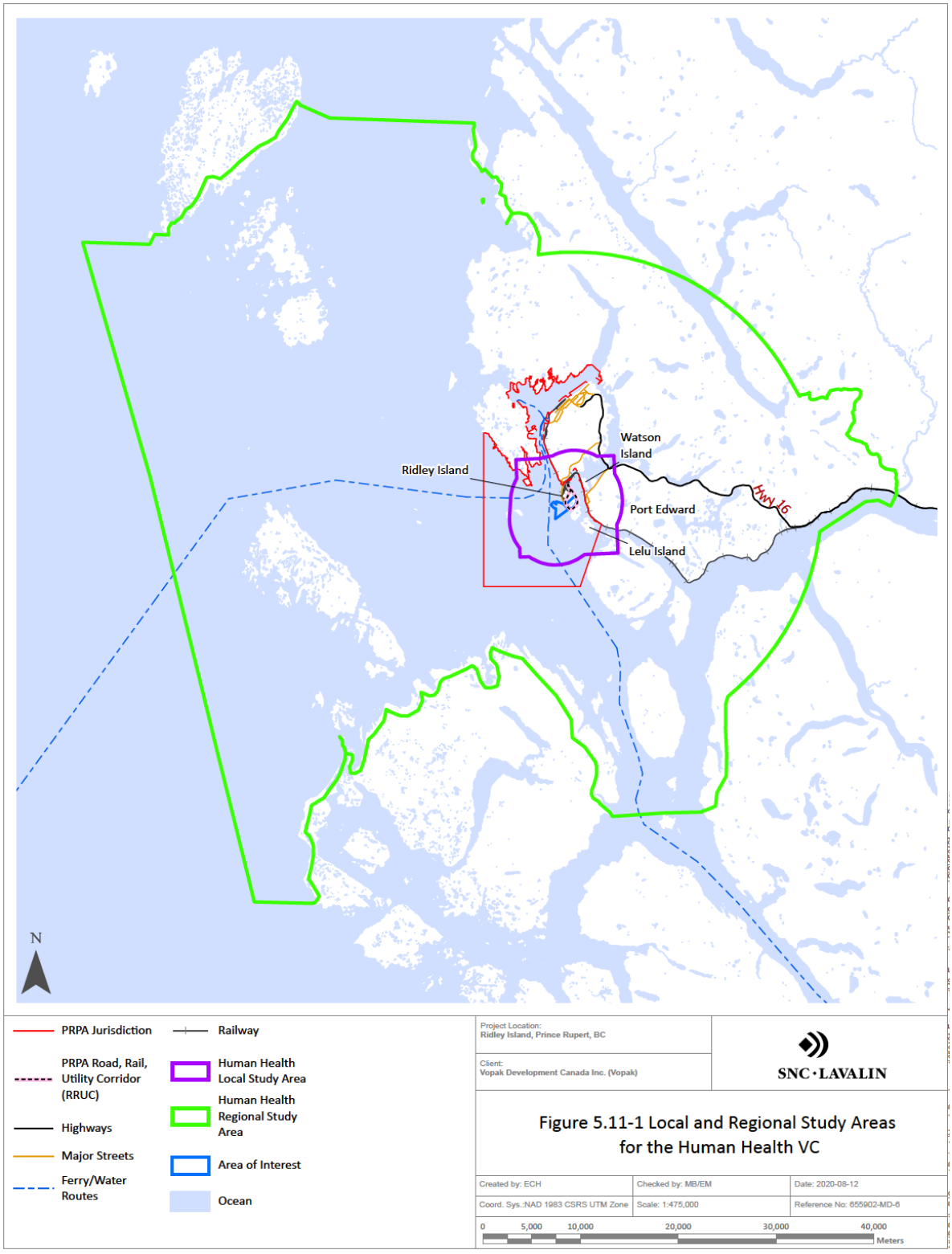


Figure 15: Local and Regional Study Areas for the Human Health VC

14.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

Vopak conducted a review of existing information to support the characterization of baseline conditions for the Human Health assessment. Vopak undertook a screening level HHRA to quantitatively evaluate potential risks associated with human exposure to predicted concentrations of contaminants of potential concern (COPCs). Vopak's HHRA incorporated the results of its assessment for the linked VCs noted in Section 14.2.1 above and traditional use information provided by Indigenous nations.

Potential impacts to Human Health for the following linked VCs were not assessed in the Application:

- Soil Quality, because the majority of the LSA has not been previously disturbed by industrial activities;
- Marine Water Quality, because baseline concentrations of selenium and boron being under guideline thresholds protective of aquatic life; and
- Freshwater Fish and Fish Habitat, because baseline conditions of freshwater fish habitat are poor quality and unlikely to support freshwater fish as a significant dietary item for humans.

Further information on Vopak's analysis is available in Section 5.11 of the Application.

MARINE RESOURCES

Refer to Section 9 Marine Resources of this Report for more information regarding Vopak's assessment of baseline conditions for marine resources, which are also summarized below.

Marine Sediment and Water Quality

Vopak's assessment of marine sediment data indicated that baseline concentrations of arsenic, copper, 2-methylnaphthalene, and dioxins and furans (PCDD/Fs) were greater than applicable screening guidelines. Arsenic and copper levels measured in sediments within the LSA were similar to concentrations measured in sediments throughout the RSA and were considered representative of naturally occurring levels. Vopak found that maximum concentrations of PCDD/Fs and 2-methylnaphthalene were less than applied human health-based direct soil contact criteria and were not retained as final marine sediments COPCs in the HHRA.

Commissioning, systems testing and hydrotesting during Construction all have the potential to affect fresh or marine water quality. Changes in marine water quality could affect Human Health by altering water-based resources (i.e., surface or marine water) and associated uses (for example, country foods). The HHRA conducted by Vopak indicates that with no dredging being involved in the VPC Project, there would be limited and localized events of disturbance of sediments during Construction. As a result, sediment disturbance is not anticipated to result in significant increased exposure of humans to dispersed sediments. Vopak did not expect any impacts to Human Health from the discharge of water from the VPC Project to the environment because associated water would be tested prior to being discharged into the

marine environment using the VPC Project's storm water system. Water quality in the two storm water lagoons would be monitored prior to discharge into the existing PRPA RRUC drainage system, and outflow would be tested and controlled so as to not exceed pre-development flows.

Marine Fish and Invertebrates: Country Foods

Invertebrate species such as shrimp, prawn, clams, mussels and crab have all been observed within the LSA and are deemed recreationally and commercially important, but DFO has issued a ban on shellfish consumption within Prince Rupert and the surrounding 20 nautical miles. Fish species that are likely captured for human consumption include rock sole, codfish, halibut, lingcod and the five Pacific salmon species.

Vopak considered the Human Health exposure pathway for marine country foods as the organisms mentioned above may be exposed to COPCs present in sediments. Vopak did not include country foods as a pathway into the HHRA as the VPC Project was not anticipated to result in an increase in COPCs through the Project discharges or physical works. As the VPC Project does not include dredging, sediment disturbance was not anticipated by Vopak to result in significant exposures of marine biota with the potential to be consumed by humans. Vopak did not anticipate release of VPC Project-associated materials into the marine environment that would have a potential effect on Human Health and therefore concluded that Operations of the VPC Project would not have an effect on Human Health. Potential effects related to accidental marine spills are assessed in Section 15: Accidents and Malfunctions of this Report.

AIR QUALITY

Vopak established baseline air quality conditions by using monitored concentrations of sulphur dioxide (SO_2)[21]; nitrogen (NO_2)[22]; fine particulate matter ($PM_{2.5}$)[23]; particulate matter (PM_{10})[24]; and, GHGs, including carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) near the VPC Project site, which are summarized in Table 5.11-6 in the Application.

Vopak added these baseline concentrations into its air dispersion model along with all other industrial, commercial and residential emission sources in the RSA and found that these criteria air contaminants did not exceed provincial ambient air quality objectives (AAQOs) for human health protection. As a result, an evaluation of criteria air contaminants was not included in the HHRA and no final COPCs were identified in outdoor air or further evaluated in the HHRA. More detailed baseline conditions of air quality are available in Section 5: Air Quality of this Report.

[21] (1-hour and annual)
[22] (1-hour and annual)
[23] (24-hour and annual)
[24] (24-hour)

Construction and Decommissioning

Construction of the VPC Project has the potential to affect air quality in the LSA through equipment usage and road traffic, including through dust generation and burning of diesel fuel. Construction-related dust generation was expected to be short-term and localized, while generation of criteria air contaminants through burning diesel was not predicted to have a measurable change to air quality in the LSA. As such, Vopak did not expect impacts to Human Health related to changes in air quality during Construction.

Vopak's Application assumed that activities associated with Decommissioning would result in similar potential effects related to air quality, and therefore did not evaluate potential effects of Decommissioning activities related to Human Health.

Operations

Vopak's assessment on the Air Quality VC found that all criteria air contaminants and hazardous air pollutants (HAPs) were below AAQOs with the exception of acrolein, where concentration levels exceeded 24-hour AAQOs. Acrolein was retained for secondary screening, but not retained as a final COPC in the HHRA because the highest concentrations occurred in areas where there is no public access, and public exposure would be short-term and infrequent. HAPs that do not have federal or provincial AAQOs were retained in the HHRA for secondary screening using air quality benchmarks from federal and provincial health agencies. Vopak does not expect Human Health effects related to changes in air quality during operations as public exposure to HAPs and criteria air contaminants would be short-term and infrequent if at all given that public access to the VPC Project site is restricted.

TERRESTRIAL RESOURCES: COUNTRY FOODS

Detailed baseline information regarding terrestrial resources and country foods are available in Section 10: Terrestrial Resources of this Report and are summarized below.

Country foods available on Ridley Island include a variety of berries, such as currants, red raspberry, salmon berry and huckleberries and blueberries, as well as ducks and geese, black-tailed deer, porcupine and beaver. While public access to Ridley Island is restricted and hunting of wildlife is prohibited, workers and members of Indigenous nations may harvest and consume berries through prohibited access. The baseline assessments conducted by Vopak indicated that there was little potential for adverse effects of terrestrial country foods from VPC Project-related particulate deposition or uptake of contaminants from soil. Vopak's Application therefore assumed that country foods were of good quality and did not further evaluate the country foods baseline.

Construction

Increased dust generation and subsequent decreases in air quality have the potential to affect terrestrial foods through dust deposition on country foods at the VPC Project. Vopak identified mitigation measures associated with Construction-related potential impacts to country foods, which are summarized in Section 14.2.2 below. Considering these mitigation measures, Vopak did not anticipate that country foods would

have prolonged exposure to Construction-related dust.

As Vopak did not predict Construction-related effects to result in a measurable change to air quality in the LSA, the Application indicated that dust generation and related potential effects to terrestrial resources was not a significant exposure pathway. Vopak concluded that Construction of the VPC Project would not have an effect on Terrestrial Resources through changes in air quality, and therefore did not assess its potential impact to Human Health.

Operations

Vopak did not expect significant dust deposition on terrestrial country foods during Operations and concluded that operation of the VPC Project would not affect Human Health as a result of changes to terrestrial vegetation.

VISUAL QUALITY

The VPC Project would lie within the view of the Port Edward townsite, with terrain elevation ranging from sea level to 50 m above sea level. Ridley Island is also visible from the open waters of Chatham Sound to Port Edward. The Application indicated that three viewpoints in Port Edward directed towards Ridley Island already have values of landscape disturbance that exceed 30 percent, which is the maximum modification value for existing visual condition.

Baseline ambient light conditions were measured for three viewpoint sites (Port Edward South, Port Edward School and Ridley Island Road). Vopak did not predict any potential effects to Human Health related to the baseline scenario for visual quality, as measured light values at these viewpoint sites were representative of a low light environment that would be too low to impact Human Health. More detailed information regarding baseline information for visual quality is available in Section 8: Visual Quality of this Report.

Construction

Vopak's Application indicated that a measurable effect of lighting due to Construction is not expected to be discernable from other existing nighttime operations at the Port Edward viewpoints, but may be seen from marine-based viewsheds near Chatham Sound. As construction lighting is required for safety, security and marine navigation, mitigation measures including avoidance and reduction measures were deemed unfeasible in the Application.

Operations

VPC Project lighting would be visible during nighttime operations, due to the need for workers' safety. Vopak proposed the mitigation measures outlined in Section 14.2.2 below, and concluded that, with mitigation measures in place, no adverse effects to Human Health would result from changes in ambient light levels.

NOISE

Construction, operation and decommissioning of the VPC Project would have an impact on ambient sound levels in the LSA, and therefore would potentially affect Human Health. Detailed information regarding the baseline conditions of noise levels can be found in Section 7: Noise of this Report and summarized below.

The daytime sound level limit established by PRPA's noise management program related to terminal activities and their effects on residential areas is 55 dBA. Vopak's Application assumed that 55 dBA is a general port-wide target and assumed that this limit applies to the receptor nearest to a port facility. As background noise levels do not exceed the 55 dBA limit set out by PRPA, Vopak concluded that an evaluation of human health effects related to baseline noise was not warranted.

Construction and Decommissioning

Vopak estimated Construction sound levels compared to ambient conditions for daytime and nighttime at two receptors (see Table 5.11-9 in the Application). Nighttime Construction noise levels combined with ambient noise levels at POR 1 were expected to increase by 1 dBA over ambient levels, and therefore compliant with B.C. Oil and Gas Commission Noise Control Best Practices Guideline thresholds. When considering both predicted daytime and nighttime noise levels, the change in percent highly annoyed was predicted to be 0.2 percent at Receptor 1 and 0.1 at Receptor 2, which also falls below the Health Canada Guidance maximum threshold. Vopak concluded that Construction would not impact ambient noise levels, and therefore would not have an effect on Human Health.

Vopak's Application assumes that activities associated with Decommissioning would result in similar potential effects related to noise as with Construction, and therefore did not evaluate potential effects of Decommissioning activities on Human Health.

Operations

Vopak assessed development sound levels for Operations at two receptors and found the increase at each receptor would be from 1 to 2 dBA over ambient levels and would therefore be compliant with OGC guidance noted above. When considering both predicted daytime and nighttime noise levels, the change in percent highly annoyed was predicted to be 0.11 percent and falls below the Health Canada Guidance threshold. As such, Vopak determined that the potential impacts of noise during Operations would be negligible and no adverse effects to Human Health were expected.

Vopak proposed mitigating adverse effects to linked VCs by developing and implementing construction and operations environmental management plans (CEMP and OEMP), which would include best management practices for VPC Project-related activities. Mitigation measures proposed in the Application are summarized in the following sections of this Report:

- Section 5: Air Quality;
- Section 7: Noise;
- Section 8: Visual Quality;

- Section 9: Marine Resources; and
- Section 10: Terrestrial Resources.

Vopak incorporated these mitigation measures into its assessment of the Human Health VC and concluded that no residual effects to Human Health are expected from the VPC Project.

14.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

Based on a review of the Application and with feedback from the Working Group and Indigenous nations, the following key issues related to the assessment of Human Health for the VPC Project were identified:

- Residual and cumulative effects;
- Impacts to air quality; and
- Impacts to country foods and seafood harvesting.

RESIDUAL AND CUMULATIVE EFFECTS

Indigenous nations raised concerns with respect to potential residual and cumulative effects of the VPC Project, including:

- Concerns related to Vopak's conclusions that the VPC Project would not result in any residual adverse effects to VCs linked to Human Health after the application of mitigation measures; and
- Concerns that Vopak did not conduct a cumulative effects assessment for Human Health.

Some Indigenous nations suggested that Vopak should revise its residual effects conclusion for Human Health to account for any effects emanating from new information provided by Vopak during Application Review.

> In response, Vopak submitted a memo[25] on January 18, 2021 that carried forward its concluded effects on linked VCs into a residual effects characterization and cumulative effects assessment. Vopak noted in this memo that after completing the assessment, the conclusions were consistent with the conclusions presented in the Application.

Vopak would be required by PRPA to be a member of the Port Environmental Stewardship Committee, through which Vopak would support regional initiatives, including related to the management of cumulative effects. Vopak would also be required to implement a CEMP and OEMP for the VPC Project under the federal Section 67 Determination which incorporate several management plans for linked VCs such as air quality, noise, visual quality and marine sediment to mitigate any potential residual adverse effects. Furthermore, Vopak would also be required implement the measures identified specific to these linked VCs in its Summary of Mitigations Table which would be appended to the federal Section 67

[25] Residual Effects Memo

Determination.

DIESEL PARTICULATE MATTER AND AIR QUALITY

Working Group members raised concerns regarding Vopak's HHRA related to methods for considering air quality. Concerns were raised regarding:

- Vopak's comparison of VPC Project-related emissions of diesel particulate matter to model predictions of $PM_{2.5}$; and
- Vopak's exclusion of $PM_{2.5}$ and NO_2 from the HHRA though its air quality assessment identified AAQO exceedances for both.

Health Canada suggested that diesel particulate matter and PAHs be included in the HHRA. Gitga'at noted that though the air quality assessment identified that both NO_2 and $PM_{2.5}$ air concentrations were predicted to exceed AAQOs, these exceedances were not included in the HHRA.

> In response to comments related to diesel particulate matter, Vopak submitted a memo[26] in which it conducted an HHRA for diesel particulate matter using the air quality model developed for the Application. Vopak concluded that no additional impacts to Human Health would occur as a result of diesel particulate matter emissions released during Operations.
>
> Vopak acknowledged that an error in the HHRA had occurred related to NO_2 and $PM_{2.5}$ predictions and indicated that these exceedances would not have impacts on Human Health as predicted exceedances would occur at sites where the public would not be present.

Health Canada acknowledged the additional information provided in the memo but expressed concern that Vopak did not consider the potential carcinogenic effects of diesel particulate matter.

> Vopak responded that marine safety zones are determined by the PRPA in consultation with Vopak and local predicted exceedances would be considered in that determination. Vopak committed to implementing an air quality monitoring program at the terminal and indicated that the PRPA is in the process of installing a new air quality monitoring station in Port Edward.

Vopak would be required by the PRPA to maintain marine safety zones to ensure public access is restricted from areas where AAQO exceedances are predicted. These marine safety zones are determined by the PRPA in consultation with Vopak. Vopak would also be required by the PRPA to implement a CEMP and OEMP which would incorporate an air quality monitoring program for dust during Construction and Operations. This would include best management practices to limit potential impacts related to dust and validate predicted air quality exceedances.

Considering Vopak's response as well as the federal requirements, the EAO is of the view that potential impacts to Human Health related to air quality are sufficiently addressed for the purposes of this EA.

[26] Diesel Particulate Matter Human Health Risk Assessment for Operations

IMPACTS TO COUNTRY FOODS AND SEAFOOD HARVESTING

Indigenous nations and Health Canada raised concerns regarding harvester activity downwind of the VPC Project and potential impacts to Human Health. An overview of Indigenous nations' harvesting activities is described in Part C of this Report.

> Vopak considered harvester activity downwind of the VPC Project in the Application when it identified how far the worst-case air quality objective exceedances. The worst-case emissions scenario assumes that all sources are active (ships in transit, tugboat assist, ships at berth with their auxiliaries active as well as rail activity) for every hour of every day. Vopak did not expect any impacts to harvester activity as this scenario would not occur frequently, and for safety reasons, the public would likely not be in the area around the marine jetty during ships moving to and from the berths.
>
> In response to an information request from Health Canada, Vopak stated that if constructed, the VPC Project would be regulated by site-security measures and visitor control procedures (i.e., a secure perimeter fence would surround the VPC Project area and a closed-circuit television system would be used to control access). Vopak expects that public access, including access by members of Indigenous nations, to areas where exceedances are predicted would be prohibited.

