Vopak Development Canada

Vopak Pacific Canada Draft Terms of Reference for Environmental Effects Evaluation

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PREFACE TO THE TERMS OF REFERENCE

Vopak Development Canada Inc. is proposing to develop Vopak Pacific Canada (the Project), a bulk liquid storage facility near Prince Rupert, British Columbia (BC) as described in the Project Description[1].The Prince Rupert Port Authority (PRPA), acting as a federal authority, and the BC Environmental Assessment Office (EAO), acting as a provincial authority, are conducting an environmental review of Vopak's proposed Project.

As the Project is proposed on federal lands, an Environmental Effects Determination (EED) by federal authorities is required under Section 67 of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) that carrying out the Project is not likely to cause potential significant adverse effects to the environment. The Project is not a designated activity as defined in *Regulations Designating Physical Activities* (Project List) under the CEAA 2012.

The proposed Project exceeds the energy storage threshold of 3 petajoules (PJ) of stored energy. Therefore, it is subject to a provincial environmental assessment (EA) review under Part 8 of the *Reviewable Projects Regulation (BC Reg 370/02)* of the *BC Environmental Assessment Act* (BCEAA). The EAO issued a section 10 Order to the Proponent on July 26, 2018 confirming that the proposed Project requires an Environmental Assessment Certificate (EAC), pursuant to Section 10(1)(c) of BCEAA.

The purpose of this Terms of Reference (TOR) document is to establish the information that Vopak is required to provide in the environmental effects evaluation (EEE) and the EAC Application, to be submitted to PRPA and EAO for the EA review. The TOR incorporates the provincial information requirements as specified in the EAO Application Information Requirements (AIR) template. The EEE document and EAC Application will be submitted as a single document (herein referred to as 'EEE'), to both federal and provincial authorities, and will contain the information requirements as specified in this TOR.

[1] https://projects.eao.gov.bc.ca/p/vopak-pacific-canada/docs?folder=3

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1 Acronyms and Abbreviations

Term	*Definition*
AIR	Application Information Requirements
BC	British Columbia
BCEAA	*BC Environmental Assessment Act*
BC ENV	BC Ministry of Environment and Climate Change Strategy
BCMCA	British Columbia Marine Conservation Analysis
CAC	Criteria Air Contaminants
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
CEA Agency	Canadian Environmental Assessment Agency
CEPA	*Canadian Environmental Protection Act, 1999*
CMT	Culturally Modified Tree
CN	Canadian National Railway
CO	Carbon Monoxide
CPP	Clean Petroleum Products
DAS	Disposal At Sea
DFO	Fisheries and Oceans Canada
DGPS	Differential Global Positioning System
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office
ECCC	Environment and Climate Change Canada
EED	Environmental Evaluation Determination
EEE	Environmental Effects Evaluation
GHG	Greenhouse Gas
GIS	Geographic Information System
km	Kilometer
LSA	Local Study Area
LPG	Liquefied Petroleum Gas
m	Meter
m^3	Cubic Meters
NOx	Nitrogen Oxides
PAH	Polycyclic Aromatic Hydrocarbons
PEIT	Port Emissions Inventory Tool
PJ	Petajoule
PM	Particulate Matter
PRPA	Prince Rupert Port Authority
RSA	Regional Study Area
SARA	*Species at Risk Act*
SO_2	Sulfur Dioxide
TC	Transport Canada
TEM	Terrestrial Ecosystem Mapping
The Project	Vopak Pacific Canada
TOR	Terms of Reference
VC	Valued Components
VOC	Volatile Organic Compound

TABLES OF CONCORDANCE

The EEE will include a concordance table to demonstrate where the requirements in this TOR are found in the EEE.

Table 1: Example Table of Concordance between TOR and EEE

TOR Section & Page No.	TOR Title	TOR Section Language	EEE Section Title	EEE Volume Section, Sub-Section, Page Number	Relevant Appendix
Pages 22-29	Fish – Approach	The EEE will include description of the study methodology used to assess potential adverse effects on fish.	Fish – Study Methodology	Volume 2 Section 4.1.2 Page 5-55	Volume 6 Appendix K

This Terms of Reference Document represents the scope of the environmental effects evaluation. Table 2 below demonstrates compliance between the sections of this TOR and the required sections in the EAO's Application Information Requirements (AIR) document which outlines scope requirements for an assessment under the BCEAA.