Metlakatla raised concerns that noise and visual quality, including ambient light, may potentially impact nighttime country foods harvesters near the VPC Project area. Metlakatla affirmed that increased noise and light levels may cause members to have less desire to recreate or harvest in the area, which has the potential to impact mental health and personal well-being resulting from decreased participation in traditional practices.

> Vopak acknowledged that anything that adversely affects harvesting participation could affect Metlakatla First Nation's well-being. Vopak indicated that it concluded that the VPC Project would not have a significant effect on noise and light, after mitigation measures are employed, and that it would have a negligible effect on mental health and well-being, if any.

As noted above, Vopak would be required to implement an air quality monitoring program which would include best management practices to limit dust generation and mitigate potential impacts to vegetation. Vopak would also be required to implement a Light Management Plan which would include the use of LED lighting pointed downward to only be used where and when needed as well as sensors to turn off lights at appropriate time. Vopak indicated in the Application that further mitigation, including avoidance, was not considered feasible as operational lighting must be in place for safety, security and marine navigation purposes.

14.4 THE EAO'S ANALYSIS AND CONCLUSIONS

After considering the issues raised above related to air quality, noise, visual quality and cumulative and residual effects, the measures identified in Vopak's Summary of Mitigations Table that would be required under the federal Section 67 Determination, as well as federal programs and initiatives in the area, the

EAO concludes that the VPC Project would not result in any residual adverse effects on Human Health for the following reasons:

- Effects related to changes in air quality – while there is a negligible to low residual short-term effect predicted for air quality due to diesel particulate matter and dust generation during construction and operations, Vopak would be required to maintain safety zones decided by the PRPA to prevent the public from accessing areas where exceedances are predicted. Impacts to country foods and harvesting activities are unlikely as public access to areas surrounding the jetty would be restricted. The EAO notes that some uncertainty remains with respect to the potential carcinogenic effects of diesel particulate matter, however air quality monitoring remains a component of the CEMP and OEMP required by federal authorities to mitigate potential effects.
- Effects related to noise and visual quality – while there is a low to moderate residual effect predicted for both noise and visual quality, potential for light and noise to impact human health was considered and levels were determined to be below regulated limits. The EAO acknowledges that potential impacts to Indigenous health and well-being, including impacts to seafood harvesting, goes beyond the physical determinants of health. Potential impacts of the VPC Project on community well-being and Indigenous health and well-being is discussed further as appropriate in Section 12: Social and Economic Effects and Part C of this Report.

Considering the above analysis and the conditions identified in the Section 67 Determination, the EAO concludes that the VPC Project would not have significant adverse effects on Human Health.

15. ACCIDENTS AND MALFUNCTIONS

This chapter provides an assessment of potential adverse effects from unplanned events that may occur with the VPC Project. Such events may result in effects to environmental values, human health, social, and economic values, and the interests of Indigenous nations.

The VPC Project is the first major storage facility for exporting bulk liquid petroleum and petrochemical products in the Port. The products will be delivered by rail, stored in a facility (i.e., tank farm) and exported by ship. (There is an existing petroleum gas [propane] export terminal adjacent to the VPC Project site where Vopak's parent company is a joint owner).

Accidents and malfunctions may occur during Construction, Operations, and Decommissioning of the facility. During Operations, accidents and malfunctions may occur in association with rail operations, storage facility operations (including unloading products from rail tanker cars, and loading products onto ships), and during shipping. During these times, an accidental loss of product containment could result in spills of contaminants into the receiving environment (land and marine) and or explosion/fire.

15.1 BACKGROUND

REGULATORY CONTEXT

Vopak's customers will arrange the shipping of their products to and from Vopak's facility, and Vopak will not own the products it will handle. Vopak's customers, not Vopak, will be required to obtain export licences under the *National Energy Board Act*.

The foreshore, the land between high and low watermarks of the ocean, and submerged land is provincial aquatic Crown land[27]. The area that makes up the Port includes aquatic Crown land and Crown land that BC transferred to Canada. The PRPA ensures collective oversight of vessel traffic at the Port[28] in a coordinated effort between the CCG's Marine Communications and Traffic Services, the Pacific Pilotage Authority, BC Coast Pilots, SMIT Marine, and the Western Canada Marine Response Corporation (WCMRC), and the Canada Border Services Agency.

As mentioned in prior chapters, the VPC Project is located on Ridley Island (approximately 552 ha) which is land that is administered by the PRPA, and which has been designated for Port industrial development (PRPA Land Use Plan, September 2020[29]). The PRPA controls/prohibits public access to Ridley Island.

The federal government has constitutional authority for shipping and navigation in Canadian waters. Federal agencies such as Transport Canada, CCG, ECCC, and DFO regulate marine transportation. Responsibility to protect and manage marine resources is a joint effort between provincial and federal agencies[30]. For example, BC issues Crown land tenures for aquaculture operations and licenses aquatic plant cultivation, and the federal government regulates finfish and shellfish aquaculture.

Accidental spills of liquid petroleum products into the marine environment within the Port area have the potential to spread and affect provincial aquatic Crown land in other areas.

The Application reported that the following guided the assessment of potential effects from accidents and malfunctions:

- *Canadian Environmental Protection Act*;
- *Canada Marine Act*;
- *Canada Shipping Act*;
- *Canadian Transportation Accident Investigation and Safety Board Act*;
- *Fisheries Act and regulations*;
- *Marine Liability Act*;

[27] (https://www2.gov.bc.ca/gov/content/industry/crown-land-water/crown-land/crown-land-uses/residential-uses/private-moorage).
[28] https://www.rupertport.com/marine-operations-safety/
[29] https://www.rupertport.com/land-use-plan/
[30] https://www2.gov.bc.ca/gov/content/industry/crown-land-water/crown-land/crown-land-uses/aquaculture

- *Migratory Birds Convention Act*;
- *Pilotage Act*;
- *Transportation of Dangerous Goods Act*, regulations, and standards (Emergency Response Assistance Plan approval);
- Port of Prince Rupert Harbour Operations Practices and Procedures, and Port Information Guide (PRPA); and
- environmental protection and safety provisions in accordance with international codes and standards.

The BC *Public Health Act* may also apply in the event of an accident or malfunction. Though there is no requirement for the PRPA or other federal agencies to apply the BC *Environmental Management Act* in their oversite of the VPC Project, Vopak reported in the Application that:

- accidental spills would be reported through the Provincial Emergency Program as per the BC *Environmental Management Act Spill Reporting Regulation*; and
- contaminated materials (e.g., soils) spills would be cleaned up as per the BC *Environmental Management Act Hazardous Waste Regulation*.

The *Environmental Management Act* does not apply to the marine environment.

Canada's ship-source oil spill preparedness and response regime[31] is based on the "polluter pays" principle, whereby the polluter is responsible for costs related to cleanup and pollution damage. The regime sets the guidelines and regulatory structure for the preparedness and response to marine oil spills and ensures that industry is prepared for and responds to spills in Canadian waters. The CCG is responsible for ensuring the cleanup of ship sourced spills of oil and other pollutants. For spills that are identified as recoverable, the CCG takes charge and, if necessary, sets up a response structure to coordinate the cleanup[32] if the polluter fails to do so. The CCG expects any polluter to engage (fund) contractors for the management of the response to pollution.

Liability and compensation for ship-source oil pollution in Canada is based on international conventions developed by the International Maritime Organization which make sure the polluter pays. Polluters are financially responsible, even if the spill is accidental. The *Marine Liability Act* incorporates these conventions and under the Act shipowners are liable, up to a limit based on the size of their ship, for eligible claims of loss or damage related to ship-source oil pollution, whether the oil is carried as cargo or used in the operation of the ship. Eligible claims include pollution prevention measures, clean-up costs, property damage, fisheries losses, subsistence losses, tourism losses and environmental remediation, and claimants can submit their claims directly to the shipowner or the shipowner's insurer.

[31] https://tc.canada.ca/en/marine-transportation/marine-safety/national-oil-spill-preparedness-response-regime-0
[32] https://www.ccg-gcc.gc.ca/publications/environmental-environnementale/marine-pollution-deversements-en-mer/plan-overview-eng.html

In the event of an oil tanker spilling its cargo, if the costs of pollution were more than the shipowner's limit of liability additional compensation could be paid by the International Oil Pollution Compensation Funds, which is financed by industry. Canada's domestic fund, the Ship-source Oil Pollution Fund[33] (SOPF) is also available. The SOPF provides compensation for oil pollution damage caused by any type of oil from any type of vessel, even when the source of the spill is not known. There is no limit to the amount of compensation available from the SOPF for eligible claims. Any person in Canada who has suffered a loss, or incurred costs related to oil pollution damage in Canadian waters can file a claim directly with the SOPF. Once a claim is assessed and paid, the Administrator of the SOPF is required to take all reasonable steps to recover compensation from the polluter.

Transport Canada is currently reviewing the *Marine Liability Act* to consider compensation for non-economic losses, such as cultural losses. The Government of Canada's commitment was as follows: "Looking ahead, the government will further assess the scope of losses that could be addressed by Canada's liability and compensation regime for marine oil spills (for example, non-use value)."

In terms of pollution caused by substances other than oil, under the *Marine Liability Act*, the shipowner is strictly liable for costs and expenses associated with preventive measures and response incurred by the Minister of Fisheries and Oceans in respect of reasonable measures taken under section 180 of the *Canada Shipping Act*, 2001, or any other person in respect of the measures that they were directed to take or refrain from taking under paragraph 180(1)(c).
Canada has ratified the 2010 Hazardous and Noxious Substances (HNS) Protocol that aims to ensure prompt and effective compensation for HNS incidents. HNS refers to any substance other than oil that would have a negative impact if released, including to public health and safety, the environment and marine life, as well as impacts on local economic activity. Unlike the oil regime, HNS includes many more substances, possible interactions between substances that could be released in an incident, and different behaviours in the marine environment.

The HNS Convention adds to the oil regime by covering more substances (e.g., light oils (gasoline, light diesel oil, kerosene, etc.), chemicals, noxious liquids, gases, liquefied natural gas, liquefied petroleum gas, etc.) and additional damage, such as loss of life and personal injury, related to HNS incidents.

Under the Protocol, the shipowner is first and foremost strictly liable, up to a limit based on the size of their ship (up to approximately 200 million Canadian), even if they are not at fault. They will be required to maintain insurance to cover up to their limits of liability. Shipowner liability will be complemented by an HNS Fund financed by contributions from industries that receive and import HNS. Once the Protocol enters into force, the Fund will be created. Once the Fund is available, approximately $500 million will be available per incident to cover eligible claims. Eligible claims for HNS damage include loss of life or personal injury, loss of damage to property outside of the ship, economic losses to the fishing and tourism industries, costs of preventive measures, and costs of reasonable environmental reinstatement. The Protocol will enter into force 18 months after the Convention is ratified by 12 countries with major ports

[33] http://sopf.gc.ca/

and industries receiving HNS. To date, 5 states, including Canada, have ratified the 2010 Protocol.

Transport Canada, in partnership with the CCG, ECCC and DFO, is working with experts, industry, and coastal and Indigenous communities to explore options for how Canada could better prepare for and respond to ship-source dangerous goods releases. The Oceans Protection Plan initiative committed to outlining options for a preparedness and response program for HNS. Currently, the CCG has the authority to respond to all types of pollution from ships, which would include HNS. There is not, however, a formalized national approach, or a common understanding across the country of who should be involved in HNS response and what steps should be followed.

The HNS initiative is considering options such as developing a phased approach, with the first phase to include acceding to the International Maritime Organization's agreement Protocol on HNS, identifying knowledge and capacity gaps, and clarifying roles and responsibilities. The second phase would look at exploring other actions to increase preparedness, such as, increasing HNS response equipment, researching the movement and impacts of HNS on the environment, and data collection and risk analysis, and regulatory amendments to increase the role and responsibilities of industry.

In terms of damage to property that is the result of a collision (e.g., to commercial fishing gear) which does not involve spills/pollution, under the *Marine Liability Act* compensation for damage would need to be sought through a civil claim in the courts, and liability would depend on the circumstances under which the damage occurred, and which vessel is deemed to be at fault.

TEMPORAL BOUNDARIES

Vopak reported that the VPC Project will:

- take two years to construct;
- operate for a minimum of 50 -years, but that the maximum number of years is not known as that will be dependent upon market conditions; and
- take 12 months to decommission.

PRODUCTS

The Application reported that the VPC Project is a bulk liquids storage and export terminal for:

1. light diesel (liquid petroleum product);
2. gasoline (liquid petroleum product);
3. propane gas (liquified petroleum gas product); and
4. methanol (liquid petrochemical product).

During the review of the Application Vopak reported that some products are not pure and may contain small amounts of other substances, the facility will be capable of handling other types of products which may have implications on the assessment of accidents and malfunctions, options to handle other products

were being considered, and it will seek an amendment to its environmental assessment certificate for this, should one be issued.

Excluding loaded rail tanker cars, the facility will have the capacity to store up to:

- 260 million liters (260,000 cubic meters [m^3]) of light diesel and gasoline (there is uncertainty about what the maximum individual tank capacities will be, and the number of tanks);
- 90 million liters (90,000 m^3) of liquid propane gas (one tank); and
- 220 million liters (220,000 m^3) of methanol (there is uncertainty about what the maximum individual tank capacity will be, and the number of tanks until detailed design is completed and reviewed by the PRPA).

During Operations, the facility will export about:

- *light diesel and gasoline (total)* – 2.5 billion liters/year; 85 million liters/vessel every 12-days;
- *methanol* – 7.6 billion liters/year; 60 million liters/vessel every three-days; and
- *liquid propane gas* – 2.1 billion liters/year; 84 million liters/vessel every 14-days.

The vessels transporting these products will also be carrying a maximum of about 715,000 to 2.86 million liters of heavy grade bunker fuel oil each (methanol, and other carriers respectively).

The properties/characteristics and consequences of accidents and malfunctions (and the effectiveness of measures to mitigate those) involving the above liquid products will vary:

1. *Liquid propane gas* is a hazardous but not a noxious substance; is highly flammable; if spilled on land or marine waters will pool and rapidly evaporate; and spills are impossible to contain and recover.
2. *Methanol* (also known as methyl alcohol) is a hazardous and noxious substance; is highly flammable; if spilled on land will seep through porous materials into the ground; if spilled into marine waters will initially float and create vapour, then fully dissolve and mix with water; and is impossible to recover and attempts to contain spills should not be made for safety reasons.
3. *Light diesel and gasoline* are “non-persistent oils”; are hazardous and noxious substances; diesel is not flammable, gasoline is flammable and more volatile; if spilled on land these products will seep through porous materials into the ground if not contained; diesel has a high evaporation rate (up to two-thirds of the initial spill volume over a two day period) and is highly insoluble in water; and, if spilled into marine waters these products have the ability to spread rapidly.
4. *Bunker fuel oil* is a “persistent oil”; is a hazardous and noxious substance; is not flammable; and, if spilled into marine waters has the ability to spread from moderately quickly to rapidly with a moderate to slow dispersion rate; and has very limited ability to evaporate.

Bill C-48 (2019) is federal legislation that prohibits an oil tanker at the Port to load into or contain in its

hold any crude oil or persistent oil, or any combination of the two, in an amount greater than 12,500 metric tons (about 12.5 million liters). This includes crude oil and refined products such as marine diesel oil and bunker fuel oil. During the review of the Application, Vopak confirmed that the light diesel oils handled at the facility will be non-persistent diesel oils, and none will be the heavier grade persistent diesel oils in Bill C-48. Vopak also reported that the vessels calling at the facility will likely have numerous holds where it would potentially be possible to store different products, but it does not intend to load more than one type of product onto a vessel, and would consider committing to this.

RAIL OPERATIONS

Vopak reported that the VPC Project requires additional rail tracks within the PRPA's Ridley Island Road and Railway Utility Corridor (RRUC), which loops around the storage facility site, and that the PRPA will realign two existing rail tracks and construct seven new rail tracks for facility Operations (the facility railyard), which are to be used solely by the VPC Project. Within the facility railyard, Vopak will have care and control of loaded rail tanker cars and use the tracks to make up and break down unit trains, unload products, and shunt rail cars.

A federal environmental assessment of the PRPA's RRUC was conducted in conjunction with a proposed potash export terminal (Comprehensive Study Report, Canpotex Potash Terminal Project and Ridley Island Road, Rail, and Utility Corridor, Canadian Environmental Assessment Agency, September 2012). That environmental assessment did not consider use of the RRUC for handling rail tankers of liquid petroleum and petrochemical products and did not assess accidents and malfunctions associated with such products. BC contributed 15 million dollars towards the construction of the RRUC, which was completed in 2015 (PRPA Land Use Plan, September 2020). The VPC Project is situated where the potash terminal was to have been located.

Vopak reported that spills in the facility railyard for loaded tanker cars will be dealt with by Vopak and the PRPA in accordance with the federal *Transportation of Dangerous Goods Act* and Regulations. The PRPA reported this rail area is within the upper intertidal area of Porpoise Harbour, consists of highly porous rail ballast underlain by compacted rock fill, the groundwater table is generally near the surface, and surface stormwater discharges directly into Porpoise Bay on the east side of Ridley Island. Two culverts with gate valves are in place to contain RRUC stormwater, should an issue be identified. Rail cars will be required to travel at low speeds.

FACILITY OPERATIONS

The footprint of the facility extends from the east side of Ridley Island (Porpoise Bay) where the rail unloading platform is located, to the west side of Ridley Island where the marine terminal for loading vessels is located. The Application reported that the facility is based on basic engineering, and all components and dimensions are approximate and may be subject to change.

The Application reported that the facility would also store in bulk volume water that contained contaminants from cleaning and rinsing product storage tanks and piping during Operations, which would

be transported off-site for treatment at an approved facility. During the review of the Application Vopak reported this was an error, and that lines would remain full at all times and are only cleaned as an infrequent maintenance activity (lines are cleaned using a pig propelled by nitrogen gas, a common industry practice). Vopak reported that rail tanker cars (except in case of emergency or repair) and vessel holds will not be purged or cleaned at the facility.

All surface runoff at the facility will flow into two storm water lagoons (which will undergo federal design assurance processes as administered by the PRPA). This includes water that collects within the structures around storage tanks designed to contain accidental spills. Water quality in the lagoons is to be monitored and if necessary, the water is to be treated prior to being discharged from the VPC Project site through the SE corner of PRPA's RRUC, through two culverts with gate valves (which can contain RRUC stormwater should an issue be identified) and into Porpoise Bay about 100 m away or removed for disposal.

The marine terminal includes a jetty and loading platform. Firewater pumps will be located along the jetty on separate platforms. During the review of the Application Vopak reported that watercraft and marine spill response equipment will be stored on a firewater pump platform and deployed from that location.

The design of the terminal does not allow vessels to be docked on/against the loading platform in a conventional manner, and requires a higher degree of reliance on support vessels (tugs). Each vessel will be moored close to the platform using four buoys anchored to the sea floor (two buoys off each end of the vessel). A line from each buoy to the vessel will hold it in place off of the jetty platform during loading. Vopak reported that it was not able to document successful application of such a system to berth vessels elsewhere in BC or Canada, and in a comparable setting. The Application reported that with operational procedures, vessel approach systems and tug redundancy, there is a high probability that protection barriers to prevent vessels from striking the loading platform or jetty will not be required. The federal *Pilotage Act* requires pilotage service for Canada's coasts. The Application did not report any feedback from the BC Coast Pilots (Canadian Pacific Pilotage Authority) about the marine terminal, a service that this organization has provided at the Port[34].

The Application reported that there will be no fuel loading (bunkering) or supply delivery to vessels while product loading is in progress at the marine terminal. The Application did not consider accidents and malfunctions if bunkering occurs at the terminal when product is not being loaded, or before vessels arrive at the terminal or after they leave the terminal. During Application review, the PRPA reported that it hopes to have a bunker fuel oil supplier in Prince Rupert "in the not too distant future", and it is most probable that it will permit bunkering at Vopak's berth if hoses/loading arms were disconnected but that will be Vopak's decision. Vopak reported that it will have no authority over vessel operations, but it could communicate to its clients that bunkering will not be permitted when berthed at its facility. From information on the PRPA's website, the EAO understands that a supplier would deliver bunker fuel to vessels by barge, and as such there is uncertainty where the vessels calling at Vopak's terminal might be fueled (e.g., this could occur near the terminal).

[34] https://www.bccoastpilots.com/

PROJECT LOCATION

Ridley Island is not immediately adjacent to populated areas. The community of Port Edward is across Porpoise Channel about three km to the east. The Application reported that BC Ferries on route to/from Prince Rupert will pass near the VPC Project marine terminal. The PRPA reported it will likely establish a 100 m safety zone around the terminal, and that BC Ferries will maintain approximately 260 m from the terminal.

Information from the PRPA notes that the North Pacific can see significant storm events, and while the inner harbor of the Port is protected from the full brunt of weather, there is still risk of anchor dragging when ships are at anchor (unloaded, cargo vessels sit higher in the water and more surface area is exposed to wind). The Application reported that the PRPA considers winds above 46 km per hour to be too strong to berth vessels.

The west coast of Ridley Island where the VPC Project is located is in the outer harbour of the Port and is not as protected from weather as the Port's inner harbor. Vopak reported that the VPC Project terminal design is for winds up to 102 km per hour, operating parameters are left up to individual terminal operators to determine, and that it is expected that vessels will be unable to berth at the marine terminal 19-days per year due to adverse weather conditions. The jetty and platform will be at a high enough elevation (11 m above the low-water mark and four m above the high-water mark) to reduce the potential for overtopping during storm events.

Vessel loading is expected to take approximately 30 hours at 830 liters per second (50,000 liters or 50 m^3 per minute), and on average vessels are expected to be moored at the terminal for 40 hours. The Application reported that deteriorating weather conditions could stop loading operations and force partially loaded vessels to unberth and seek anchorage at one of the designated anchoring locations in the outer Port. Preparing for a vessel to depart from the terminal would normally take approximately six hours. Use of anchorages by vessels was not included in the scope of the VPC Project assessment, and marine spill scenarios associated with partially loaded vessels at anchor were not considered in the assessment of accidents and malfunctions in the Application.

Ridley Island is in Chatham Sound near the mouth of the Skeena River. A large portion of the area around the VPC Project lies within the freshwater and sediment plume of the river. Salinity, turbidity and local currents across Chatham Sound are affected by freshwater input, particularly near the Skeena River estuary. The Application reported that, due to major freshwater input and strong tidal mixing, Chatham Sound has significantly higher primary productivity relative to surrounding areas. Within Chatham Sound there are diverse Indigenous nation food fisheries and gathering activities, and commercial and recreational fisheries.

Bordering or within Chatham Sound, and the lower Skeena River and estuary, there are a number of provincial Protected Areas, including the:

- Lax Kwaxl/Dundas and Melville Islands Conservancy[35];
- Ksgaxl/Stephens Islands Conservancy[36];
- Lucy Islands Conservancy[37];
- Skeena Bank Conservancy[38]; and
- Kennedy Island Conservancy[39].

Within the administrative boundaries of the PRPA, other major projects proposed at the mouth of the Skeena River raised concerns. Stemming from this, in January 2019, the PRPA announced a Development Moratorium on the Flora, Agnew, and Horsey Banks, located in the marine environment adjacent to Lelu Island. The moratorium is not designated in law but is a voluntary PRPA designation set for a minimum 20-year period, to be revisited every five years. Vopak reported that Flora Bank, a 500-ha sand and eelgrass ecosystem, is classified as critical habitat by DFO and is considered important habitat for waterfowl and migratory species. Ridley Island is about 300 m northwest of the area and Lelu Island. The VPC Project marine terminal on Ridley Island is about 2.5 km northwest of the Development Moratorium area.

15.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

EFFECTS

Accident and malfunction scenarios are unplanned and unexpected events that are foreseeable but considered unlikely to occur if standards and codes, operational procedures and risk management measures are successfully incorporated into project design. The hazard scenarios considered in the Application included, for example:

Construction and Decommissioning

- Spills of contaminants and hazardous materials.
- Release of sediment into water bodies.
- Fly rock from blasting (Construction).
- Fire or explosion.
- Safety incidents from the malfunction or improper use of equipment.

Operations – Land

[35] https://bcparks.ca/explore/cnsrvncy/lax_kwaxl_dundas_melville_islands/
[36] https://bcparks.ca/explore/cnsrvncy/ksgaxl-stephens-is/
[37] https://bcparks.ca/explore/cnsrvncy/lucy-isl/
[38] https://bcparks.ca/explore/cnsrvncy/skeena-bank/
[39] https://bcparks.ca/explore/cnsrvncy/kennedy-isl/

- Risk involving rail and unloading operations (e.g., car derailment, loss of containment, fire, or explosion).
- Risk involving spill or leaks from the propane gas cooling process, product storage and terminal operations, structural failure (e.g., loss of containment, fire, or explosion).

Operations – Marine

- Risk involving vessel berthing and cargo loading (e.g., collision with berthed vessel or loading platform/jetty, grounding, loss of containment, malfunction, fire, or explosion).
- Risk from marine transit between the marine terminal and Triple Island (e.g., collision, grounding, structural failure, loss of containment, fire, and explosion).

The environmental conditions at which vessel berthing and loading of products must cease or be postponed have not been established, and these thresholds are to be specified in operational management plans.

For Construction, Operations and Decommissioning, Vopak concluded that with risk reduction measures, accident and malfunction scenarios are unlikely to occur and interact with Valued Components, and if they did occur residual adverse effects are either not anticipated or would not be significant with mitigation strategies. The risk of a propane leak resulting in human harm, casualties or a fatality was considered to be remote. With respect to biophysical resources, the principle concern identified was the potential effects of a bunker fuel oil spill (not a product to be carried as cargo) from a vessel collision on marine fauna, including marine mammals.

The assessment of accidental spills of contaminants into the marine environment was based on the likelihood of events occurring and their severity. Overall, the assessment concluded that with best practices and preventative measures severe events were unlikely, and based on this, that there would be no significant residual adverse effects on Valued Components.

MITIGATIONS

Vopak proposed to mitigate accidents and malfunctions by developing and implementing Environmental Management Plans for Construction, Operations, and Decommissioning that include the following component plans:

- Health and Safety Management Plan;
- Petrochemical Storage and Handling Plan;
- Preventative Maintenance Program and Periodic Inspection Plan; and
- Spill Prevention and Emergency Response Management Plan.

In some scenarios the plans that Vopak develops to respond to accidents and malfunctions may be applied along with similar plans maintained by the PRPA. These plans include measures to meet regulatory requirements and industry standards, and best management practices, such as:

- planned maintenance and periodic inspections;
- safety requirements, procedures for working around the site, specifications for handling products and equipment, and training;
- identifying responsible personnel and external contacts, communication procedures, reporting requirements, and information to assist emergency responders; and
- specifying containment and clean-up procedures, and equipment to be stored on site.

Key design measures reported in the Application include:

- impermeable floors and bunds under the rail unloading area to contain any accidental releases of product from rail tank cars;
- secondary containment around storage tanks (pit with impermeable floors and bund walls);
- a control and safety system that will monitor, alarm, and shut down all or part of the facility in the event of an emergency; and
- use of vessels that are double-hulled.

Vopak proposed to have a spill boom in place during the loading of light diesel oil and gasoline, but not during the loading of liquid propane gas or methanol.

Vopak will be responsible and liable for accidents and malfunctions that occur during its rail operations, within the storage facility, and at the marine terminal. This includes accidental spills where Vopak has care and control of products, and includes spills that occur on land which find their way into the marine environment.

Under the *Canada Shipping Act* and *Environmental Response Regulations*, as the operator of an oil handling facility, Vopak will be responsible for maintaining Oil Pollution Prevention Plans and Oil Pollution Emergency Plans. These plans include procedures to be followed for loading oil onto vessels and preventing oil spills. As the operator of a class 4 oil handling facility with an oil transfer rate of 3,000 m^3 per hour, Vopak will be required to demonstrate the ability to respond to a discharge of at least 50 m^3 (50,000 liters) of oil product at the facility, and to have an arrangement with the WCMRC for responding to the quantity of oil being loaded to the prescribed maximum of 10,000 tonnes (about 11 million liters of diesel).

Vopak will also be responsible for procedures to ensure safe berthing and unberthing of vessels, and the safety of vessels while alongside the terminal. Vopak will only be liable for accidental spills that are associated with loading products onto vessels. Otherwise, Vopak will not be liable for accidents and malfunctions and the *Marine Liability Act* would apply while vessels are berthed, berthing or unberthing and underway along the marine transit route between the terminal and Triple Island (see Regulatory Context above).

15.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

During the review of the Application, the public and the Working Group, including Indigenous nations, raised concerns about:

1. rail accidents in areas/communities outside of Ridley Island during Operations, and public health and safety (outside the scope of the VPC Project);
2. the environmental effects of accidents and malfunctions during Construction and Decommissioning;
3. serious accidents and the health and safety of the public and members of Indigenous nations (e.g., re explosion/fire, and effects on air quality);
4. the risk assessment methodology for accidents and malfunctions, and the conclusions reached in the Application;
5. accidents involving VPC Project vessels when anchored and not berthed at the marine terminal (outside the scope of the VPC Project assessment);
6. spills in the marine environment or fire/explosion, and effects on Valued Components and the interests of Indigenous nations given the location/setting of the VPC Project (e.g., to marine wildlife, beaches, tidal flats, and critical salmon habitat such as the eelgrass beds by Lelu Island); and
7. the effectiveness of measures to eliminate risk or reduce risk to an acceptable level, and to mitigate effects if an incident occurs (e.g., contain and clean up marine spills given tidal and weather conditions in the area).

Indigenous Nations (Gitxaala, Kitselas, Kitsumkalum, Lax Kw'alaams, Metlakatla) expressed concerns about the Quantitative Risk Assessment referenced in the Application, including relating to spills in the marine environment, and requested that this study be provided. Vopak responded that the study was shared with the PRPA for feedback (e.g., re potential impacts to nearby facilities on Ridley Island) and used to inform the assessment of potential accidents and malfunctions, but is considered confidential as it contains proprietary information. Vopak provided supplemental information, including from the Quantitative Risk Assessment, and hosted a meeting on the study with Indigenous Nations to address questions and concerns.

ECCC questioned Vopak's assertion that spill containment measures would be immediate and adequately contain spills, and noted that containment measures depend upon the volume and location of a spill, ocean and weather conditions at the time of a spill which influence spread, and response times, and that petroleum products have the potential to spread large distances in a short period of time.

The EAO requested additional information from Vopak regarding the assessment of effects to Flora's Bank and salmon populations there specifically, given the (albeit low) probability of reaching Flora's Bank and

the Skeen River Estuary in some spill scenarios. This information is pending as of the time of this draft Assessment Report.

Transport Canada determined that the VPC Project could be considered a prescribed class oil handling facility (*Canada Shipping Act Environmental Response Regulations*), and Vopak could be required to prepare an Oil Pollution Prevention Plan and an Oil Pollution Emergency Plan. Transport Canada recommended that vessel tug and berthing requirements be discussed and approved by the BC Coast Pilots, and asked if TERMPOLs completed in the region informed the VPC Project design/assessment (these consider changes in regional shipping activity when a marine terminal is built and potential threats to safety, and are voluntary and coordinated by Transport Canada).

In response to the concerns raised, Vopak reported that the accident frequency for VPC Project vessels is about one accident in 24 years (including scenarios involving collisions, powered grounding, drift grounding, structural failures, and fire/explosions), but emphasized that an accident does not mean that a spill will occur. Vopak also provided supplemental information about the risks of loss of life from the loss of product containment, potential effects to marine use and navigation and community services and infrastructure, and potential effects of spills in the marine environment. Vopak acknowledged that the VPC Project would be a class 4 oil handling facility. Vopak reported it had been in discussions with the BC Coast Pilots and will continue these, and that TERMPOLs completed in the region were not taken into account as part of the VPC Project design/assessment as marine shipping is the responsibility of Vopak's customers and marine shipping safety is not within the scope of the VPC Project.

CONSTRUCTION AND DECOMMISSIONING

With respect to the Construction and Decommissioning of the VPC Project, collectively, the information provided by Vopak suggested that accidents and malfunctions are more likely to be of consequence to the health and safety of workers than the public and the environment.

OPERATIONS – MARINE USE AND NAVIGATION

With respect to marine navigation, for accidents during VPC Project Operations, collectively, the information provided by Vopak predicted that impacts to recreational vessels would be limited, impacts to commercial vessels would likely be limited to those calling at the terminal, and with PRPA harbour procedures and protocols in place, including safety zones around the terminal, that potential adverse effects on marine use and navigation would be minimal.

OPERATIONS – COMMUNITY SERVICES AND INFRASTRUCTURE

With respect to community services and infrastructure, during VPC Project Operations, collectively, the information provided by Vopak predicted that while anticipated to be of low likelihood, an accident would have a substantial, shorter-term impact on health care services in the region.

OPERATIONS – HUMAN HEALTH AND SAFETY

With respect to a serious accident involving explosion/fire and spills during VPC Project Operations, collectively, the information provided by Vopak predicted that in the worst-case scenario involving liquified propane gas, such an incident is highly unlikely and loss of life (1.8 to 7.5 fatalities per 10,000 years) would mostly be limited to on-site facility personnel. Vopak predicted that impacts on air quality (and noise generated, visual quality and ambient light) would be temporary and reversible.

OPERATIONS – TERRESTRIAL ENVIRONMENT

With respect to accidents involving explosion/fire and the terrestrial environment adjacent to the facility, collectively, the supplemental information provided by Vopak during the review of the Application reported that impacts to vegetation, wetlands, and wildlife habitat could be high in magnitude, and wildlife disturbance, displacement, and mortality could be low to moderate in magnitude for birds, amphibians, small and medium-sized mammals, and invertebrates, depending on the season of the event and the presence or absence of migratory species and eggs or young. (This assumes that the lands adjacent to the facility are not developed by the PRPA for industry during its minimum 50 -year operation. Over time, Ridley Island may be fully developed by the PRPA for Port operations (PRPA Land Use Plan, September 2020).

OPERATIONS – MARINE ENVIRONMENT AND SPILLS

With respect to accidental spills in the marine environment, collectively, the supplemental information provided by Vopak during the review of the Application reported the following.

Factors That Influence Effects

The extent of impacts in the marine environment from liquid petroleum spills is influenced by many factors, including: spill size (volume), duration, and rate; the type of contaminant; how the contaminant weathers/breaks down in the environment (i.e., changes through physical, chemical, and biological processes); the toxicity of the contaminant to different organisms; weather and sea conditions which affects the spread and weathering of contaminants; and, the marine habitats and receptors exposed to the contaminants and their relative sensitivity.

Spill Response

Spills of light diesel oil and gasoline are mitigated (weathered) mainly through their evaporation and spreading (dispersal and dilution) in the receiving environment. Remediation of bunker fuel oil is challenging as the product is persistent and weathers very slowly.

It can be more difficult to detect spills in darkness or in adverse weather conditions when visibility is lower than during daytime hours/sunny conditions. Weather and sea conditions can delay spill response and impact the effectiveness of response efforts because of safety concerns and equipment limitations. Spill recovery efficiencies are influenced by many variables, including type of product spilled, operating

equipment, location, weather, water temperatures, and response times, etc. If it is available, information about the recoverable percentages of spills of products was not provided.

Weather and ocean conditions could create safety hazards for Vopak personnel at the marine facility and impact the ability to deploy containment equipment. The number of days per year that weather and ocean conditions might prevent or limit effective deployment of spill containment and recovery equipment at the marine terminal cannot be estimated until after the type of equipment has been selected.

The WCMRC will respond to spills and assess appropriate response strategies, which may include the use of sorbent pads and booms, and mechanical skimmers for bunker (persistent) oil. Mechanical skimmers in combination with booms are typically used for spills of light diesel oil. For safety reasons, gasoline is not boomed. Chemical dispersants are not effective for diesel oil and gasoline. Bunker oil is resistant to chemical dispersants. Sorbent booms are the most susceptible to weather conditions, relative to skimmers and dispersants[40]. The Corporation's spill response resources include the following (West Coast Spill Response Study Volume 1: Assessment of British Columbia Marine Oil Spill Prevention & Response Regime, March 28, 2013; Report to the British Columbia Ministry of Environment, Nuka Research & Planning Group, LLC.):

- Protected water booms – 80 % of inventory; rated to operate in wave heights up to 0.9 and 1.8 m;
- Open water booms – nine % of inventory; can be used where wave heights reach or exceed 1.8 m;
- Calm water booms – nine % of inventory; intended for sheltered harbour waters, where waves heights range up to 0.3 to 0.9 m;
- Shore seal boom – two % of inventory; meant for use in intertidal regions where the boom may be afloat at high tide but on the shore at low tide; and
- Mechanical skimmers – able to recover only a limited range of oil types and viscosities.

The CCG reported that, upon the CCG Environmental Response Duty Officer being notified, an assessment of reported cases of marine pollution will be initiated, if required resources will be mobilized within six hours of completion of the assessment, and arrival time on-scene will vary. The CCG expects any polluter to engage (fund) contractors for the management of the response to pollution (see Regulatory Context).

Environmental Effects

Spills of petroleum products (light diesel oil, gasoline and bunker fuel oil) have the potential to cause long-term contamination, including long-term intertidal contamination and potential for subtidal impacts. Products may interact/integrate with suspended sediments within the sediment plumes from the Skeena River. Materials like diesel and bunker oil may degrade both shoreline and marine habitat and have impacts on the prey species populations of marine mammals, birds, and other wildlife. This could result in loss of prey resources, habitat, and a decline in habitat quality. The long-term consequences of these indirect effects are difficult to quantify, but could have serious consequences at the species or population

[40] http://wcmrc.com/

levels. Direct contact with these substances can also have a variety of negative effects on marine mammals, birds and other wildlife. Vopak reported that in the marine environment methanol is significantly less toxic to marine life than oil or gasoline, and a large spill would have some immediate impacts but biodegradation would occur rapidly within fairly short distances from the spill.

Human Effects

Humans could be exposed through direct contact with contaminated materials or inhalation of volatile constituents, or indirectly through the consumption of contaminated seafood. The significance of human exposure would change over the course of a spill, as weathering, degradation and clean-up of the spill progresses, and as the spill plume migrates through the environment. Potential exposures would have to be managed for seafood consumers (e.g., through the closure of potentially impacted fisheries), beach or recreational users (e.g., through the restriction of access to impacted shorelines), local fishers (e.g., through restriction of access to the impacted waters), and nearby residents and workers. The magnitude of effects to human health will change over time and depend on a number of factors (e.g., the reported concentrations of contaminants, timing of the spill, etc.), but, without risk management, could range from low to high.

Worst-Case Modelling

It is impossible to recover marine spills of liquid propane gas and methanol. Light diesel oil and gasoline spills spread rapidly and are mainly mitigated through evaporation and dispersal and dilution in the marine environment. Vopak reported that measures will be in place to prevent/minimize the likelihood of a spill, and smaller spills will be caught, cleaned up and remediated immediately, and environmental effects in the area surrounding the facility are not expected over time.