Table 2: Table of Concordance between AIR and TOR

AIR Section	AIR Title	TOR Section	TOR Section Title
1.0	Overview of Proposed Project Proponent Description	1.2	Proponent information
1.1	Description of Proposed Project	1.1, 2.1, 2.2, 2.3, 2.4, 2.5	Project Overview, Setting and Site Location, Project Components and Related Activities, Schedule, Land and Marine Use, Project Benefits
1.2	Applicable Authorizations	1.3.2	Applicable Authorizations
1.3	Project Design and/or Alternative Means of Carrying out the Project	2.6	Project Design and/or Alternatives Means of Carrying out the Project
1.4	Alternatives to the Proposed Project	2.7	Alternatives to the Proposed Project
2.0	Environmental Assessment Process	1.3, 3.0	Regulatory Context Consultation and Engagement
2.1	Provincial EA Process	1.3, 3.0	Regulatory Context, Consultation and Engagement
2.2	Federal EA Process	1.3, 3.0	Regulatory Context, Consultation and Engagement
3.0	Assessment Methodology	4	Methodology
3.1	Issues Scoping and Selection of Valued Components	4.1, 4.2	Selection of Valued Components, Scope of the Assessment
3.2	Assessment Boundaries	4.2.1, 4.2.2	Assessment Boundaries, Subcomponents and Indicators

Table 2 (Cont'd): Table of Concordance between AIR and TOR

AIR Section	AIR Title	TOR Section	TOR Section Title
3.3	Existing Conditions	4.3	Baseline Conditions
3.4	Potential Effects	4.4	Project Interactions and Potential Effects
3.5	Mitigation Measures	4.5	Mitigation Measures
3.6	Characterization of Residual Effects	4.6	Residual Effects Characterization and Proponent Determination of Significance
3.7	Likelihood	4.6	Residual Effects Characterization and Proponent Determination of Significance
3.8	Proponent's Determination of Significance	4.6	Residual Effects Characterization and Proponent Determination of Significance
3.9	Confidence and Risk	4.6	Residual Effects Characterization and Proponent Determination of Significance
3.10	Cumulative Effects Assessment	4.7,	Cumulative Effects Assessment
3.11	Follow-up Strategy	11.0	Monitoring and Follow up Programs
4.0	Environmental Effects Assessment	5 5.1 5.2 5.3 5.4 5.5 5.6 5.7	Effects Evaluation Air Quality and Greenhouse Gas Emissions Noise Visual Quality – Including ambient light Marine Resources Soils and Terrain Terrestrial Resources Freshwater Fish and Fish Habitat
5.0	Economic Effects Assessment	5.8	Socio-Economic Resources
6.0	Social Effects Assessment	5.8	Socio-Economic Resources
7.0	Heritage Effects Assessment	5.9	Archaeology
8.0	Health Effects Assessment	5.10	Human Health
9.0	Accidents and Malfunctions	7.0	Accidents and Malfunctions
10.0	Effects of the Environment on the Project	8.0	Effects of the Environment on the Project
12.0	Aboriginal Consultation	6.0	Aboriginal Rights and Interests
12.1	Aboriginal Interests	6.0	Aboriginal Rights and Interest
12.2	Other Matters of Concern to Aboriginal Groups	6.0	Aboriginal Rights and Interests
12.3	Issue Summary Table	6.0	Aboriginal Rights and Interests
13.0	Public Consultation	3.1 9.0	Consultation and Engagement - Public Consultation Public Consultation
14.0	Management Plans	10.0	Management Plans
15.0	Monitoring & Follow-up Programs	11.0	Monitoring and Follow-Up Programs
16.0	Conclusions	12.0	Conclusions
16.1	Summary of Residual Effects	12.0	Conclusions
16.2	Summary of Mitigation Measures	12.0	Conclusions
17.0	Reference Material	13.0	References
18.0	APPENDICES	--	As required

ENVIRONMENTAL EFFECTS EVALUATION SUMMARY

The EEE will include the following:

- A summary of the proposed Project including the project scope, project benefits and applicable permit requirements;
- A brief overview of the EA process including project reviewability, the Project Description and TOR Phase, the EEE Phase and the Determination Phase;
- A brief overview of consultation approaches with Aboriginal groups, the public and government agencies to date;
- A summary of the key issues raised by Aboriginal groups, the public and government agencies;
- A summary of key adverse effects on Aboriginal Interests and mitigation measures;
- A summary of key effects, proposed mitigation measures and residual and cumulative effects on Valued Components (VCs); and
- Proponent's conclusions regarding the potential for significant adverse effects on VCs.