Vopak conducted modelling for three worst-case spill scenarios it considers highly unlikely under the worst possible conditions (e.g., measures in place to prevent the events from occurring fail, and there is no containment and recovery of spills), one from the terminal jetty, and two from vessels about five km from the terminal:

- a 659,000-thousand-liter diesel oil spill from a vessel striking the terminal jetty causing a burst loading line, with an eight second emergency shut down time;
- a 22.5-million-liter diesel oil spill from a vessel being struck by another vessel (a 25 % loss of cargo based on historical accident data and ship design), and
- a 2.86-million-liter bunker fuel oil spill from a vessel being struck by another vessel (loss of a full fuel compartment).

For the larger spill scenario, surface oil would mainly go northwest towards Chatham Sound, but with seasonal variations (Figures 16 to 18). In summer, surface oil could also go south towards the area between Smith Island, Kennedy Island and Porcher Island. The expected impact area in the Malacca passage would reach the Chatham Sound to Dundas Islands in the northwest. Within one day, oil could reach the areas of Digby Island, north to Tugwell Island and up to the east coast of Melville Island and

Dunira Island. To the south, it could reach the north tip of Smith Island and Porcher Island within one day.

The expected shoreline oil contamination from the two larger vessel spill scenarios includes the Lax Kwaxl/Dundas and Melville Islands Conservancy (Melville and Dunira Islands), the Lucy Islands Conservancy, and Kinahan Islands. Other areas, such as Digby Island, have less than a 50 % probability for shoreline oil contamination due to the nearshore main current direction. The expected shoreline oil contamination from the spill scenario at the marine jetty includes Kaien Island to Prince Rupert and southern areas of Digby Island.

In all three scenarios, spills could reach Agnew, Flora and Horsey Banks, and the spills in the latter two could also reach the Skeena River Estuary. With the largest spill scenario, in summer there would be a 70 % probability of the spill reaching all three Banks and 10-20 % of it reaching the Skeena River Estuary.

Figure 16: Diesel Spill at Jetty

Figure 17: Diesel Spill

Figure 18: Bunker Oil Spill

MITIGATIONS

In response to concerns raised during the review of the Application, Vopak reported the following:

- Vopak will be responsible for ensuring no long-term damage to the environment, and bonds may be considered as a component of the terms of the commercial lease between the PRPA and Vopak.
- In the event of a worst-case spill of diesel oil or bunker fuel oil, a comprehensive monitoring program would be implemented to monitor the concentrations of primary contaminants of concern associated with fuel oil in the various impacted Valued Components (e.g., water, sediment, air) over time.

The PRPA reported that the lease for the VPC Project will include terms requiring the assessment and remediation of contamination from spills. Vopak reported that the terms and conditions of the lease are commercially sensitive and cannot be shared.

15.4 THE EAO'S ANALYSIS AND CONCLUSIONS

The VPC Project will handle light diesel oil, gasoline, methanol, and liquid propane gas in bulk volumes. The properties and characteristics of substances are of consequence to potential accidents and malfunctions and the effectiveness of mitigation measures if these occur.

Vopak's customers will arrange shipping of their products to and from the VPC Project, and variations in the types and volumes of products that might be handled (dictated by market conditions and shipping logistics) creates some uncertainty with respect to accidents and malfunctions. Vopak will not own the products the facility will handle (except for by-products produced at the facility), and this limits where/when Vopak will be liable for accidents and malfunctions.

Vopak reported that a serious accident at the facility involving explosion/fire and loss of human life is unlikely, and effects would be contained to the site of the facility and Ridley Island, an industrial area where there are no private residences or public access. Northern Health emphasized that in order to issue appropriate public health advisories, it will need to rely on risk/impact assessments, studies and/or sampling data from Vopak and/or other agencies, and this could be a challenge if conditions/requirements are not set out. Northern Health also emphasized that, for major accidents, health care and emergency services could be affected throughout the region, industry on Ridley Island needs to work together to develop emergency response capacity to be able to appropriately evacuate the area and bring injured workers to health care facilities as the BC Ambulance Service (e.g., air support) may not always be available or sufficiently resourced, and regular drills should be carried out in collaboration with emergency service providers as part of a Health and Safety Plan.

Weather and ocean conditions will affect vessel berthing and loading at the VPC Project marine terminal during the year. The terminal will use a system to berth vessels that has not been used elsewhere in BC or Canada.

Environmental conditions (e.g., weather and ocean that vary seasonally, monthly and daily) will affect marine related operations, and may be the cause of, or a contributing factor in, accidents that result in spills. Environmental conditions will influence the spread of marine spills, will influence the magnitude of adverse effects, and may prevent or limit measures to effectively contain and clean up spills regardless of their size.

It is expected that spills of liquid propane gas and methanol cannot be contained and recovered. Spills of light diesel oil and gasoline are mitigated mainly through their evaporation and spreading (dispersal and dilution) in the receiving environment. These products can spread rapidly, and there are numerous factors that can affect containment and recovery. There was some range in the information provided between Vopak and Working Group members, and between Working Group members, regarding the containment and recovery of products, such as gasoline.

Under the *Canada Shipping Act* and *Environmental Response Regulations*, as the operator of a class 4 oil handling facility, Vopak will be required to demonstrate the ability to respond to a discharge of at least 50,000 liters of oil product at the facility, and to have an arrangement with the WCMRC for responding to the quantity of oil being loaded to the prescribed maximum (about 11 million liters of diesel).

If activated by the CCG (e.g., for a spill from a vessel along the marine transit route), it will take about six hours for the WCMRC to deploy resources, depending on conditions. Weather and ocean conditions and poor visibility/darkness can delay spill response and impact the effectiveness of response efforts because of safety concerns and equipment limitations.

In the worst-case spill scenarios that were modelled for products that the facility will handle, diesel oils, there could be serious, widespread and long-term environmental and human consequences, particularly if foreshore environments are affected. Such diesel oil spills within about five km of the marine terminal could spread up to about 45 km in 24 hours and affect provincial aquatic Crown lands outside of the Port administrative area. Vopak considers such events to be highly unlikely as this assumes measures in place to prevent the events from occurring fail, and there is no containment and recovery of the spills. Though, as has been noted, there are many factors that could prevent or limit containment and recovery/clean-up of spills of diesel oil, and gasoline.

Vopak's assessment of accidents and malfunctions is based on several key assumptions, some of which it reported to not have control over:

1. the facility will not handle other types of products;
2. estimated average daily volumes of products was used;
3. more than one type of product will not be loaded onto a vessel;
4. vessels calling at the facility will be double-hulled;
5. vessels will not be fueled (bunker) while at/near the marine terminal;
6. rail tanker cars (except in case of emergency or repair) and vessel cargo holds will not be purged or cleaned at the facility;

7. key facility design measures identified in the Application will be implemented; and
8. cargo vessels calling at the facility will normally adhere to the marine transit route identified in the Application.

The assessment of accidents and malfunctions did not consider the following scenarios:

1. partially loaded vessels that have to leave the terminal and seek anchorage because of weather conditions; and
2. vessels loading fuel (bunkering) elsewhere in the Port before arriving at the terminal or after leaving the terminal (also relevant to other aspects of the environmental assessment).

Overall, Vopak reported that, with design measures and management plans in place to minimize accidents and malfunctions from occurring, the likelihood of such events during Construction, Operation and Decommissioning is low.

Vopak's assessment of accidents and malfunctions was based on an estimated average of 240 rail cars calling at the facility per day, and an estimated 171 vessels calling at the terminal annually. In June 2021, Vopak requested*:

1. the facility be authorized to handle additional liquid petroleum products (diluents such as condensate and naphtha, solvents, aviation gasoline, kerosene, and jet fuels);
2. there be no limit set for the maximum *individual* tank size/capacity for liquid petroleum products and methanol ("Vopak is still in the preliminary design stage and has not yet determined the maximum individual tank capacity for each type of product");
3. there be no limit set for the maximum vessel size/capacity that could call at the facility;
4. rail car unloading bays be switched from single product to multi-product bays;
5. there be no limit set for the daily maximum number of rail cars that could call at the facility given this is based on averages by day rather than certain volumes; and
6. clarified that vessels could carry multiple types of liquid petroleum products in their holds at the same time.

* The EAO declined request #1, noting that the behaviours of various petroleum products can differ in terms of environmental effects, even if they appear to be chemically similar. The EAO conferred with the federal authorities on these requests and conclude that Vopak requests #2-7 can be effectively managed through respective federal requirements and assurance processes in terms of detailed project operational and design standards that must be met in later stages.

There are some gaps in Canada's ship-source spill preparedness and response regime that federal agencies are working to address, which includes products the VPC Project will handle (see Regulatory Context).

The magnitude of adverse effects from an accident or malfunction would depend upon the severity of the event. With respect to an accidental spill in the marine environment, the magnitude of adverse effects

would depend upon numerous factors including the substance involved, location of the spill, volume and duration of the spill, environmental conditions at the time of the spill (e.g., weather and ocean), the trajectory and spread of the spill, and the marine ecosystem values/Valued Components affected.

Worst-case accidental spills into the marine environment could have adverse effects on provincial aquatic Crown land including Protected Areas. The EAO is not able to comment on the marine ecosystem values/Valued Components present where the spill modelling indicated shoreline/foreshore contamination could occur, or whether such spills may affect existing provincial aquatic Crown land tenures or the issuance of future tenures. The EAO understands that it is important that spill responders have information to predict the fate, behaviour, and trajectory of spills in the marine environment. Given this, and:

1. the location and setting of the VPC Project;
2. how environmental conditions may affect the project (including mitigative measures in pending Management Plans);
3. the number/types and properties of the products that could be handled;
4. market driven uncertainties re the types and volumes of products received/shipped;
5. complexities as to responsibility and liability for accidental spills in different scenarios;
6. the factors that can affect spill containment and recovery, and the limitations of this;
7. the negative effects spills can have, and the reliance on dispersal and dilution in the environment to prevent effects;
8. efforts to address gaps in the regulatory ship-source spill preparedness and response regime;
9. anticipated changes in PRPA services re bunkering for vessels;
10. this is the first facility of its kind at the PRPA; and
11. facility design uncertainty, the assumptions in the assessment, and the scenarios not considered;

If the VPC Project proceeds, consideration might for example, be given to:

- Vopak conducting additional risk analysis;
- Vopak conducting additional spill modelling, and verifying predictions;
- Vopak correlating spill modelling predictions with resource mapping;
- Vopak compiling information about spill recovery rates;
- Vopak compiling information about contaminant effects and persistence, and remediating shoreline/foreshore contamination (e.g., to shellfish beds) in coordination with applicable federal authorities; and
- Vopak working to minimize spill response times in priority locations, where required and feasible.

Considering the above analysis, should *worst-case* accidents or malfunctions occur during the minimum 50 -year operation of the VPC Project, the EAO concludes that:

- significant adverse effects to public health and safety are not likely (assuming no collision between a VPC Project vessel and a commercial passenger vessel); and
- significant adverse environmental and human effects are likely from spills of liquid petroleum products into the marine environment water column within close time and spatial proximity to the spill, and where shoreline/foreshore contamination occurs. Dilution in the environment tends to increase with over time and distances.

16. EFFECTS OF THE ENVIRONMENT ON THE PROJECT

This chapter provides an assessment of how local environmental conditions, including natural hazards, could negatively affect the VPC Project. The Application described conditions and hazards, changes to and negative effects on the VPC Project that may be caused by these factors, and measures to avoid or minimize consequences.

16.1 BACKGROUND

REGULATORY CONTEXT

The Application identified current codes, guidelines, specifications and standards, and reported these were used to design the facility, including all structures, foundations, and facilities. The Application reported that the facility is based on basic engineering, assumptions made will be reviewed during future detailed engineering studies, and all components and dimensions are approximate and may be subject to change based on the outcome of those studies. The Application included preliminary drawings for the overall site plan, vessel mooring and berthing arrangements, jetty elevation, vessel loading system, and typical liquid propane gas containment tank.

Federal standards and codes listed in the Application included:

- National Building Code of Canada and Supplement (2015);
- National Fire Code of Canada (2015);
- Canadian Coast Guard National Maneuvering Guidelines, Channel Design Parameters;
- Liquefied Natural Gas Production, Storage and Handling, CAN/CSA-Z276-15;
- Codes of Practice for Storage Tank Systems containing Petroleum Products; and
- Canadian National Engineering Specifications for Industrial Tracks.

Provincial standards and codes listed in the Application included:

- British Columbia Building Code (2018);

- British Columbia Fire Code (2018);
- Liquefied Natural Gas Facility Regulation, BC Reg 146/2014;
- BC Safety Standards Act / BC Safety Authority Act;
- British Columbia Occupational Health and Safety Regulation, BC Reg 296/97;
- Industrial Health & Safety Regulations, WorkSafe BC; and
- Local Building Permit Bylaws.

16.2 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IN THE APPLICATION

The factors potentially affecting Construction, Operations, and Decommissioning that were considered in the Application included extreme weather, seismic events, forest fires and climate change.

BASELINE INFORMATION

Weather

Prince Rupert is situated on the windward side of the Coast Mountains and there is little shelter from ocean storms through Dixon Entrance. Local weather conditions typically reflect cool, cloudy summers and cold, windy winters, and it is wet year-round. Prince Rupert is the wettest city in Canada, and on average there is measurable precipitation about 236 days per year, with measurable snowfall about 22 days per year. Fog and low-level clouds are prevalent year-round. Foggy conditions and low visibility occur mostly from July to October.

On average, most wind occurs in January with the least occurring in July. The highest wind speeds occurred from October to March. Severe winds can exceed about 93 km/hr. During winds of this magnitude mariners will avoid navigating through unsheltered passageways. The Prince Rupert harbour can be subject to extreme gusts of wind during the fall and winter months.

Information from the PRPA notes that while the inner harbor of the Port is protected from the full brunt of weather, there is still risk of anchor dragging when ships are at anchor (unloaded, cargo vessels sit higher in the water and more surface area is exposed to wind). The Application reported that the PRPA considers winds above 46 km per hour to be too strong to berth vessels.

The west coast of Ridley Island where the VPC Project is located is in the outer harbour of the Port and is not as protected from weather as the Port's inner harbor. Vopak reported that the VPC Project terminal design is for winds up to 102 km per hour, operating parameters are left up to individual terminal operators to determine, and that it is expected that vessels will be unable to berth at the marine terminal 19-days per year due to adverse weather conditions. The design of the terminal does not allow vessels to be docked on/against the loading platform in a conventional manner. Vessels will be moored close to the platform using buoys anchored to the sea floor (two off each end of a vessel).

Seismic Events

The west coast is recognized as a high-risk earthquake zone. The Queen Charlotte fault, the location of Canada's largest historical earthquake (magnitude of 8.1 in 1949), is about 200 km west of the VPC Project. Recent earthquakes near Ridley Island include 1.3 and 0.8 magnitude events in 2019, seven km south of Prince Rupert (the VPC Project is about 11 km south of the City of Prince Rupert). There are two minor faults on the northwest shore of Ridley Island where fault movement is described as indeterminant and probably insignificant. A tsunami generated from a high-magnitude event within 320 km of the facility could reach the area within minutes. Submarine landslides can also trigger tsunamis. Vopak estimated that the facilities' land-based infrastructure will be between 25 and 35 m above sea level.

Forest Fires

The moist environment in Prince Rupert helps prevent frequent severe and intense fires. There are breaks in forest cover from past development that may reduce the potential for wildfire to spread to and within Ridley Island. The area around the facility site is bog habitat dominated by small trees interspersed with open water and sphagnum-shrub areas.

Climate Change

In BC, by the next century, average annual temperature may increase one to four degrees, average annual precipitation may increase by 10 to 20 percent, wind speeds and direction are expected to change, and sea level may rise between 26 to 77 centimetres. Forest fires are becoming more frequent and intense and the fire season is expected to lengthen in future. Over time, increased storm conditions (i.e., precipitation, flooding, and wind), and increases in sea levels, extreme high-water events, and coastal erosion, are expected in the VPC Project area from climate change.

POTENTIAL EFFECTS

During the relatively short durations of Construction and Decommissioning (up to two years and one year respectively), storms or strong wind events, periods of intense precipitation, heavy snow, and fog and low-lying cloud cover may, for example, halt and delay activities, damage equipment and infrastructure, increase risk of accidents, and increase erosion and affect water quality.

Vopak reported that Operations will be a minimum of 50 years, but that the maximum number of years is not known as that will be dependent upon market conditions.

During Operations:

- At the marine terminal, high wind or storm events may affect ship berthing and unberthing, interrupt the loading of products onto vessels, require vessels to unberth and seek anchorage before loading is completed, and increase risk of accident and damage to infrastructure.
- All surface runoff at the facility will flow into the two storm water lagoons. This includes water that collects within the structures around storage tanks designed to contain accidental spills. Prolonged rain events and increased surface runoff may exceed the capacity of the facility's surface water collection and storage system and result in a release of water containing contaminants into the marine environment.
- Heavy snow and freezing conditions may damage equipment and increase risk of accidents.

If they occur, seismic events may extensively damage the low-lying coastal area of the VPC Project and there may be permanent loss or damage to the foundation of the facility infrastructure, loss of products into the environment, and impacts to the health and safety of workers. Flooding and coastal erosion from tsunamis may damage marine infrastructure.

Vessel use of anchorages at designated locations in the outer Port was excluded from the scope of the VPC Project assessment. The potential effects of high wind or storm events and tsunamis while vessels are at anchorage and not berthed at the terminal, and if they are being fueled (bunkered), are activities that were not considered in the Effects of the Environment on the Project.

Wildfires could cause damage to infrastructure, storage tanks, and the facility site. Smoke from wildfires could also affect visibility and have both short-term and long-term effects on worker respiratory health.

Increases in the frequency of severe weather events and conditions from climate change could increase the frequency of the weather-related effects on the VPC Project that are noted above. Storm surge and sea level rise could damage infrastructure susceptible to this.

MITIGATIONS

The Application reported various measures to avoid or minimize the consequences of extreme weather, seismic events, forest fires and climate change on the VPC Project. The measures involve considering these factors in the way the facility is designed and built, adhering to construction and safety codes and standards, and implementing best practices during Construction, Operations, and Decommissioning through management plans.

Examples of the measures to avoid or minimize consequences include:

- engineering infrastructure for seismic events, sea level rise and storm surge;
- designing the marine jetty to accommodate wave heights from high winds (four m above the high water mark);
- designing lagoon capacity to handle storm water run-off;

- including flexibility in scheduling activities to account for unforeseen weather delays, and taking weather forecasting into account when planning critical activities;
- stopping activities when necessary to ensure safety and prevent accidents, including procedures for ceasing or postponing vessel docking and loading if weather conditions make those operations unsafe;
- fire detection and fighting systems; and
- emergency response plans.

The environmental conditions at which vessel berthing and loading of products must cease or be postponed have not yet been established, and these thresholds are to be specified in operational management plans.

The Application reported that although the VPC Project was designed to withstand expected increases in severe storm events from climate change, the extent of this increase or the damages that may occur over its life cannot be predicted.

16.3 POTENTIAL PROJECT EFFECTS AND PROPOSED MITIGATIONS IDENTIFIED DURING APPLICATION REVIEW

The EAO identified the following as the key issues about the effects of the environment on the VPC Project from review of the Application and the feedback received from members of the public, and technical working group including Indigenous nations.

Members of the public expressed concern that with the extreme tidal and weather conditions that are present, accidental spills will be impossible to contain or clean up, and the products being handled will spread quickly to beaches and tidal flats etc. in the surrounding area, including critical salmon habitat (eelgrass beds) by Lelu Island.

> Vopak responded that should an incident occur, Vopak will have an emergency response plan and trained responders in place to protect the community and the environment. Vopak provided supplemental information describing potential impacts from marine accidents, which is discussed in Section 9: Marine Resources of this report.

Indigenous nations questioned whether a tsunami could lift the vessel mooring buoys beyond the lengths of their anchor chains and pull the anchors out of the seabed, moored vessels could be pulled free of the buoys or pull the buoy anchors from the seabed, and whether vessels will be moved from the terminal when there are tsunami warnings (Kitselas, Metlakatla).

> Vopak responded that tsunami wave heights are not considered to be a concern at the location of the terminal, and should a tsunami warning be issued vessels will be moved away from the terminal to a designated anchorage site in the outer Port. Vopak also reported that preparing for a vessel to depart from the terminal would normally take approximately six hours.

The PRPA's Ridley Island Road and Railway Utility Corridor forms a loop around the VPC Project site. The site extends from one side of the Road and Railway Utility Corridor to the other, bisecting the area inside the Road and Railway Utility Corridor and leaving two patches of mostly bog-wetland complex on either side. Excavation and site preparation for the facility will alter hydrological patterns and could cause a drying effect in the adjacent bog-wetland complexes. The Application did not report whether this may increase risk of fire occurring in these areas, or if there are challenges associated with bog fires.

Normal variations in environmental conditions that occur from day-to-day and that vary seasonally from month-to-month, and extreme conditions, may adversely affect the VPC Project. This includes environmental conditions such as wind and weather, waves and swell, tides and ocean currents, temperature, and outflows from the Skeena River. Under normal and extreme conditions during Operations, such factors individually or collectively:

- Will influence the extent (spread) of accidental spills of contaminants in the marine environment, and the magnitude of adverse effects on environmental and human Valued Components; and
- May prevent or limit measures to effectively mitigate accidental spills of contaminants into the marine environment (contain and recover spills and remediate foreshore contamination).

The above is discussed in Section XX: Effects of the Environment of this report. Over time, climate change may influence both the day-to-day and month-to-month, and extreme environmental conditions experienced during the minimum 50 years that the VPC Project may operate.

Seismic events including tsunamis, and climate change (e.g., sea level rise) may damage facility infrastructure. While these hazards will be considered during detailed engineering, seismic events, if they occur, may still result in the release of liquid contaminants into the marine environment. The VPC Project is the first major storage facility for exporting bulk liquid petroleum and petrochemical products in the Port. Unlike other facilities in the Port where damages from such events may perhaps be more contained to specific sites, the adverse effects of spills of liquid contaminants (diesel oils and gasoline) could be more widespread with a catastrophic loss of containment at the facility.

16.4 CONCLUSIONS

Wildfire is unlikely to affect the VPC Project.

Normal variations in environmental conditions (e.g., weather and ocean) that occur from day-to-day and that vary seasonally from month-to-month, and extreme conditions that may be associated with climate change:

1. will affect the operation of the VPC Project (e.g., vessels may be unable to berth, loading of products may have to be halted, vessels may have to leave the terminal before being fully loaded);
2. may be the cause of or a contributing factor in accidents that result in spills of contaminants into the marine environment (e.g., re vessel collision with terminal infrastructure, and loading products onto vessels);
3. will influence the extent (spread) of accidental spills of contaminants in the marine environment, and the magnitude of adverse effects on environmental and human Valued Components; and
4. may prevent or limit measures to effectively mitigate accidental spills of contaminants into the marine environment (contain and recover spills, and remediate foreshore contamination).

Vopak reported that the probability of seismic events occurring is moderate due to the location of the VPC Project location, but the likelihood of a high-magnitude event is evaluated as low, and if an earthquake occurred, the result could be minimal to catastrophic infrastructure damage. Vopak reported that if a seismic event caused a tsunami, evaluated as low risk, the VPC Project would likely be flooded and damaged.

The facility will have the capacity to store up to 260 million litres (260,000 cubic meters) of liquid petroleum products (this does not include loaded rail tanker cars). Vopak is of the view that with design and construction standards, a catastrophic loss of containment at the facility from a seismic event, would not result in a spill of contaminants into the marine environment greater than the worst-case accidental diesel oil spill scenarios modelled (a 659,000-thousand-litre diesel spill from at the terminal jetty; a 22.5-million-litre diesel spill from a vessel). If a tsunami warning is issued there may not be sufficient time to move vessels away from the terminal to a designated anchorage site in the outer Port.

17. SUMMARY OF ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

Environmental Management and Monitoring Plans will be required for Construction, Operation and Decommissioning to minimize adverse environmental effects throughout the lifespan of the VPC Project, and to ensure meaningful Working Group involvement in mitigations development, review and adaptation, as required. These plans will provide a framework for the development and implementation of measures and procedures, to mitigate adverse effects and risks, and to support compliance with applicable legislation, terms and conditions of permits, and approvals and authorizations issued in relation to the VPC

Project, including an EAC, if issued.

Management plans will be developed in consultation with appropriate regulatory agencies, Indigenous nations, Working Group members and key stakeholders, as required.

This section provides a high-level summary of each Environmental Management Plan that was:

- Identified by Vopak in the Application (Section 10) and/or during Application Review;
- Proposed by the EAO and is legally binding as part of the EAO's proposed Table of Conditions; and
- Authorized by the PRPA.

17.1 PLANS IDENTIFIED BY VOPAK

The following sections provide summaries of the Construction Environmental Monitoring Plan (CEMP), Operation Environmental Management Plan (OEMP) and Decommissioning Environmental Management Plan (DEMP), as well as the Indigenous Interest Management Plan (IIMP).

The CEMP will be implemented during Construction with the inclusion of 19 component management plans. The CEMP will provide guidance on mitigation measures that will be implemented prior to and throughout Construction to avoid and/or minimize adverse environmental effects. While the majority of the CEMP component management plans below were submitted as part of the Application, one additional plan was developed during the Application Review Phase of the EA.

AIR QUALITY AND DUST CONTROL MANAGEMENT PLAN

This management plan provides mitigation measures, a monitoring program, and best practices that will be followed to control dust during the construction phase. The plan also includes control measures for air quality and the dust resulting from construction activities.

ARCHAEOLOGICAL RESOURCES MANAGEMENT PLAN

This management plan provides guidelines for the procedures to implement if archaeological sites are encountered during on-site construction. The plan includes procedures to identify, report and manage archaeological and heritage resources during construction. In addition, a Chance Finds Management Plan will provide information for on-site personnel to identify archaeological materials and actions to protect a discovery if uncovered on the project site.

CONSTRUCTION BLASTING MANAGEMENT PLAN

This management plan provides strategies to minimize transmission of debris and vibration to adjacent properties, protect against impacts to wildlife, and reduce and avoid impacts of noise, dust, geotechnical instability and vibration from blasting.

CONSTRUCTION TRAFFIC MANAGEMENT PLAN

This management plan provides procedures and measures to address VPC Project-related traffic volume and safety. This will include various safety measures and driving requirements.

CONSTRUCTION WASTE MANAGEMENT PLAN

This management plan strives to manage and reduce the volume of waste produced during construction of the VPC Project.

ENVIRONMENTAL AWARENESS AND EDUCATION PLAN

This plan provides an approach/method to ensure that all personnel and contractors are given region-specific cultural training and environmental awareness, as well as support appropriate cultural/environmental awareness mitigations.

EROSION AND SEDIMENT CONTROL PLAN

This plan provides personnel and contractors with procedures to be used during activities that have the potential to cause erosion and/or require sediment control. Various measures will be put into place to protect to reduce risks of erosion or sedimentation to occur during heavy rain as well as due to flowing water, steep slopes and wind.

FISH AND FISH HABITAT MANAGEMENT PLAN

This management plan describes the mitigation measures to reduce effects to fish and fish habitat, in compliance with the *Fisheries Act*, including seasonal work windows and identifying fish habitats.

HEALTH AND SAFETY MANAGEMENT PLAN

This management plan outlines specific procedures and protocols for working around the active construction site. This plan will be developed in accordance with BC Guidelines for Industrial Camps Regulations, Communicable Disease Control Plan – Best Management Guide for Industrial Camps, and Northern Health COVID-19 Update to Industrial Partners. In addition, Vopak will develop and implement an Emergency Response Assistance Plan, and a Health and Medical Services Plan that will implement measures to reduce strain on regional health care system.

INDIGENOUS INTERESTS MANAGEMENT PLAN

This management plan will engage Indigenous nations and work to address Indigenous interests and outline mitigation measures to address them. This management plan will also work to provide economic opportunities to Indigenous nations. In addition, cross-cultural awareness training will occur, developed in collaboration with Indigenous nations.

MARINE ACCESS AND VESSEL COMMUNICATIONS PLAN

This plan provides requirements and protocols to follow with respect to marine access and vessel communications, including marine traffic, public and traditional access to marine resources, emergency response plan, travel corridors and staging areas. Communities will be liaised with to provide up-to-date

information regarding vessel traffic.

MARINE UNDERWATER NOISE AND VIBRATION MANAGEMENT PLAN

This management plan provides methods to manage transmission of underwater noise and vibration during marine construction as well as to reduce, avoid and mitigate impacts of underwater noise and vibration during marine activities.

MARINE WATER QUALITY AND SEDIMENT QUALITY MANAGEMENT PLAN

This management plan was developed post-submission of the Application and provides requirements for conducting in-water works, including seasonal time period, environmental monitoring, and banning vessels from shallow water or grounding, to reduce impacts to water and sediment quality.

PETROCHEMICAL STORAGE AND HANDLING PLAN

This plan describes protocols and procedures for handling and storing petrochemicals onsite. Workers will be required to complete training and designated areas will be used for storage.

SITE RESTORATION PLAN

This plan requires set restoration to take place after construction of the facility is completed. The specifications and designs for site restoration will be developed by a qualified professional.

SPILL PREVENTION AND EMERGENCY RESPONSE MANAGEMENT PLAN

This management plan describes measures to avoid and reduce potential spills of hazardous materials and provides a guide for emergency response during construction. This plan will provide procedures to address any spill or emergency in an effective, fast and safe manner.

SOIL MANAGEMENT PLAN

This management plan describes the protocols and procedures for handling and storing native soils on-site. This will include management of shallow groundwater and contaminated soils.

SURFACE WATER AND STORM WATER MANAGEMENT PLAN

This management plan provides procedures to management surface water runoff and storm events, including avoidance, reduction or mitigation of the mobilization of sediments and pollutants to water bodies.

VEGETATION MANAGEMENT PLAN

This management plan outlines strategies to minimize disturbance to existing vegetation, reduce and avoid impacts outside of clearing zone, retain peripheral vegetation, and control speed or introduction of invasive or noxious plans.

WILDLIFE MANAGEMENT PLAN

This management plan identifies sensitive wildlife habitats and their locations and provides protective measures to reduce impact on wildlife from the VPC Project. Protective measures for wildlife (including birds and marine mammals) will be taken and timing windows for vegetation clearing will be used.

The OEMP will be implemented during Operation with the inclusion of 14 component management plans. The OEMP will provide guidance on mitigation measures that will be implement prior to and throughout Operation to avoid or minimize adverse environmental effects. While the majority of the OEMP component management plans below were submitted as part of the Application.

The OEMP includes a description of requirements Vopak will have for vessels to follow to reduce local marine impacts, as well as an air quality monitoring program at the terminal.

EROSION AND SEDIMENT CONTROL PLAN

This plan provides guidelines to reduce potential for degradation of surrounding vegetated habitats from VPC Project-related factors such as sedimentation, drainage or erosion including those from clearing and other maintenance activities.

ENERGY MANAGEMENT PLAN

This management plan works to reduce GHG emissions from VPC Project operations. In addition, it will assist with annual inventory emissions tracking.

HEALTH AND SAFETY MANAGEMENT PLAN

This management plan developed for Construction will be updated for Operations.

LIGHT MANAGEMENT PLAN

This management plan describes mitigation measures that will be taken to avoid, reduce and/or mitigate the impact from lighting on the surrounding environment and community.

MARINE ACCESS AND VESSEL COMMUNICATION PLAN

This plan provides Notices to Shipping and Notices to Mariners in collaboration with the Canadian Coast Guard, as required. The plan will provide measures to notify marine traffic of VPC Project-related marine activities and identify designated safety zones under the jurisdiction of the PRPA.

MARINE UNDERWATER NOISE AND VIBRATION MANAGEMENT PLAN

This management plan provides strategies to manage transmission of underwater noise and vibration as well as reduce and avoid impacts resulting from underwater noise.

NOISE MANAGEMENT PLAN

This management plan describes mitigations to avoid, reduce and/or mitigate noise impacts on the surrounding environment and community. Schedules will be followed and noise abatement measures utilized.

PETROCHEMICAL STORAGE AND HANDLING PLAN

This plan describes how petrochemicals will be handled and stored onsite and where the designated areas for storage and usage of petrochemicals are. Specifications for worker training and proper disposal of petrochemicals are set.

PREVENTATIVE MAINTENANCE PROGRAM AND PERIODIC INSPECTION PLAN

This plan provides a schedule of planned maintenance and periodic inspections to avoid preventable accidents and malfunctions.

SPILL PREVENTION AND EMERGENCY RESPONSE MANAGEMENT PLAN

This management plan describes measures that will be taken to avoid or reduce the risk for spill or release of hydrocarbons or other hazardous materials and provides framework for emergency response, including an Emergency Response Assistance Plan. The training requirements for personnel are included in this management plan.

SURFACE WATER AND STORM WATER MANAGEMENT PLAN

This management plan provides procedures for management of surface water runoff and storm events to address mobilization of sediments and pollutants to water bodies. This includes environmental monitoring and reporting.

TRAINING MANAGEMENT PLAN

This management plan requires Vopak to implement a training and employment program targeting local Indigenous and non-Indigenous individuals for entry-level operations jobs.

VEGETATION (SENSITIVE HABITAT, INVASIVE AND NOXIOUS PLANTS) MANAGEMENT PLAN

This management plan provides strategies to minimize disturbance to existing vegetation, reduce impacts offsite, mitigate impacts to rare onsite plants, and control spread of invasive/noxious plants.

WILDLIFE MANAGEMENT PLAN

This management plan describes the mitigation measures to minimize impacts to wildlife. Sensitive timing windows, driver training, best management practices and other form specific measures are required.

The DEMP will be implemented during Decommissioning with the inclusion of four component management plans. The DEMP will provide guidance on mitigation measures that will be implement prior to and throughout Decommissioning to avoid or minimize adverse environmental effects.

As part of the DEMP mitigation measures will be employed to address concerns during the decommissioning phase, including consideration of marine mammals, dust control, GHG emissions, and marine navigation. In addition, discussions will occur with the local governments and Vopak will adhere to updated versions of the previously developed Health and Safety Management Plan and Wildlife Management Plan, and participate in marine programs such as the PRPA Marine Mammals Program and

Canadian Coast Guard Navigational Warning (NAVWARN) and Notice to Mariners.

EROSION AND SEDIMENT CONTROL PLAN

This plan describes the mitigation measures that will be taken for address erosion, manage stormwater and restore surface water conditions.

SURFACE WATER AND STORM WATER MANAGEMENT PLAN

This management plan establishes methods to avoid waterbodies and address surface water runoff and stormwater. Water quality will be assessed prior to discharge.

MARINE UNDERWATER NOISE MONITORING PLAN

This plan includes the development and implementation of safety zones, marine monitoring safety and monitoring zones, reduction of concurrent in-water noise activities and notification to vessels of marine mammals observed.

17.2 PLANS REQUIRED BY THE EAO

The EAO will require Vopak to follow the 10 Conditions set out in the Table of Conditions. The two conditions of note are Condition 9 – Cumulative Effects Management and Condition 10 – Socio-Economic.

The Cumulative Effects Management Condition requires the Holder to participate in initiatives related to monitoring, assessment and management of the Project's cumulative effects during all Project phases.

The Socio-Economic Condition requires the Holder to provide three socio-economic engagement summary reports related to economic conditions, community services and infrastructure, health and medical services and community well-being; there are two reports required during Construction and one after the start of Operations.

17.3 PLANS REQUIRED BY THE PRPA

The PRPA will require Vopak to develop a CEMP, Operations Management Plan (OMP) and Monitoring and Reporting Plan (MRP). The required components of these are listed below. The EAO will not be involved in compliance and enforcement of the CEMP, OMP or MRP.

The CEMP will be required to include the following:

- Fuel management, spill prevention and emergency response;
- Stormwater management including sediment and erosion control;
- Construction Waste Management;
- Marine Water Quality Protection;
- Contaminated soil assessment and management (as required);
- Vegetation clearing;
    - Species at Risk mitigation measures;
    - Nesting survey and avoidance measures;
    - Merchantable tree salvage;
    - Burning plan
- Dust control;
- Noise control;
- Light management;
- Traffic management;
- Complaint reporting and resolution;
- Waste Organics Transport and Disposal;
- Archaeological Resources Management;
- Fish and Fish Habitat Protection;
- Construction worker Environmental Awareness Training;
- Marine Operations plan;
- Marine Underwater Noise and Vibration Mitigation Management;
- Post-construction site restoration;
- Wildlife interaction management; and
- Monitoring and reporting.

The OMP will be required to include the following:

- Emergency Preparedness and Response;
- Vessel Berthing Plan and Procedures;
- Stormwater Management for Operations activities;
- Fugitive Emissions Control;
- Air emission management;

- Intentional/Planned Flaring events management;
- Noise Control;
- Light Control;
- Wildlife management; and
- Provisions for a third-party operational objectives performance evaluation.

The MRP will be required to include the following:

- Environmental Emissions Reporting – liquid and air including CAC and GHG;
- Notice of Interruptions, cessations and decommissioning;
- Spills, Accidents and Malfunctions;
    - Event notification;
    - Investigation reporting;
- Accounting of feed streams, product streams, waste/loss streams;
- Flaring notifications;
- Operational non-compliance notices and investigations;
- Public complaint reporting and resolution; and
- Third party operational objectives performance evaluation.

PART C: INDIGENOUS CONSULTATION REPORT

18. INDIGENOUS INTERESTS

The Government of BC has a constitutional duty to consult and, if appropriate, accommodate Indigenous nations where they have asserted or established Aboriginal rights and title, as recognized and affirmed by Section 35 of the *Constitution Act, 1982* ("Section 35 Rights"), that may be adversely impacted by provincial decisions. In the past, the provincial EA process focused primarily on impacts to Section 35 Rights that the courts and/or treaties have generally addressed to date: typically hunting, fishing, trapping, and gathering rights, and title. For the VPC Project, the EA considered an assessment of effects to Indigenous interests in the broader sense, which includes any interests related to an Indigenous nation as well as their Section 35 Rights (collectively, "Indigenous Interests").

The EAO notes that an EA is not a rights-determination process. Key objectives of an EA are to identify potential adverse effects of proposed projects on Indigenous Interests, and to identify measures to avoid, mitigate or otherwise appropriately address such effects.

19. DEPTH OF CONSULTATION

The following section discusses the procedural elements of Indigenous engagement activities undertaken by the EAO and Vopak with Indigenous nations.

On November 2, 2018, the EAO issued a Section 11 Order which specified the consultation activities that both the EAO and Vopak would undertake with Indigenous nations potentially affected by the VPC Project. The EAO considered comments received from Indigenous nations on the draft Section 11 Order.