1. PROJECT IDENTIFICATION

1.1. Project Overview

The Environmental Effects Evaluation (EEE) will provide a brief introduction to the Project including the Project location.

Vopak Development Canada Inc. (Vopak), a wholly-owned subsidiary of Royal Vopak, is proposing to construct and operate a new bulk liquids tank storage facility in Prince Rupert, BC. The Project is proposed to be located on Ridley Island within the lands and waters under the jurisdiction of the Prince Rupert Port Authority (PRPA) (Figure 1). The Project will store Liquefied Petroleum Gas (LPG) (i.e., propane), Clean Petroleum Products (CPP) (i.e., diesel and/or gasoline), and methanol on behalf of Vopak's customers. Vopak will build the Project and manage the day-to-day operations of the bulk liquids tank storage facility. All products will be transported from various locations across Western Canada to the Project via the existing Canadian National Railway (CN) line. Customers of Vopak will be scheduling the transportation of the products to the facility and will ship the products from the Project's jetty to international markets.

The physical works and activities of the Project are located entirely on federal lands and waters administered by PRPA. The Project is being built within an area designated for port-related activities within PRPA jurisdiction. Ridley Island falls under the *Port of Prince Rupert 2020 Land Use Management Plan* (AECOM 2011), which refers to the development of a liquid bulk terminal as being a long-term prospect in the port.

1.2. Proponent Information

The EEE will provide background information about Vopak, including history, type of company or organization, affiliations, the address, contact information, and a list of parties involved in the preparation of the EEE.

Table 3: Proponent Contact Information

Project Name	Vopak Pacific Canada
Proponent	Vopak Development Canada Inc.
Address	444 5th Ave SW, Suite 1460 Calgary, AB T2P 2T8 www.vopak.com Project website: https://www.vopak.com/vopak-pacific-canada Project email: vopakpacificcanada@vopak.com
Project Lead	Peter Keeshan Business Development Director Email: peter.keeshan@vopak.com Phone: (403) 870 8469
Principal Contact	Marina Spahlinger Manager, Regulatory and Stakeholder Relations Email: marina.spahlinger@vopak.com Phone/Fax: (587) 355 7874

1.3. Preparation of the EEE

The EEE will include a list of parties involved in the preparation of the EEE including their qualifications.

1.4. Regulatory Context

The EEE will provide additional detail about the regulatory context and process for review of the Project, including:

- A statement that the proposed Project is subject to review under the *BC Environmental Assessment Act* (BCEAA) and *Canadian Environmental Assessment Act* (CEAA 2012), identifying the trigger(s) for the review under the regulations or provisions of BCEAA and CEAA 2012;
- A statement that the EEE has been developed pursuant to the Terms of Reference (TOR) approved by PRPA and BC Environmental Assessment Office (EAO) and complies with relevant instructions provided in the section 11 Order and any other direction provided by PRPA and EAO; and
- A table documenting applicable milestones, including, but not limited to, issuance of section 10 and section 11 Orders, working group meetings, any public comment periods or open houses and the issuance of the TOR, including links to documents on EAO's public website.

1.4.1. Federal Process

As the Project will be built on federal lands it will be subject to an Environmental Effects Determination (EED) under Section 67 of CEAA 2012:

- *"67 An authority must not carry out a project on federal lands, or exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands, unless:*

  (a) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or
  (b) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides that those effects are justified in the circumstances under subsection 69(3)."

Environmental effects on federal lands, as defined in CEAA 2012, Section 5(1)(a), are considered a change that may be caused to:

- *"(i) fish and fish habitat as defined in subsection 2(1) of the Fisheries Act,*
- *(ii) aquatic species as defined in subsection 2(1) of the Species at Risk Act* (SARA)*,*
- *(iii) migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994, and*
- *(iv) any other component of the environment that is set out in Schedule 2."*

As currently described, the Project is not defined under the CEAA 2012 *Regulations Designating Physical Activities (SOR/2012-147)*; therefore, the Project does not require an environmental assessment (EA) under Section 13 of CEAA 2012.