Indigenous nations are listed in Schedule B of the Section 11 Order and (alphabetically) include:

- Gitga'at First Nation (Gitga'at)
- Gitxaała Nation (Gitxaała)
- Kitselas First Nation (Kitselas)
- Kitsumkalum First Nation (Kitsumkalum)
- Lax Kw'alaams Band (Lax Kw'alaams)
- Metlakatla First Nation (Metlakatla)

19.1 EAO-LED ENGAGEMENT ACTIVITIES

EAO-led Indigenous engagement with the Indigenous nations includes the following:

- Participation in the Working Group;
- Opportunities to seek to achieve consensus throughout the EA (see Section 19.1.1 below for more information);
- Regular (weekly, biweekly or triweekly) government-to-government calls between the EAO and each Indigenous nation;
- Opportunities for joint work planning;
- Opportunities to identify Indigenous Interests that may be adversely affected by the VPC Project and to discuss potential measures to avoid, mitigate, address or otherwise accommodate potential adverse effects on Indigenous Interests, as appropriate;
- Opportunities to participate in issue/topic-specific Working Group sessions with the EAO, the PRPA and other federal authorities;
- Opportunities to review and comment on key documents, including the draft Project Description, draft Section 11 Order, draft Application Information Requirements, Vopak's Application for an EAC, supplemental materials and topic-specific memos, the EAO's draft Assessment Report (including Part C of the Assessment Report), the draft Certified Project Description and draft Table of Conditions;
- Opportunity to collaboratively draft sections of the EAO's Assessment Report (Part C) within established timelines;
- Opportunity to submit a document outlining the Indigenous nation's views on the Assessment Report, Table of Conditions and the Certified Project Description to be included in the package of materials sent to Ministers when the VPC Project is referred for decision; and
- Additional measures for consultation and accommodation where appropriate.

Refer to the nation-specific Part C sections of this Report for more information regarding government-to-government engagement.

Indigenous nations and the EAO worked together throughout the EA process with the goal of seeking to achieve consensus on key issues in order to support both Indigenous and provincial decision-making.

Indigenous nations and the EAO project teams have years of experience working together on previous EAs in northwest BC, and applied this knowledge and experience in developing approaches to consensus-seeking for the VPC Project EA. Approaches to consensus-seeking with the EAO varied across the Indigenous nations and, for some, included the identification of check-ins that aligned with key milestones in the EA process, and the development of a consensus tracking tool for documenting and communicating out issues resolution activities and outcomes.

Indigenous nations and the EAO acknowledge that consensus-seeking is a process as opposed to a specific action or point in time. As noted in Section 19.1 above, the EAO encouraged the development of principles for working together, joint work planning, and regular calls to support consensus-seeking activities throughout the EA process.

Although best efforts were made in good faith, Indigenous nations and the EAO did not always achieve consensus on some outcomes of the VPC Project EA, as noted in the nation-specific sections of this Report.

19.2 PROPONENT-LED ENGAGEMENT ACTIVITIES

As part of the Section 11 Order, the EAO directed Vopak to undertake certain procedural aspects of consultation during the EA with Indigenous nations. The Section 11 Order also required Vopak to develop and share drafts of an Indigenous Consultation Plan and three Indigenous Consultation Reports with Indigenous nations at prescribed milestones during the EA. These documents were reviewed by Indigenous nations and revised by Vopak based on input received from and concerns expressed by Indigenous nations prior to being submitted to the EAO. These documents enabled the EAO to:

- Understand Vopak's consultation plans and subsequent efforts and the perspectives of the Indigenous nations related to those efforts;
- Understand any issues and concerns identified by Indigenous nations to Vopak and how Vopak has made efforts to respond to or address these issues;
- Evaluate Vopak's consultation plan for subsequent consultation activities required with Indigenous nations during Application Review; and
- To direct Vopak to take additional measures to satisfy the EAO and/or Indigenous nation concerns/questions, when applicable.

Vopak engaged with each Indigenous nation to complete traditional land use studies specific to the VPC Project, which included the initial development of a Terms of Reference to ensure that the traditional use studies contained the information required to assess effects of the VPC Project on Indigenous Interests and inform the assessment of Part B VCs. Vopak received draft or final studies from all six Indigenous nations as follows:

- Gitga'at prepared the Gitga'at First Nation Traditional Use and Occupancy Study, Prince Rupert Harbour Region (draft December 19, 2019; final March 15, 2020);
- Gitxaała prepared the Gitxaała Use Study: Vopak Pacific Canada Project Report (draft December 4, 2019[41]);
- Kitselas prepared the Kitselas First Nation Traditional Use and Occupancy Study for the Vopak Project. Ridley Island, Prince Rupert Harbour Region (draft December 23, 2019; final March 9, 2020);
- Kitsumkalum prepared a preliminary land use memo outlining potential effects of the VPC Project (February 18, 2020), and provided the Kitsumkalum First Nation Indigenous Land Use Study regarding the Vopak Pacific Canada Project (August 2020);
- Lax Kw'alaams prepared the Lax Kw'alaams Band Traditional Land Use and Occupancy Study for Vopak Development Canada Inc.'s Proposed Vopak Pacific Canada Bulk Liquids Storage facility Project on Ridley Island (final November 19, 2019); and
- Metlakatla prepared Metlakatla First Nation Traditional Use and Ecological Knowledge of the Vopak Pacific Canada Project Area (final December 13, 2019).

Vopak engaged with Indigenous nations during the Pre-Application phase on a Part C work plan regarding its proposed approach to assessing potential effects on Indigenous Interests in its Application, which included the identification of Indigenous Interests and potentially linked VCs, indicators and methods, which are described in more detail below.

Vopak engaged directly with Indigenous nations throughout the Application Review process for the purposes of information sharing and issues resolution.

20. ASSESSMENT METHODS

It is recognized that adverse project impacts on Indigenous Interests may not arise solely from changes to the biophysical environment, and are assessed in consideration of environmental conditions, specific sites or areas of importance, and Indigenous well-being, including social, economic, cultural and health factors as appropriate. Indigenous Interests are also understood as including traditional practices related to hunting, trapping, gathering, fishing and marine harvesting, but may not be limited to these practices.

Following engagement on the Part C work plan, Vopak's Application assessed the following Indigenous Interests:

- Harvesting Rights;
- Sense of Place and Sense of Attachment;
- Access and Travel;
- Indigenous Governance Systems;

[41] Gitxaała is not expecting to finalize the draft Gitxaała Use Study before the Assessment is completed and has agreed to the use of the draft. When circumstances allow for the finalization of the report, any substantive changes will be discussed with Vopak as required.

- Cultural Identity;
- Indigenous Health;
- Indigenous Socio-Economic Conditions; and
- Indigenous Physical and Cultural Heritage.

Indigenous Health, Indigenous Socio-Economic Conditions and Indigenous Physical and Cultural Heritage were included as Indigenous Interests in response to an information request regarding Vopak's approach to considering the federal requirements under Section 5(1)(c) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). Section 5 (1)(c) requires an assessment of effects of any change that may be caused to the environment on these factors, with respect to Indigenous nations. Although Section 5(1)(c) of CEAA 2012 does not specifically apply to the VPC Project, as it is not a designated project under CEAA 2012, Vopak included these topics as Indigenous Interests following engagement with Indigenous nations.

The EAO recognizes the value in being flexible in incorporating nation-specific needs and interests into the assessment of project-specific effects. For the VPC Project EA, the EAO encouraged Indigenous nations to draft and organize their own assessment based on their nation-specific Indigenous Interests using the information provided by Vopak in its Application and each nation's own inputs during Application Review. The EAO and Indigenous nations worked together iteratively regarding assessment methods and reviews during Pre-Application and Application Review using government-to-government workplans. Much of the assessment of effects on Indigenous Interests involved learning-by-doing as the methods were unique for the VPC Project and unique across nation-specific assessments.

To maintain procedural fairness, further information was not requested of Vopak for additional nation-specific Indigenous Interests identified by an Indigenous nation during Application Review that did not align with the Indigenous Interests that Vopak had already engaged upon during Pre-Application and assessed in its Application.

A summary of the different approaches taken in the assessment of effects to Indigenous Interests for each Indigenous nation is listed below and additional information is provided in the nation-specific sections of this Report:

- The EAO drafted Gitga'at's assessment generally using the Indigenous Interests identified in Vopak's Application (however, see below for some regrouping of the Indigenous Interests) with iterative review and input by Gitga'at;
- Gitxaała drafted its own assessment structured around Gitxaała VCs and the information provided in Vopak's Application with review and input by the EAO;
- Kitselas drafted its own assessment using Kitselas' Values and methods for characterizing effects with iterative review and input by the EAO;
- The EAO drafted Kitsumkalum's assessment generally using the Indigenous Interests identified in Vopak's Application with iterative review and input by Kitsumkalum; and
- Lax Kw'alaams and Metlakatla co-drafted a single assessment with Indigenous Interests identified through their experiences with other EAs in Coast Tsimshian traditional territories, consistency with

the United Nations Declaration on the Rights of Indigenous Peoples, and the Indigenous Interests identified in Vopak's Application, followed by review and input by the EAO.

The EAO engaged with Indigenous nations on draft questions for consideration and definitions for residual effects characterizations specific to Indigenous Interests; these did not always align across nations and assessment approaches. Refer to Appendix B: Residual Effects Characterization Definitions for the definitions that the EAO applied for Gitga'at and Kitsumkalum. The residual effects characterization criteria represented a starting point for the EAO and Indigenous nations in understanding the key considerations for assessing effects to Indigenous Interests and were intended to be flexible, with not all characterizations being applicable to all Interests.

Given substantial overlap and cross-referencing of other Indigenous Interests in the Application, the EAO, Gitga'at and Kitsumkalum combined and re-grouped the Indigenous Interests as follows:

- Harvesting Rights;
- Sense of Place and Sense of Attachment;
- Access and Travel;
- Indigenous Governance Systems;
- Cultural Identity;
- Indigenous Health and Well-Being, including Social Determinants of Health; and
- Indigenous Economy.

21. POTENTIAL IMPACTS ON INDIGENOUS INTERESTS

21.1 CURRENT CONTEXT AND CUMULATIVE EFFECTS

Throughout the Vopak EA, Indigenous nations expressed concerns regarding the cumulative effects of historical, current and foreseeable economic development on Ridley Island, the Prince Rupert Harbour and Chatham Sound more generally. Indigenous nations noted that past and present development and land use designations including those resulting in access restrictions on Ridley Island adversely impacts their Indigenous Interests.

Lax Kw'alaams and Metlakatla assessed effects on their Indigenous Interests using a temporal boundary from the pre-contact period (prior to 1830) to a future development period (2070). These temporal boundaries were selected to characterize baseline conditions and trends over time with which the VPC Project is anticipated to interact. Kitselas assessed a Value of 'Respect for Kitselas History' which encompasses both the period before European colonists arrived and the colonial period extending to the present day.

The EAO considers the current context of the state of the environment, which is understood to include the effects of past and present projects or activities. These factors are considered when determining overall

levels of impact of the VPC Project. Further, where the cumulative effects of past and present projects or activities have negatively affected conditions today compared to those conditions required for the meaningful practice of an Indigenous right, the EAO's conclusion on effects from a current project on that right would generally be expected to be more serious.

The EAO acknowledges that there may be fundamental differences in how an Indigenous nation might assess project-specific impacts to their Indigenous Interests in light of cumulative effects. These differences are discussed further in the nation-specific sections of this Report as appropriate.

Refer to Section 4.5 and Appendix C: Existing Regional Crown Initiatives to Address Cumulative Effects for a description of existing regional Crown initiatives that are currently underway to help address cumulative effects on the North Coast including the Prince Rupert Harbour and Chatham Sound.

21.2 CONCERNS RAISED BY INDIGENOUS NATIONS REGARDING PROCESS

During the Pre-Application phase, concerns were raised by the six Indigenous nations regarding the potential effects of increased operational rail traffic of the VPC Project beyond the Port of Prince Rupert, and the EAO was asked to consider including this increase in rail traffic within the scope of the EA. Refer to Section 4.6 of this Report for information regarding the EAO's perspectives regarding rail traffic beyond the scope of the VPC Project EA.

During Application Review, Indigenous nations raised concerns regarding Vopak's reliance on management plans in its assessment and the limited prescriptive actions for which to evaluate the effectiveness of mitigation during the EA. Concerns were also raised regarding consultation requirements in management plan development and implementation including reporting frequencies and adaptive management approaches.

The EAO understands that the federal Section 67 Determination would include commitments required of Vopak to develop management plans and to adhere to the mitigation identified in Vopak's Application and additional mitigation identified during Application Review. Following the Section 67 review, the PRPA would issue an authorization for the VPC Project which would include measures related to compliance and enforcement of the commitments outlined in the federal Section 67 Determination, including the requirement to obtain and comply with the Port Authority Operations Regulation approval. The EAO is satisfied that the management plans identified in the federal Section 67 Determination and the appended table of mitigation would be adequately managed and enforced by PRPA. The EAO reviewed and provided input on the appended table of mitigation to ensure mitigation measures committed to by Vopak in its Application and during Application Review were reflected.

In response to concerns from Indigenous nations regarding transparency, accountability and meaningful engagement by Vopak on the development and implementation of management plans beyond those attached to the provincial EA Certificate, the EAO requested an Engagement Process memo outlining Vopak's approach to engagement, which is available on the EAO's website here.

Refer to Part A of this Report for more information regarding the provincial-federal regulatory coordination for the VPC Project.

21.3 ISSUES RAISED BY INDIGENOUS NATIONS AND POTENTIAL IMPACTS ON INDIGENOUS INTERESTS

The EAO's evaluation of potential effects on Indigenous marine harvesting rights (including marine fishing, marine mammal hunting and marine bird harvesting) considered:

- Impacts to environmental conditions that may result in changes to marine resource quantity and quality;
- Changes in access to and use of marine harvesting sites; and
- Changes to Indigenous well-being, including social, economic, cultural and health factors associated with marine harvesting that are attributable to the VPC Project.

The pathways of potential effects to marine harvesting rights are outlined below. Specific issues raised by each Indigenous nation and the Indigenous nation and/or the EAO's conclusions on impacts of the VPC Project to marine harvesting activities are identified in nation-specific sections of this Report.

Environmental Conditions

Indigenous nations identified a rich diversity of marine species that are fished, hunted or otherwise harvested in the VPC Project area including salmon, steelhead, eulachon, herring, halibut, lingcod, cod, snapper, rockfish, crab, prawns, shrimp, octopus, mussels, kelp, herring roe on kelp, seagrass, seaweed, sea urchin, sea cucumbers, chitons, clams, cockles, crab, abalone, scallop and seagull eggs, seal, sea lion, sea otter, geese and ducks.

Although not an exhaustive list, with respect to the environmental conditions associated with marine harvesting, the EAO understands the Indigenous nations are concerned about potential VPC Project effects from:

- Reduction in the quantity and quality of marine resources due to Project construction and operations;
- Marine shipping may result in potential effects in the marine environment thereby adversely affecting marine resources;
- Introduction of invasive species;
- Increased noise, vibration or light may result in behavioural changes, removal or alteration of habitat, and reduction in quantity of marine resources;
- Construction and operational activities have the potential to affect marine water quality through storm water and wastewater discharge, and marine infrastructure;
- Permanent removal of marine vegetation and habitat could reduce the quality and quantity of marine resources; and

- Increased risk of environmental emergency resulting in changes to the quantity and quality of marine resources.

The EAO concluded that the VPC Project would result in residual adverse effects to marine resources. The residual effects include:

- Alteration or loss of marine habitat;
- Effects to fish and invertebrates and marine mammals from underwater noise;
- Effects to fish, invertebrates and marine birds due to overwater lighting;
- Disturbance and displacement of marine birds; and
- Effects to marine sediment quality, marine water quality, marine habitats, and fish and invertebrates from sedimentation.

The EAO concluded low magnitude effects on marine resources due to sedimentation and habitat loss and alteration in the marine environment. Similarly, the EAO concluded low magnitude effects on fish, invertebrates, and marine birds due to overwater lighting.

The EAO concluded low to moderate magnitude effects on fish, invertebrates and marine mammals due to underwater noise (injury, direct mortality and displacement) during Construction, moderate magnitude effects on fish and invertebrates during Operations, and low magnitude effects on marine mammals during Operations.

The EAO concluded low to moderate magnitude effects on marine birds due to disturbance and displacement.

Specific Sites or Areas of Importance

With respect to access and use of specific sites or areas of importance associated with marine harvesting, the EAO understands the Indigenous nations are concerned about potential VPC Project effects from:

- The VPC Project including the jetty, Marine Safety Zone and marine shipping activities could reduce or restrict access to marine harvesting areas, safe coastal travel ways along Ridley Island, access points and/or harvesting anchorages and result in the alienation of Indigenous nation members of marine and intertidal areas thereby impacting their marine harvesting rights.

Vopak anticipates up to 171 vessels will call to the VPC Project facility per year at full capacity, the vessels to be at berth for approximately 40 hours, and the transit time between the Triple Island pilot station and the berths to take an average of 1.5 hours.

A Marine Safety Zone would restrict access to marine harvesters near the VPC Project jetty. The radius of the Marine Safety Zone is not yet confirmed; Vopak assessed a Marine Safety Zone of 100 m in its Application and PRPA noted that Marine Safety Zones are typically 50 m.

Vessel passage under the jetty will be restricted during all VPC Project phases. Vopak has indicated that permanent marine safety zones will be established around the jetty and berth to separate fishing and recreational activities from the VPC Project activities; the safety zone is under the jurisdiction of the PRPA. Vopak has indicated that its Marine Access and Vessel Communication Plan will describe navigation restrictions and that routing advisories will be communicated to marine users as required. Vopak will work with the Canadian Coast Guard to provide Notices to Shipping and Notices to Mariners.

Indigenous Well-being, including Social, Economic, Cultural and Health

The EAO acknowledges the importance of marine harvesting to Indigenous well-being. With respect to social, cultural and experiential values associated with marine harvesting, the EAO understands that Indigenous nations are concerned about potential VPC Project effects from:

- Safety concerns for Indigenous marine harvesters due to an increase in marine shipping and other activities in the marine environment due to the VPC Project;
- Reduced air quality, visual quality and increased noise may reduce members' enjoyment and desire to harvest marine resources near the VPC Project site due to reduced quality of experience;
- Project activities could result in changes to marine resources used for social and ceremonial purposes;
- Reduction in the quantity and quality of marine resources consumed by Indigenous members; and
- ***Project activities could affect Indigenous knowledge transfer and overall human well-being because participation in terrestrial harvesting activities has a strong social, mental and spiritual health component.***

The EAO concluded that the VPC Project would result in residual effects due to an increase in noise levels during Construction. In the marine environment, the EAO concluded moderate magnitude residual effects given predicted noise levels exceed 55 dBA during pile driving and particularly during the use of hammer pile driving, which is the recommended guideline for good outdoor speech comprehension.

The EAO concluded that the VPC Project would result in a low magnitude residual effect to air quality during Construction and Operations given the predicted negligible to low increases in concentrations of Criteria Air Contaminants following implementation of Vopak's proposed mitigation measures.

The EAO concluded that VPC Project would result in a residual effect on visual quality of low magnitude along the marine shipping route beyond 8 km from the facility and moderate magnitude within 8 km of the facility.

Mitigation

As a conditions of the federal Environmental Effects Determination, Vopak would be required to develop and implement a Construction Environmental Management Plan, which would include measures to

manage fuels, spills, emergency response, stormwater including sediment and erosion, marine water quality, complaint reporting, marine operations plan, marine underwater noise and vibration, wildlife interactions, dust, noise, light, monitoring and reporting.

Vopak would also be required to develop and implement an Operations Management Plan, which would include measures to manage emergency response, fugitive emissions, air emissions, noise, light, stormwater, and wildlife interactions, and provisions for third party operational objectives performance evaluation.

Vopak would also be required to implement the mitigation identified in its Summary of Mitigations Table. Vopak has also committed to staffing an Indigenous Liaison to coordinate engagement on the development and implementation of Vopak's mitigation measures and management plans, including the Indigenous Interests Management Plan, as described in its Engagement Process Memo. Vopak would also be required to provide cross-cultural awareness training for its VPC Project workers, which would be developed in collaboration with Indigenous nations.