PRPA will coordinate the Section 67 EEE process, and the federal authorities involved in regulating the Project will be required to make an EED. These federal authorities are expected to be PRPA, Transport Canada (TC), Environment and Climate Change Canada (ECCC) and Fisheries and Oceans Canada

(DFO). The federal authorities will make an EED prior to issuing permits outlined below. The EEE will be prepared by Vopak following the guidance of PRPA and using federal guidance as provided in *Projects On Federal Lands: Making a determination under section 67 of the Canadian Environmental Assessment Act, 2012,* (Canadian Environmental Assessment Agency (CEA Agency), 2014).

1.4.2. Provincial Process

The provincial EA process in BC is administered by the BC EAO. Projects that are considered reviewable pursuant to the BCEAA are specified in the *Reviewable Projects Regulations* (regulations).

The EEE will include a statement that the proposed Project is subject to review under BCEAA and will identify the trigger(s) for the review under the Act. As currently described, the Project exceeds the energy storage threshold of 3 PJ of stored energy as specified under Part 4, Table 8 of the regulations. The Project also will require dredging of an area larger than 2 hectares of foreshore or submerged land, which exceeds the shoreline modification threshold specified under Part 5, Table 9 of the regulations.

1.4.3. Coordinated Environmental Assessment Process

The EEE will describe the coordinated EA review process by PRPA and EAO.

1.4.4. List of Reviewing Agencies

The following government agencies, Aboriginal Groups and the public will have had the opportunity to review and comment on the draft TOR:

Federal Agencies:

- Prince Rupert Port Authority;
- Department of Fisheries and Oceans Canada;
- Transport Canada;
- Environment and Climate Change Canada; and
- Health Canada.

Provincial Agencies:

- Climate Action Secretariat;
- Ministry of Environment and Climate Change Strategy;
- Ministry of Energy, Mines and Petroleum Resources;
- Ministry of Forests, Lands and Natural Resource Operations and Rural Development;
- Ministry of Health;
- Ministry of Indigenous Relations and Reconciliation;
- Ministry of Transportation and Infrastructure;
- Northern Health; and
- BC EAO.

Local Governments:

- City of Prince Rupert;

- District of Port Edward; and
- North Coast Regional District.

Aboriginal Groups:

- Lax Kw'alaams;
- Metlakatla;
- Kitselas;
- Kitsumkalum;
- Gitxaala; and
- Gitga'at

1.4.5. Applicable Authorizations

The EEE will include a list of applicable licenses, permits and/or approvals that are already received or required for the phases of the proposed Project, and the associated responsible regulatory body. Identified list of required authorizations, to the extent that is known at the time, is available below in Table 4.

Table 4: Applicable Authorizations

Permit or Approval	Regulator	Description
PRPA Lease Agreement under the *Canada Marine Act*	PRPA	Lease to occupy and use PRPA-administered lands.
Approval under *Navigation Protection Act* (NPA)	TC	Approval for the construction of Project components that would impact navigation (marine facility, dredging, etc.).
Authorization under *Fisheries Act*	DFO	Marine-based activities and infrastructure causing disturbance or loss of fish habitat in the marine environment require an Authorization from DFO.
Disposal at Sea (DAS) permit under *Canadian Environmental Protection Act*	ECCC	Permit authorizing disposal of excavated or dredged material at sea.

2. PROJECT DESCRIPTION

The EEE will summarize the scope of the Project as defined in the Project Description (Vopak, 2018).

2.1. Setting and Site Location

The EEE will provide a brief description of the Project, including:

- Location, including geographic coordinates, with maps showing both regional context and specific location of the Project.
- Describe the location of the proposed Project relative to Aboriginal groups' traditional territories.

2.2. Project Components and Related Activities

The EEE will include details regarding the physical components and related activities at each phase (i.e., construction, operations and decommissioning) of the Project, including figures of on-site and off-site components. The physical components and related activities identified within this section of the EEE will support the assessment of potential effects on relevant VCs.

The scope of the Project includes the receiving and unloading of customer products from CN rail cars on six rail tracks into the Project's rail unloading area and into Project storage facilities. From the storage facilities the product is loaded via pipeline along the Project's jetty to a berthed ship ready to take the products to their final destination. The Project includes all physical works and activities associated with the construction, operation and decommissioning of the bulk liquids storage facility, the jetty and supporting infrastructure. The physical works and activities are located entirely on federal lands and waters, administered by PRPA.

2.2.1. Project Components

The EEE will include a description of Project components similar to those described in the Project Description:

Table 5: Project Components

Component Category	Project Components
Bulk liquids tank storage facility	• Up to 50 rail car unloading racks along the PRPA Road Railway Utility Corridor; • Gas generators capable of producing up to 2.7 megawatt of electrical power combined for LPG cooling; • LPG cooling equipment and de-ethanizer; • Emergency ground flare; • Six pressurized LPG bullets of 1,000 cubic meters (m^3) each; • One full containment LPG storage tank of 90,000 m^3; • Carbon steel storage tanks (CPP: 2 tanks at 40,000 m^3 and 6 tanks at 30,000 m^3, Methanol: 4 tanks at 40,000m^3 and 2 tanks at 30,000 m^3); and • Process control and safety systems.

Table 5 (Cont'd): Project Components

Component Category	Project Components
Jetty	• A 200 meter (m) long causeway; • A 800 m long trestle; • A pipe rack for the insulated pipelines for products and utilities; • Two berths for vessels up to 85,000 m^3 capacity (80,000 dead weight tonnes); • Two loading platforms including all required equipment and systems; and • One auxiliary platform for the firewater pump house, spill boom shed and electrical building.
Supporting Infrastructure	• Roads and car parking; • Drainage and wastewater treatment system; • Nitrogen for safety and maintenance purposes; • Office including central control room, maintenance and utilities buildings; • Electrical substation and connection to the BC Hydro grid; and • Natural gas connection to Pacific Northern Gas for compressors, gas generators and heating of buildings.

2.2.2. Construction Activities

The EEE will provide a description of Project activities and workforce during construction. The anticipated construction activities will include:

- Site clearing and grading;
- Construction of Project facilities on land (civil, mechanical and electrical and instrumental work);
- Construction of marine jetty and berths, including dredging;
- Disposal of surplus organics, waste rock and dredge material, including transit to and from the disposal site;
- Post-construction clean-up and on-site ground reclamation; and
- Commissioning.

2.2.3. Operation Activities

The EEE will provide a description of Project activities and workforce during operation. Activities during operations include:

- Railway operations associated with Project inbound train unloading and outbound train staging within the Port of Prince Rupert;
- LPG cooling process;
- Product storage;
- Vessel berthing;
- Cargo loading;
- General terminal operations; and
- Associated off-site shipping activities along the marine access route between the Project marine berths and the pilot boarding area near Triple Island.

Routine inspections and maintenance of all systems will be completed on an ongoing basis, including:

- Maintenance of equipment to ensure safe and reliable operations;
- Inspection of equipment and facilities to ensure mechanical integrity is maintained; and
- Inspection and maintenance of safety, civil structures and environmental monitoring devices.

Associated off-site shipping and rail activities will be the responsibility of Vopak's customers and within the care of the infrastructure service providers.

2.2.4. Decommissioning Activities

The EEE will provide a description of Project activities during decommissioning.

2.3. Schedule

The EEE will provide a schedule of activities for all phases of the Project.

2.4. Land and Marine Use

The EEE will summarize existing and planned land and marine use that overlaps or may be potentially impacted by the Project components and activities, including:

- Land ownership e.g. private land, provincial land, federal land (including Indian Reserves);
- Local government zoning or plans;
- Tenures (municipal, provincial, federal), licenses, permits or other authorizations;
- Non-tenured current land uses;
- Current and planned marine use plans;
- Federal land use plans (e.g. PRPA Land Use Management Plan);
- Other development or activities, whether or not directly related to the Project; and
- Maps showing location of other uses referenced above in relation to the Project.

2.5. Project Benefits

The EEE will describe the Project's economic benefits.

- Capital construction cost estimates, including:
  - Breakdown of costs (e.g. land, buildings, equipment) associated with the Project;
  - Estimated operating costs over the life of the Project, including breakdown of costs by category (e.g. labour, supplies and materials, administration); and
  - Estimated costs for decommissioning/closure/abandonment/reclamation.
- Employment estimates including:
  - Direct employment to be created, by job category by Project phase, in number of person year jobs for construction and decommissioning and full-time equivalent jobs for operations. Direct employment estimates will be broken down into full-time, part-time and seasonal job categories;
  - Average wages, by major job category, for the construction and operating periods;

- Breakdown of jobs that will be filled from local, provincial, national or international labour markets;
- Indirect and induced employment to be generated, by Project phase; and
- Information about an employment strategy, if any.