The EAO's evaluation of potential effects on Indigenous terrestrial harvesting rights considered impacts to environmental conditions that may result in:

- Changes to terrestrial resource quantity and quality;
- Changes in access to terrestrial harvesting sites; and
- Changes in access to and use of terrestrial harvesting sites; and changes to Indigenous well-being, including social, economic, cultural and health factors associated with terrestrial harvesting that are attributable to the VPC Project.

The pathways of potential effects to Indigenous nations terrestrial harvesting rights are outlined below. Specific issues raised by each Indigenous nation and the Indigenous nations and/or the EAO's conclusions on impacts of the VPC Project to Indigenous marine harvesting rights are identified in nation-specific sections of this Report.

Environmental Conditions

Although not an exhaustive list, with respect to the environmental conditions associated with terrestrial harvesting, the EAO understands that the Indigenous nations are concerned about potential VPC Project effects from:

- Project activities could affect the quantity and quality of terrestrial species through direct mortality, disruption of critical life stages, alteration and reduction of important habitat and behavioural changes due to sensory disturbance such as visual quality and ambient light;
- Potential effects on one species could have effect son other species in the food web; and

- Increased risk of environmental emergency resulting in changes to the quantity and quality of terrestrial resources.

Most of the effects on terrestrial resources, and the principle mitigation for those effects, are related to wetlands and the plant associations, wildlife habitat and wildlife species associated with those wetlands. For this reason, the EAO's characterization of residual effects to terrestrial resources focuses on wetlands. Approximately 29% of wetlands within the LSA would be lost and effects to wetlands would extend, to some degree, beyond those that are lost to adjacent wetlands. The EAO concluded that the VPC Project would result in moderate magnitude residual adverse effects to terrestrial resources.

Specific Sites or Areas of Importance

Indigenous nations identified various terrestrial species of plants and animals harvested by the members in their traditional territories, including historically on Ridley Island.

PRPA has noted that access to Ridley Island is strictly prohibited and should not be undertaken for personal safety reasons given it is an industrial development area. PRPA noted that road access is restricted with a gate, a person stationed at the gate, barriers, signage and patrols.

Gitxaała, Lax Kw'alaams and Metlakatla assert that their members continue to access the southern portion of Ridley Island for terrestrial resource harvesting such as deer hunting. Indigenous nations have noted that the restriction of public access to Ridley Island has not removed their asserted right to access and use the island.

With respect to access and use of specific sites or areas of importance associated with terrestrial harvesting, the EAO understands the Indigenous nations are concerned about potential VPC Project effects from:

- Increased access restrictions to coastal areas that could result in loss of access to harvesting and gathering locations; and
- The permanent alteration of the land and removal of vegetation, wetlands and timber in the Project footprint that could result in the irreversible loss of harvesting activities in and around Ridley Island.

Indigenous Well-being, including Social, Economic, Cultural and Health

With respect to social, cultural and experiential values associated with terrestrial harvesting, the EAO understand that Indigenous nations are concerned about potential VPC Project effects from:

- Project activities could reduce the quality of the harvesting experience, reduce confidence in the harvested areas and disrupt the ability to exercise rights through impacts to wildlife;
- Construction and operations could reduce the quantity and real or perceived quality of terrestrial resources consumed by Indigenous members;

- Project activities could result in changes to terrestrial resources used for social and ceremonial purposes; and
- Project activities could affect Indigenous knowledge transfer and overall human well-being because participation in terrestrial harvesting activities has a strong social, mental and spiritual health component.

The EAO concluded that the VPC Project would result in residual effects due to an increase in noise levels during Construction. In the terrestrial environment, the EAO concluded the residual effect would be low in magnitude given the predicted noise levels at the nearest residential locations due to Project sources would be below health and annoyance levels identified in relevant municipal bylaws and provincial and national guidelines, and for the most part would not result in any increase in noise levels over ambient conditions.

The EAO concluded that the VPC Project would result in a low magnitude residual effect to air quality during Construction and Operations given the predicted negligible to low increases in concentrations of CACs following implementation of Vopak's proposed mitigation measures.

Mitigation

In addition to the mitigation identified above for marine harvesting rights, Vopak would be required to develop and implement a Wetlands Function Compensation Plan that aligns with the Federal Policy on Wetland Conservation to offset the direct and indirect loss of wetlands in the Project footprint.

Refer to the nation-specific sections of this Report for the assessment of potential VPC Project impacts on other Indigenous Interests by Indigenous nation.

PART D: CONCLUSIONS

Based on:

- Information contained in Vopak's Application and supplemental information provided during Application Review;
- Vopak and the EAO's efforts at consultation with Indigenous nations, federal, provincial and local government agencies, and the public, and Vopak's commitment to ongoing consultation;
- Comments on the VPC Project made by Indigenous nations, federal, provincial and local government agencies as members of the EAO's Working Group, and Vopak's and the EAO's responses to these comments;
- Comments on the VPC Project received during the public comment periods, and Vopak's response to these issues;
- Issues raised by Indigenous nations regarding the potential impacts of the VPC Project, and Vopak's responses and best effort to address these issues;
- The design of the VPC Project as specified in the proposed Schedule A (CPD) of the EAC to be implemented by Vopak during all phases of the VPC Project; and
- Mitigation measures identified as proposed conditions in Schedule B (TOC) of the EAC to be undertaken by Vopak during all phases of the VPC Project.

The EAO is satisfied that:

- The EA process has adequately identified and assessed potential adverse environmental, economic, social, heritage and health effects of the VPC Project, having regard to the proposed conditions set out in Schedule B (TOC) to the proposed EAC;
- The consultation with Indigenous nations, federal, provincial and local government agencies and the public has been adequately carried out by Vopak, and that efforts to consult with Indigenous nations will continue on an ongoing basis as outlined in Vopak's Management Plan Engagement Memo;
- Issues identified by Indigenous nations, Working Group members and the public, which are within the scope of the EA, were adequately addressed through the EA process;
- Practical means were identified to prevent and/or reduce any potential adverse environmental, social, economic, heritage or health effects of the VPC Project such that no direct or indirect significant adverse effects is predicted or expected;
- The collaborative engagement and consensus seeking efforts with Gitga'at, Gitxaala, Kitselas, Kitsumkalum, Lax Kw'alaams, and Metlakatla has been carried out in good faith and that the Crown's process of seeking to understand potentially outstanding issues and impacts was reasonable;
- The potential for adverse effects on the Indigenous Interests of Indigenous nations that are within the scope of this EA, has been avoided, minimized or otherwise accommodated to an acceptable level; and

- On matters within the scope of this EA, the provincial Crown has fulfilled its legal obligations to consult and accommodate potentially affected Indigenous nations related to the issuance of an EAC for the VPC Project.

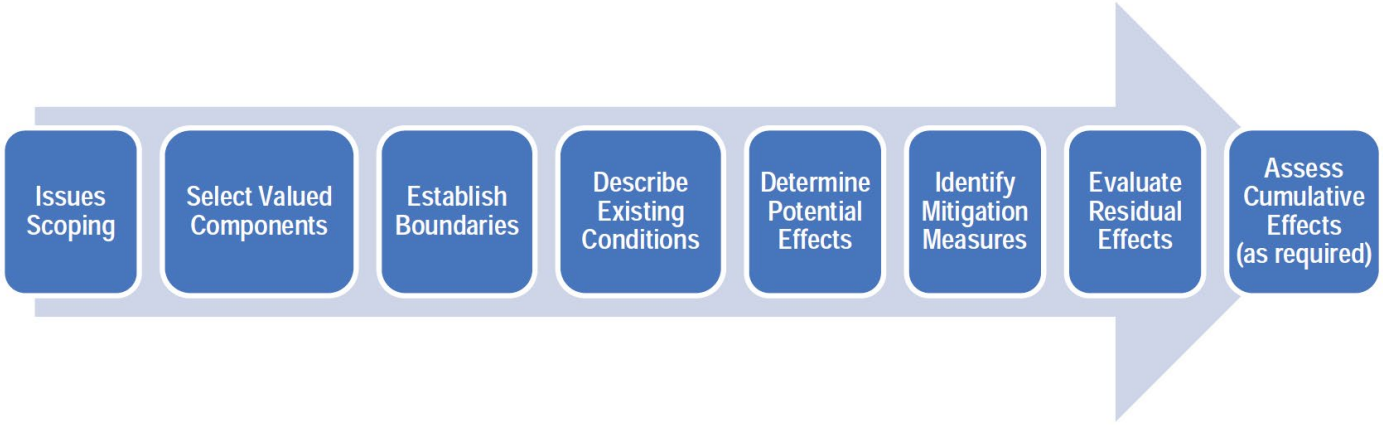
APPENDIX A: ENVIRONMENTAL ASSESSMENT METHODOLOGY AND OVERVIEW OF POTENTIAL PROJECT EFFECTS

ENVIRONMENTAL ASSESSMENT METHODS

In this Report, the EAO assessed whether the VPC Project is likely to have significant adverse environmental, economic, social, heritage and health effects, including cumulative effects, having regard for the mitigation measures proposed in the Application or otherwise developed through the provincial and federal EA processes, in addition to conditions proposed by the EAO.

To conduct this assessment, the EAO followed the methods outlined in its *Guideline for the Assessment of Valued Components and Assessment of Potential Effects* (2013). This section provides a brief summary of the methodology followed. The methodological steps in BC's EA process are shown in Figure [XX].

EAO's Environmental Assessment Methods



EA in B.C. uses a values-based framework to promote a comprehensive, yet focused, understandable, and accessible assessment of the potential effects of proposed projects. This framework relies on the use of VCs as a foundation for the assessment. VCs are components of the natural and human environment that are considered by the Proponent, public, Indigenous nations scientists and other technical specialists, and government agencies involved in the assessment process to have scientific, ecological, economic, social, cultural, archaeological, historical or other importance.

Appropriate VCs are identified and selected during the Pre-Application phase of the EA. Ultimately, the VCs required to be in the Application are established by the EAO upon finalization of the Application Information Requirements. Much of the early part of the Pre-Application phase is focused on consultation on the VCs, intermediate components, key indicators, study area boundaries and technical requirements with Working Group members (including Indigenous nations) and the public.

INTERMEDIATE/PATHWAY COMPONENTS

Intermediate or Pathway Components are part of the pathway between a proposed project and the ultimate receptor.

For example, sediment-laden discharge from a project to a stream may adversely affect water quality and benthic habitat and these changes may consequently affect the health and survival of fish that depend on those habitat attributes. In this example, water quality and benthic habitat would be ICs and fish health and survival would be the ultimate receptor, or the VC.

STUDY BOUNDARIES

Assessment boundaries serve to define the scope or limits of the assessment. They encompass the areas within and times during which the proposed Project is expected to interact with the VCs (spatial and temporal boundaries). These boundaries are discussed in the Application for each VC.

Spatial boundaries encompass the areas within which the proposed Project is expected to have potential effects on the selected VCs. The study areas generally include the:

- Project area or Project footprint – the area directly disturbed by the proposed Project's physical works and activities;
- Local Assessment/Study Area (LAA/LSA) – varies by VC, the area surrounding and including the Project area, where there would be reasonable potential for the proposed Project or Project-related activities to interact with and potentially have an adverse effect on the VC; and
- Regional Assessment/Study Area (RAA/RSA) – varies by VC, provides the regional context for the assessment of potential Project-related effects within the LAA/LSA, in most cases encompassing the area within which potential residual adverse effects of the Project would likely to cumulate with effects of other project and activities. The cumulative effects assessment area may include the RAA/RSA as well as areas outside of the RAA/RSA.

Temporal boundaries encompass the periods during which the project is expected to have potential effects on selected ICs and VCs. The temporal phases discussed under each VC included:

- Construction – two years
- Operations – a minimum of 50 years, depending on market conditions
- Decommissioning – 12 months

ASSESSMENT OF VALUED COMPONENTS

For each selected VC (or grouping of VCs), the Application describes the existing conditions within the study area in sufficient detail to enable potential Project-VC interactions to be identified, understood and assessed. The description of existing conditions includes, as relevant, natural and/or human-caused trends that may alter the environmental or socio-economic setting irrespective of the changes that may be caused by the project or other projects and activities in the local area.

The assessment then considers the potential interactions of the project with the VC, and the potential effects that could arise. These potential effects are identified and described, and an analysis is presented of the potential adverse effects resulting from the project.

The assessment then describes the mitigation measures that would be incorporated into the Project, including site and route selection, project scheduling, project design, and construction and operation procedures and practices.

Consistent with the Ministry of Environment's (ENV) Environmental Mitigation Policy and Procedures, EAO considers mitigation to be any practical means or measures taken to avoid, minimize, restore on-site, compensate or offset potential adverse effects. Also described are standard mitigation, best management practices (BMP), environmental management plans (EMP), contingency plans, emergency response plans (ERP), and other practices proposed to be implemented.

The residual effects on each VC (or grouping of VCs) are then identified. Residual effects are those effects remaining after the implementation of all mitigation measures, and are, therefore, the expected consequences of the proposed Project for the selected VCs. To inform the determination of the significance of a residual (adverse) effect, it is necessary to characterize the residual effect.

Residual effects are usually described using standard criteria: context, magnitude, extent, duration, reversibility and frequency. These criteria, as well as likelihood, are summarized in the following box.

Summary of Criteria for Characterizing Residual Effects

Context refers primarily to the current and future sensitivity and resilience of the VCs to change caused by the Project. Consideration of context draws heavily on the description of existing conditions of the VC, which reflect cumulative effects of other projects, and activities that have been carried out, and especially information about the impact of natural and human-caused trends in the condition of the VC.

Magnitude refers to the expected size or severity of the residual effect. When evaluating magnitude of residual effects, consider the proportion of the VC affected within the spatial boundaries and the relative effect (e.g., relative to natural annual variation in the magnitude of the VC or other relevant characteristic).

Extent refers to the spatial scale over which the residual effect is expected to occur.

Duration refers to the length of time the residual effect persists (which may be longer than the duration of the physical work or activity that gave rise to the residual effect).

Reversibility pertains to whether or not the residual effect on the VC can be reversed once the physical work or activity causing the disturbance ceases.

Frequency refers to how often the residual effect occurs and is usually closely related to the frequency of the physical work or activity causing the residual effect.

Likelihood refers to whether or not a residual effect is likely to occur. It may be influenced by a variety of factors, such as the likelihood of a causal disturbance, occurring or the likelihood of mitigation being successful. Generally speaking, the residual effects described in the assessment comprise the best prediction of what is likely to occur as a result of a proposed Project, assuming a suite of proposed mitigation is implemented.

The identification of significant adverse residual effects is a requirement of the Act. When determining significance for each VC, consideration should be given to how each of the criteria for characterizing residual effects informs the determination of significance. Significance may be determined based on a quantitative or qualitative threshold that describes the point beyond which a residual effect would be considered significant. In some instances, thresholds established for some VCs by legislation, regulation, or regulatory standard are used.

Once the residual effect prediction has been described in terms of significance and likelihood, it is important to explain the level of confidence in each prediction. The level of confidence, typically based on expert judgement, characterizes the level of uncertainty associated with both the significance and likelihood determinations. Specifying the level of confidence associated with these determinations allows the decision-maker to better evaluate the risk associated with the proposed Project. The assessment of confidence also informs the need for and scope of monitoring or other follow-up programs, including adaptive management.

Significance is usually determined for both the residual effects of the proposed Project and the cumulative effects. This is critical for making an informed decision about the proposed Project. It is important to understand the characteristics and significance of the potential project-specific residual effects in order to also understand the relative contribution of the proposed Project to cumulative effects. The cumulative effects assessment is discussed further below.

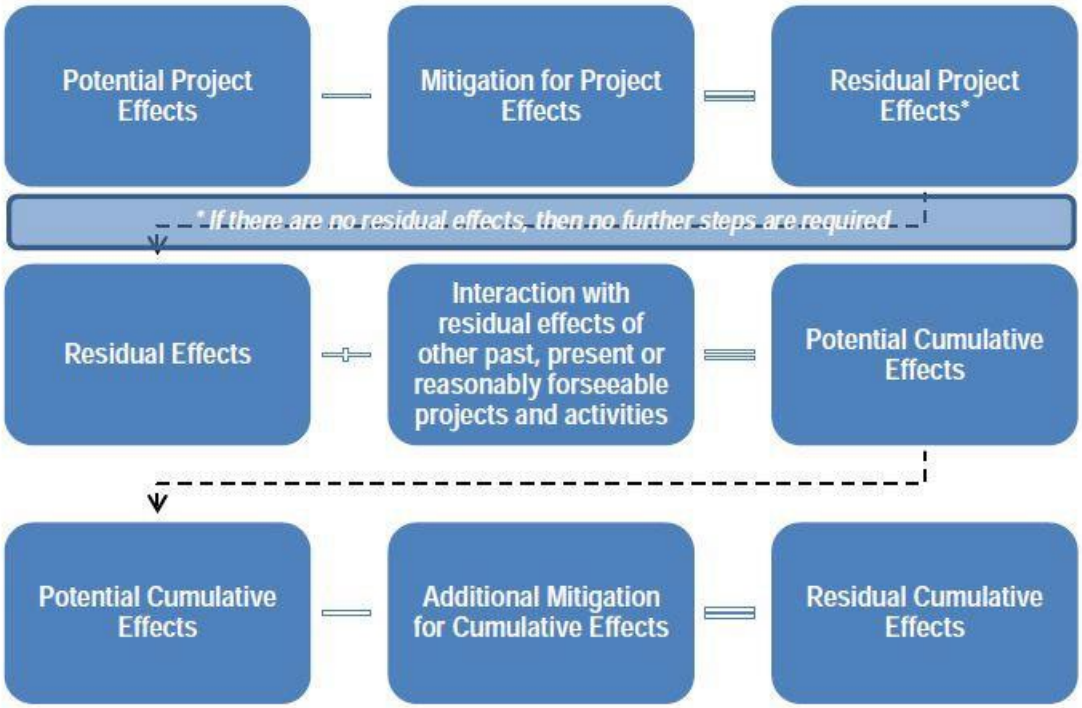
CUMULATIVE EFFECTS ASSESSMENT

If the proposed Project is expected to result in any residual adverse effects on the selected VC, there is a need to consider cumulative effects. It is important to note that this consideration must be made for all residual adverse effects, not only for those predicted to be significant.

Where there is a residual adverse effect, the assessment of cumulative effects for reviewable projects should consider other past, present and reasonably foreseeable projects and activities, which were identified in the AIR.

The general steps for a cumulative effects assessment are shown below. The likelihood of a cumulative interaction with other projects and activities, and the proposed Project's contribution to the overall cumulative effect, should together inform the cumulative effects assessment undertaken.

Steps to Determine Residual Effects and Cumulative Effects



The EAO evaluates cumulative effects by considering how the proposed Project's residual effects interact with the residual effects of other past, present and reasonably foreseeable projects and/or activities included in the Proponent's cumulative effects assessment. These projects and activities are discussed where relevant under the cumulative effects section for each VC in this report.

APPENDIX B: RESIDUAL EFFECTS CHARACTERIZATION DEFINITIONS

Characterization	General Description	Assessment Report Chapters		
		Air Quality Noise Visual Quality Greenhouse Gases (GHGs) Marine Resources Soils and Terrain/Terrestrial Resources Freshwater Fish and Fish Habitat Social and Economic Human Health	Heritage and Archaeology	Indigenous Interests
Context	The current and future sensitivity and resilience of the VC or Indigenous Interest to change caused by the project. Context draws on the descriptions of the existing conditions for the VC or Indigenous Interest, which reflect cumulative effects of other projects and activities that have been carried out, and especially information about the impact of natural and human-caused trends in the condition of the VC or Indigenous Interest.	**Low –** The indicator has low resiliency or is acutely sensitive to existing conditions **Moderate –** The indicator has moderate resiliency or is mildly sensitive to existing conditions **High –** The indicator has high resiliency or is generally not sensitive to existing conditions		**Low** – The Indigenous Interest has low resiliency or is acutely sensitive to a change in existing conditions **Moderate** – The Indigenous Interest has moderate resiliency or is mildly sensitive to a change in existing conditions **High** – The Indigenous Interest has high resiliency or is generally not sensitive to a change in existing conditions
Magnitude	The expected size or severity of the residual effect. Considers the proportion of the VC or Indigenous Interest affected within the spatial boundaries and the relative effect (e.g., relative to natural annual variation in the magnitude of the VC or other relevant characteristics).	**Negligible** – Project would likely have no measurable change **Low** – Residual effect would likely not be distinguished from baseline case conditions **Moderate** – Residual effect would likely result in demonstrable change, but remain within regulatory criteria or historic norms **High** – Residual effect would likely results in changes that are beyond regulatory criteria or historic norms	The amount of physical alteration or destruction of a heritage resource that can be expected. The resultant disturbance measured either in the amount or degree of disturbance (adapted from Archaeology Branch 1998) as follows: **Low** – minimal effects to resources of low, moderate, or high heritage value **Moderate** – moderate to high effects to resources of low or moderate heritage value **High** – moderate to high effects to resources of high heritage value	**Negligible** - a change that is small such that it is not detectable nor measurable and would not noticeably affect the Indigenous interest **Low** – a small but detectable change from baseline conditions that is within historic norms and within the system's capacity to respond **Moderate** – a demonstrable change from baseline conditions that is within historic norms and within the system's capacity to respond. **High** – a demonstrable change from baseline conditions that is beyond historic norms and beyond the system's capacity for effective response.
Extent	The spatial scale over which the residual effect is expected to occur.	**Project area/Site-specific** – Residual effect is restricted to the Project area or a specific area of the LAA **Local** – Residual effect is restricted to the LAA **Regional** – Residual effect is restricted to the RAA **Beyond Regional –** Residual effect extends beyond the RAA **Global** – Residual effect extends globally (i.e., Greenhouse gas emissions)		**Site-specific** – Residual effect is limited to the Project area **Local** – Residual effect is limited to the LSA **Regional** – Residual effect is limited to the RSA **Beyond Regional** – Residual effect extends beyond the RSA
Duration	The length of time the residual effect persists (which may be longer than the duration of the physical work or activity that gave rise to the residual effect) or is experienced by the Indigenous nation measured in generations (i.e., 25 years).	**Short-term –** Residual effect is restricted to the construction, decommissioning or reclamation phases **Long-term** – Residual effect last throughout the operational phase **Permanent** – Residual effect is not likely to recover to baseline **Temporary –** Effect lasting only for a limited period of time		**Short-term** – Residual effect is restricted to the construction, decommissioning or reclamation phases **Long-term** – Residual effect persists for 25 years or less **Permanent** – Residual effect persists for longer than 25 years
Frequency	How often the residual effect occurs and is usually closely related to the frequency of the physical work or activity causing the residual effect.	**Single/ Rare** – Residual effect occurs one time or rarely occurs **Infrequent** – Residual effect occurs infrequently at multiple times **Frequent/ Regular** – Residual effect occurs frequently, at regular intervals **Continuous** – Residual effect occurs continuously		
Reversibility	Whether or not the residual effect on the VC or Indigenous Interest can be reversed once the physical work or the activity causing the disturbance ceases.	**Reversible –** Residual effect is reversible **Irreversible** – Residual effect is permanent		**Reversible** – Residual effect is likely to recover to baseline **Irreversible** – Residual effect not likely to recover to baseline

Assessment Report → Date

APPENDIX C: EXISTING REGIONAL CROWN INITIATIVES TO ADDRESS CUMULATIVE EFFECTS

MARINE PLAN PARTNERSHIP FOR THE NORTH PACIFIC COAST AND THE ENVIRONMENTAL STEWARDSHIP INITIATIVE

The VPC Project is located on the North Coast of BC, and five of the six Tsimshian nations engaged in the review of the VPC Project are partner Indigenous nations in both the Marine Plan Partnership and the North Coast Environmental Stewardship Initiative: Kitsumkalum, Kitselas, Metlakatla, Gitxaała, and Gitga'at, along with Haisla Nation.

The Marine Plan Partnership was formalized in 2011 and is a co-led initiative between the Province and up to 17 partner Indigenous nations. The Marine Plan Partnership led to the development of four sub-regional marine plans which were signed in 2015 for Haida Gwaii, North Coast, Central Coast and Northern Vancouver Island, and a regional action framework which was completed in 2016. The VPC Project is located in the North Coast sub-region, and the six Tsimshian nations engaged in the review of the VPC Project are partner Indigenous nations.

To increase efficiencies and align complementary work, the Marine Plan Partnership's North Coast sub-region recently aligned with the North Coast Environmental Stewardship Initiative to produce an integrated North Coast cumulative effects workplan.

The Environmental Stewardship Initiative is a collaborative effort between the Province, and 32 Indigenous nations and industry in Northern BC, which was initially launched in May 2014 in response to natural gas development throughout the region. Through the Environmental Stewardship Initiative, Indigenous nations and the Province are creating opportunities for developing new environmental stewardship projects associated with natural resource and infrastructure development. The goal of the Environmental Stewardship Initiative is to develop a new, collaborative approach to establishing environmental legacies and to generate high quality, accessible and trusted environmental information.

Four regional forums have been established in the Skeena, the Omineca, the Northeast and the North Coast to identify and develop projects according to priorities in each area. The North Coast Environmental Steward Initiative Regional Stewardship Forum areas of focus include both habitat restoration projects and longer-term value-based work to address cumulative effects within the traditional territories of the six participating North Coast Indigenous nations.

The focus of the integrated North Coast cumulative effects program delivered through the Marine Plan Partnership and the Environmental Stewardship Initiative is to co-develop cumulative effects assessments for four initial values within the traditional territories of the participating North Coast Indigenous nations: aquatic habitats – estuary, food security, access to resources, and salmon. Gitxaala noted that an outcome of the Marine Plan Partnership and

the Environmental Stewardship Initiative will include co-developed management recommendations for ongoing monitoring and management of shared values in the North Coast region.

THE OCEANS PROTECTION PLAN (ADMINISTERED BY TC, DFO, AND ECCC)

The Oceans Protection Plan aims to develop a world class marine safety system, preserve and restore marine ecosystems, build Indigenous partnerships, create a stronger evidence base and increase community participation and public awareness. Built on science, technology and traditional knowledge, the Oceans Protection Plan includes over 50 marine safety, research and ecosystem initiatives from coast-to-coast-to-coast. Below are descriptions of specific related initiatives that overlap with the VPC Project area and are relevant to issues raised during the EA:

- **Baseline Environmental Data on BC's North Coast**[42]: ECCC is collecting baseline biological, ecological, and other environmental data about BC's marine ecosystems, including: taking aerial georeferenced videos and photos for shoreline characterization; updating socioeconomic and ecological information; conducting studies on marine birds to identify distribution, movements, and abundance; and conducting eco-toxicological work to understand the effects of oil on marine birds. ECCC is using this information to protect BC's north coast.

- **ECCC Enhanced 24/7 Emergency Response Capacity**: ECCC has increased response capacity with additional Environmental Emergency Officers and an additional wildlife emergency coordinator for BC, and supported the development of the Northern Shelf Bioregion Regional Response Plan by collecting and coordinating scientific data support and providing expert scientific and technical advice.

- **Enhanced Maritime Situational Awareness (EMSA)**: Transport Canada is working with pilot partners to develop a web-based Geographic Information System that improves situational awareness for Indigenous and coastal communities in order to support marine safety, environmental monitoring and protection, and marine spatial planning. The Enhanced Maritime Situational Awareness system, which is available now but also undergoing a process of enhancement and improvement, provides a platform to upload, create, and/or view spatial data and near-real time vessel traffic in order to provide a common operating picture and to support collaboration.

  Enhanced Maritime Situational Awareness is being developed collaboratively with 13 Indigenous nations (pilot partners) across Canada. While there are no

[42] https://tc.canada.ca/sites/default/files/migrated/eccc_coastal_baseline_factsheet_final_en_1_.pdf

further opportunities to become pilot partners on the Enhanced Maritime Situational Awareness initiative, Transport Canada can work to provide access to the Enhanced Maritime Situational Awareness system. There are currently more than 625 Enhanced Maritime Situational Awareness users, including Indigenous nations, federal & provincial government, academic/science organizations, and industry.

The Enhanced Maritime Situational Awareness pilot project initiative is a part of Canada's Oceans Protection Plan. As such, it is currently funded through March 2022 but Transport Canada is working with its pilot partners to create a series of recommendations to government for the continuation of the project after this date.

- **Cumulative Effects of Marine Shipping:** Canada in its Oceans Protection Plan is committed to the Cumulative Effects of Marine Shipping initiative, intended to improve understanding of cumulative effects from marine vessel activities at identified pilot sites, including the Northern Shelf Bioregion in BC, through strengthened collaboration between the federal government, Indigenous governments, coastal communities, marine stakeholders and other interested parties. A key deliverable of the national Cumulative Effects of Marine Shipping initiative is the development of a framework to guide and direct Cumulative Effects of Marine Shipping activities across Canada.

  In June 2018 the Pacific North Coast First Nations and Canada entered into a Reconciliation Framework Agreement for Bio-Regional Oceans Management and Protection. The Reconciliation Framework Agreement commits the Parties to advance Collaborative Governance and Management on matters related to Marine Planning and Oceans Management and Shipping, Marine Safety, and Ocean Protection. Schedule B of the Reconciliation Framework Agreement commits the Parties to engage in discussions to achieve "improved understanding of the cumulative effects of shipping on marine wildlife and ecosystems (including human communities), including collaborative work to collect and update baseline data to support effective environmental stewardship".

  The Northern Shelf Bioregion Cumulative Effects of Marine Shipping Pilot Project is seeking to achieve stated goals and objectives within the Reconciliation Framework Agreement mandate and existing legislation and policy as well as within an agreed to Project Charter and workplan. Work is currently underway on the conduct of the Cumulative Effects of Marine Shipping assessment, which will lead to the identification of tools and strategies to mitigate the adverse cumulative effects of marine shipping on priority marine shipping issues and valued components.

- **Coastal Environmental Baseline Program:** The Coastal Environmental Baseline Program is part of the national Oceans Protection Plan, launched in 2016. The program includes funding to collect comprehensive data over 5 years on the state of 6 marine ecosystems in Canada, including the Port of Prince Rupert[43].

  DFO collaborates with coastal communities and research partners to determine what baseline data will be gathered to understand our marine ecosystems and inform decisions that impact sensitive coastal environments. The Coastal Environmental Baseline Program enables research partners and coastal communities to be directly involved in gathering the scientific data that contributes to characterizing Canada's coastal environments. By gathering comprehensive baseline data, we can better detect changes in the environment over time and improve our understanding of the effects of shipping and coastal development on the marine environment.

PORT-LED INITIATIVES

The **Port Environmental Stewardship Committee** provides a forum for data sharing, communication, and collaboration. It is comprised of port partners like tenants and port users, Indigenous nations, government agencies, NGOs, academics, proponents, and community members. Various Port programs use working groups from Port Environmental Stewardship Committee to provide advice, direction and to collaborate on projects including the Marine Mammal Program, Shorezone mapping, the Pollution Tracker program and the Aquatic Invasive Species initiative.

PRPA has undertaken an **annual energy and emissions inventory** since 2010. The inventory has been consistently developed in collaboration with all of the port tenants and users to establish baseline information and inform proactive initiatives to support reductions in energy consumption and total emissions.

PRPA currently has several emission reduction programs in place: the Green Wave vessel incentive program, the no idling policy for container trucks entering Fairview terminal, the Clean Truck program (real-time monitoring of truck activity), electrification of equipment, and improved port design and infrastructure.

Introduced in 2013, the **Green Wave** environmental incentive program offers discounted harbour dues to commercial vessels that implement emission reduction measures or other environmental practices. Through Green Wave, PRPA is providing opportunities for shipping companies to benefit from environmental performance. The program includes a variety of

[43] https://www.dfo-mpo.gc.ca/science/environmental-environnement/cebp-pdecr/index-eng.html

qualification standards for arriving commercial vessels consistent across the global shipping industry.

Green Wave incorporates a number of mechanisms for incentives, which include the Environmental Ship Index, Green Marine, RightShip, the Clean Cargo Working Group, the Green Award, the Clean Shipping Index, and the Energy Efficiency Design Index, as well as multiple underwater noise notations and reduction technologies. Using a three-tier criteria system, vessels are scored for their level of achievement in one of the recognized environmental programs or for technological advancement and awarded a discount on their harbour dues paid to PRPA.

PRPA has established a network of **meteorological and air quality data** in the region. Meteorological sites collecting data on wind, temperature and humidity are located at Roosevelt Elementary School (2012) Westview (2013), Fairview (2018), Port Edward and Ridley Island (2020). Meteorological data is also part of Ocean Networks Canada's stations on Digby and Ridley Islands. Air quality stations collect data on a number of parameters including PM2.5, PM10, NOx, SOx and ozone. Stations are located at Westview (2013), Fairview (2018) with a station planned for Port Edward (2021). Real time data from Fairview is available on the BC Ministry of Environment air quality portal.[44]

A wet deposition station was established in Port Edward in 2014, which is part of the national atmospheric deposition program, a multi-partner atmospheric monitoring program with a network of stations across North American. The program measures concentrations and **deposition of atmospheric constituents** by collecting data and science on acid rain, atmospheric deposition and precipitation chemistry.[45]

A series of **noise monitoring stations** has been established in the communities of Prince Rupert and Port Edward. The stations collect data continuously and present the information on a publicly accessible real-time portal, which also includes access to noise audio clips for events over set thresholds.[46]

PRPA's **ShoreZone Initiative** has worked with key partners to document existing shoreline habitats around Prince Rupert, the Tsimshian peninsula and the Skeena River using very high-resolution aerial imagery. The photographs and videos of hundreds of kilometres of shoreline were taken while flying several hundred feet over the ground, and spatially referenced by a global positioning system so that accurate latitude and longitude information can be determined for any location in the photo. Lastly, the images are stitched together to create a

[44] https://www.env.gov.bc.ca/epd/bcairquality/readings/find-stations-map.html
[45] https://www.usgs.gov/mission-areas/water-resources/science/national-atmospheric-deposition-program-nadp?qt-science_center_objects=0#qt-science_center_objects
[46] https://public.envcloud.com/ppr/rupertport/

coastal survey map.[47]

PRPA launched an **aquatic invasive species** program at the Port of Prince Rupert in 2012. The program includes sampling for tunicates (Platewatch program) and green crab (trapping and zooplankton sampling). The program partners include Smithsonian platewatch program, Coast Mountain College, Metlakatla, Lax Kw'alaams and DFO. The program is conducted through an advisory working group.

PRPA established a **marine environmental water quality** program in 2013. Quarterly water sampling involves collection and analysis of discrete samples collected at up to 23 sites throughout the Prince Rupert harbour and surrounding area. These samples are analyzed for parameters including turbidity and total suspended solids, nutrients, metals, phytoplankton abundance, bacteria, and hydrocarbons. At the same time, in-situ measurements are taken of other common parameters such as dissolved oxygen, temperature, and salinity. More frequent monthly in-situ monitoring is performed to enhance understanding of the natural oceanographic processes in the Prince Rupert region and their potential impact on water quality. Indigenous technicians have assisted with collection of samples and the marine environmental water quality program has supported DFO and Skeena Fisheries Commission in the collection of carbon samples. The program is a collaboration with PRPA, City of Prince Rupert, DP World, RTI, AltaGas, Vopak and DFO through the Oceans Protection Plan. The marine environmental water quality program is conducted through an advisory working group. Various **oceanographic sensors** have been established in the Prince Rupert harbour through a collaboration between PRPA and Ocean Networks Canada. Underwater platforms are located off the west side of Digby Island and in the Prince Rupert inner harbour. The platforms collect continuous data on temperature, tides, salinity, chlorophyl, oxygen and turbidity.[48]

Along with the Ocean Networks Canada tide data, PRPA has a **tide** sensor in the Prince Rupert harbour and **current** sensors at Fairview, Porpoise Channel and Porpoise Harbour. PRPA has a number of bouys in the harbour (Prince Rupert Harbour, Agnew Bank, Triple Island) collecting **wave** data. Ocean Networks Canada also has coastal ocean dynamics applications radar on Ridley and Digby to calculate surface currents in the area around the entrance to the Prince Rupert Harbour.[49]

PollutionTracker is a BC coast-wide, integrated **marine pollution monitoring** program. Sampling and analysis along the BC coast provides an overview of pollution in order to guide best practices, management responses, and remediation. PRPA has coordinated with Ocean Wise, DFO, Metlakatla and Lx Kw'alaams on the north coast. DFO has also provided funds through the Oceans Protection Plan. Two samples in the north coast were collected in 2016 and eleven sites

[47] https://www.arcgis.com/apps/webappviewer/index.html?id=2fe5da0bd65b422a87031bc083152062&extent=-14526196.6738,7219660.7773,-14489506.9002,7237814.5716,102100
[48] https://data.oceannetworks.ca/PrinceRupertPort?rotatemin=0&refreshsec=0&qpddr=L10
[49] https://www.rupertport.com/live-harbour-data/

in 2019.[50]

The Port of Prince Rupert **Marine Mammal Program** was established in 2015 as a multi-party collaboration working to reduce physical and acoustic disturbance of marine mammals in the region. The program is conducted through an advisory working group, and there are a number of ongoing programs and initiatives including:

- Quiet vessel incentives: One of only two ports in world providing incentives for quieter vessels (other port Vancouver);
- North Coast Cetacean Research Initiative: Program currently funded by PRPA, DP World and DFO with focus on science, research, education and community engagement;
- Underwater noise modeling: Modeling conducted by JASCO on baseline noise and future port growth;
- Mariners Guide for Western Canada: Marine mammal identification and historical distribution through collaboration between Ports of Prince Rupert and Vancouver, Ocean Wise and DFO;
- Whale Report Alert System: Real time whale alerts from visual sightings through collaboration between Ports of Prince Rupert and Vancouver, Ocean Wise, DFO, Transport Canada and other partners;
- Whales in our Waters: Online tutorial on marine mammals for marine and vessel operators; and
- Hydrophone: Initial hydrophone deployment through Ocean Networks Canada platform.

Annual **biodiversity surveys** are conducted in the Prince Rupert region, which include ongoing surveys and data collection for habitat compensation projects including intertidal and subtidal reefs. A series of shoreline segments have been selected for intertidal surveys to study species composition and track changes over time.

[50] https://pollutiontracker.org/

APPENDIX D: LIST OF WORKING GROUP MEMBERS

PROVINCIAL GOVERNMENT

Ministry of Energy, Mines and Low Carbon Innovation

Ministry of Environment and Climate Change Strategy, Climate Action Secretariat

Ministry of Forests, Lands, Natural Resource Operations, and Rural Development – Archaeology Branch

Ministry of Health

Ministry of Jobs, Economic Development and Competitiveness

Ministry of Municipal Affairs and Housing

Ministry of Transportation and Infrastructure

FEDERAL GOVERNMENT

Canadian Coast Guard, Western Region

Environment and Climate Change Canada

Fisheries and Oceans Canada

Health Canada

Transport Canada

LOCAL GOVERNMENT AND HEALTH AUTHORITY

City of Terrace

District of Port Edward

North Coast Regional District

Northern Health

INDIGENOUS NATIONS

Gitga'at First Nation

Gitxaala Nation

Kitselas First Nation

Kitsumkalum Band Council

Lax Kw'alaams Band

Metlakatla First Nation