- Contractor supply services estimates including:
  - List of the major types of businesses/contractors to be used, broken down at the local, provincial, and national level, by Project phase;
  - Value of supply of service contracts expected, by Project phase; and
  - Information about a local purchasing strategy, if any.

- Annual government revenues, by type (e.g. income tax, license rent, property tax) and jurisdiction (e.g., local, provincial, federal), for the phases of the Project;
- Benefits the project may have on either environment, economic, social, health, or heritage components;
- Canadian dollar estimates will be provided in real dollars, with an explanation of how they are measured (e.g. discount rates); and
- Assumptions and references for the above information will be stated.

2.6. Project Design and/or Alternative Means of Carrying out the Project

The EEE will include:

- An assessment of the alternative means of carrying out the Project that are technically and economically feasible.
- The rationale and criteria used to select the proposed means of undertaking the Project; and
- Specific alternatives already considered (e.g. components and activities that will be considered in the EEE).

Vopak has been, and will be evaluating a number of alternative designs and technologies (collectively referred to as the “alternative means”) for the proposed Project, including;

- Orientations for the onsite facilities;
- Jetty location and structure; and
- Disposal of marine sediments.

Initial criteria used to evaluate these alternatives include:

- Technical requirements to construct and operate the Project;
- Geotechnical and geophysical properties of the land and marine site including seismic data;
- Feedback receive from Aboriginal Groups, including feedback related to Aboriginal interests;
- Economic feasibility of alternative technologies for construction and operation of the Project;
- Reducing adverse effects on environmental and heritage resources; and
- Industry safety standards and regulatory requirements.

2.7. Alternatives to the Project

The EEE will include an assessment of the alternatives to the Project that were technically and economically feasible.

3. CONSULTATION AND ENGAGEMENT

The EEE will summarize the consultation and engagement activities undertaken to date and/or planned by Vopak with the public, Aboriginal groups, and government agencies regarding the Project's potential to cause adverse environmental effects.

3.1. Public Consultation

The scope of engagement with the public and stakeholders will be described in the EEE, including a summary of public participation in the EEE process, a list of the key issues raised, and the status of issue resolution (with cross-references, as appropriate, to other sections of the EEE that deal further with consultation and issues raised).

3.2. Aboriginal Consultation

The scope of engagement with Aboriginal groups will be described, including a summary of their participation and a list of the key issues raised by each party and the status of issue resolution.

3.3. Regulatory Engagement

The scope of engagement with regulatory agencies will be described, including a summary of their participation and a list of the key issues raised by each party and the status of issue resolution.

4. METHODOLOGY

The EEE will present additional details regarding the effects assessment methodology used. The approach used in this EEE is consistent with the CEAA 2012 principle of ensuring that the primary effort and analysis of an EA is focused on the components of the Project most likely to yield residual adverse effects.

The methodology used in this EEE is consistent with guidance from the CEA Agency (2014), "*Projects on Federal Lands: Making a determination under section 67 of the CEAA 2012*" and the EAO (2013), "*Guideline for the Selection of Valued Components and Assessment of Potential Effects,*" in addition to current best practices for EAs in BC and Canada. This will include establishing the existing conditions of the study areas as the baseline, selection of final Valued Components (VCs), characterization of project effects and interactions, identification of effects associated with accidents and malfunctions, identifying effective and established mitigation measures, determining residual effects after applying mitigation, and assessment of cumulative effects.

Ridley Island and the area have been recently subject to several large-scale and detailed EAs conducted for nearby projects. The EEE will incorporate available information from several key existing EAs, including but not limited to:

- Ridley Island Propane Export Terminal – Environmental Effects Document. 2016.
- Proposed Prince Rupert LNG Facility – Application Information Requirements for an Environmental Assessment Certificate. 2014.
- Summary of the Environmental Impact Statement and EA for Pacific Northwest LNG. 2014.
- Bulk Liquids Project. Worley Parsons for RTI. 2013 (EA not completed – studies used for reference herein).
- Marine Berth Expansion Project. Worley Parsons for RTI. 2013 (EA not completed – studies used for reference herein).
- Environmental Impact Statement and Technical Data Reports – Canpotex Potash Export Terminal and Ridley Island Road, Rail, and Utility Corridor. 2011.
- EA Document - Sulphur Forming, Handling and Storage Facility, Ridley Island, BC. 2007 C, February 2007.
- Phase II Environmental Site Assessment, Ridley Island, Prince Rupert, BC. Dillon Consulting Ltd for Transport Canada, March 31, 2004.
- Sulphur Export Terminal at Ridley Terminals, Ridley Island, Prince Rupert – Environmental Appraisal Document. Sulphur Corp of Canada, March 1999.
- Onshore Geotechnical Investigation, Ridley Island, BC, Canpotex Terminals Ltd., October 2009.

Vopak will undertake field studies to fill data gaps in existing environmental work, described in Section 4.3.

Vopak will incorporate, as appropriate, information received from Aboriginal groups through engagement. Traditional Knowledge and Current Use information will inform the effects assessment of all Project VCs, when available.

4.1. Selection of Valued Components

The EEE will summarize the process and methodologies used to identify and select the VCs for assessment. VCs will be final after the review phase of this TOR document has been completed and relevant stakeholders, regulatory agencies, and Aboriginal groups have had an opportunity to comment on the scope of the EEE.

VCs are components of the biophysical and socio-economic environments that are considered by Vopak, the public, Aboriginal groups, government agencies, and other stakeholders involved in the assessment process to have scientific, ecological, economic, social, cultural, archaeological, or historical importance (CEA Agency 2014 and 2015; EAO 2013).

The assessment will describe the three-step process used to select the VCs:

1. Issues scoping (including: a literature review, public, Aboriginal groups, and regulatory agency engagement);
2. Evaluation of candidate VCs; and
3. Selection of final VCs, including identification of indicators for assessment.

VCs will be selected to be **relevant** to the Project, **representative** of the important features of the natural and human environment likely to be affected by the Project, **responsive** (i.e., sensitive) to the potential effects of the project, **concise** (so the nature of the project-VC interaction can be understood, while avoiding overlapping or redundant analysis), and taken together, **complete** to enable a full understanding of the important potential environmental, economic, social, heritage, and health effects of the Project (EAO 2013).

A list of candidate VCs are summarized in Table 6 below.

Table 6: List of Candidate Valued Components and Rationale for Selection

Valued Component	Subcomponent	Rationale
Air Quality and Greenhouse Gas (GHG) Emissions	Air Quality	• Potential interaction of the Project including emissions of Criteria Air Contaminants (CACs) and GHGs.
	Greenhouse Gas Emissions	
Noise	--	• Potential disturbance to nearby sensitive receptors.
Visual Quality - including Ambient Light	--	• Existing viewscape from marine side may be altered. • Lighting related to the Project may increase sky glow. • Lighting related to the Project may disturb or interrupt wildlife and marine life along jetty.
Marine Resources	Marine Habitat	• The Marine Resources VC was selected as an umbrella for several marine-related subcomponents commonly regarded in other EAs as important values for the public, Aboriginal groups, federal and provincial regulators. • Several federal acts have provisions for the protection of resources related to the marine environment, including fauna and habitat. • Assess the potential for sediment contamination.
	Marine Water Quality Marine Sediment Quality	
	Marine Fish and Benthic Invertebrates	
	Marine Mammals, including Species at Risk	

1 **Table 6 (Cont'd): List of Candidate Valued Components and Rationale for Selection**

Valued Component	Subcomponent	Rationale
Terrestrial Resources	Wildlife and Wildlife Habitat, including Birds and Species at Risk	• Terrestrial Resources are considered to be of value for several stakeholders and communities because of mandated protection legislation, values placed on preservation of natural environments (e.g., wetland function), recreation and hunting values. Certain species are considered to be of traditional or cultural importance for Aboriginal groups. • Certain species are legally protected under legislation, i.e., species at risk, such as little brown myotis bat (*Myotis lucifugus*)
	Vegetation, including Rare Plants	
	Wetland Function	
Soils and Terrain	Soils and Terrain	• The Soils and Terrain VC is proposed because potential changes to soil and terrain may have effects on other VCs (e.g., loss of permeability, habitat loss).
Freshwater Fish and Fish Habitat	Ground and Surface Water Quality	• Freshwater Fish and Fish Habitat was selected to represent several related components of freshwater aquatic habitat. The quality of surface and groundwater has the potential to affect habitat for receptors such as fish and other fauna. These subcomponents of freshwater resources support an understanding for the environmental setting of the Project.
	Freshwater Fish	
Socio-Economic Condition	Marine Use and Navigation	• Project components have the potential to interfere with navigation and other commercial, recreational and traditional marine uses. Project-related effects will focus on: o Fishing, recreation and marine use and o Interference on navigation.
	Community Infrastructure and Services, including Accommodations	• Construction, operations and decommissioning of the proposed facility may increase the demand on existing infrastructure, social services and local accommodation via an increase in local workforce and families (i.e., temporary and/or permanent human populations). The effects of the work camp will also be assessed here.
	Economic Conditions (Labour Force Capacity Commercial Business)	• The Project may have economic effects locally and regionally (e.g., job creation during construction and operation).
Archaeology	--	• Archaeological sites have been identified within the Vopak project site; therefore, archaeology has been identified as a VC to be considered for this Project.
Human Health	--	• Air quality, noise and lighting have been considered in other EAs as important to the health of nearby residents and workers; and • Results of the marine sediment assessment will provide the basis for assessing potential Project-related effects to human health from contaminated marine foods.

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Aboriginal groups' rights and interests will be addressed under Section 6 of the EEE. Section 6 will include:

- A summary of engagement activities.
- A summary of Aboriginal groups' questions and issues related to the Project.
- A description of potential effects on Aboriginal groups within the Project area.
- A description of measures to avoid, reduce or mitigate potential adverse environmental effects.
- A summary of preliminary conclusions respecting potential Environmental Effects to Aboriginal groups as defined in Section 5(1)c of CEAA 2012:
    - Health and socio-economic conditions;
    - Physical and cultural heritage;
    - The current use of lands and resources for traditional purposes; and
    - Structure, site or thing that is of historical, archaeological, paleontological or architectural significance).

4.2. Scope of the Assessment

For each identified candidate VC the following information and methodology is summarized in this document:

- Scope of the assessment: including assessment boundaries, subcomponents of the VC and measurable indicators to be used to assess change;
- Regulatory guidelines and legislation relevant to the management of the VC;
- Existing information sources;
- Proposed field and desktop studies;
- Project interactions and potential effects summary;
- Mitigation measures;
- Residual effects characterization; and
- Cumulative effects assessment.

4.2.1. Assessment Boundaries

The EEE will include a definition of the spatial and temporal boundaries, and where applicable the relevant administrative boundaries, for the effects assessment for each VC.

4.2.1.1. Spatial Boundaries

Spatial boundaries defined for the scope of the assessment encompass the areas within which the Project is expected to have potential effects on each VC. For each VC a Local Study Area (LSA) and Regional Study Area (RSA) will be defined. The LSA comprises of an area within which the potential Project-related effects are expected to occur, often considered the Project's zone of influence where direct Project interactions with VCs are expected. The RSA is a study area that provides context to the VC at a regional level. Often the RSA boundary is used to define the scope of the cumulative effects assessment.

The EEE will include a map figure and description of the spatial assessment area for each VC. The VC boundaries will be relevant to its respective VC assessment to sufficiently capture potential Project-related effects.

4.2.1.2. Temporal Boundaries

The potential effects specific to the Project are based on the three main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase; and
- Decommissioning Phase (if required and appropriate).

4.2.2. Subcomponents and Indicators

The EEE will introduce subcomponents of the VCs, the indicators to be used for the VC assessment, and other linked VCs that form part of the pathway of effects.

'Subcomponents' of a VC are used to focus the assessment of a more broadly defined VC (e.g., Terrestrial Resources).

'Indicators' are metrics that will be used to measure and report on the condition of a VC in order to demonstrate change from current condition to expected condition with the Project. Indicators that will be used to measure change for each VC assessment are presented within each VC section in Section 5.

'Linked VCs' represent VC assessments that can be informed by, or inform the assessment of other VCs. For example, Project-related changes to marine water quality represents a pathway of effects to other VCs such as marine fish or marine mammals.

4.2.3. Regulatory Context

The EEE will include the relevant guidelines and legislation, as listed in Section 5 for each VC, used in the regulation of each VC and to inform or guide the assessment.

4.3. Baseline Conditions

The EEE will describe the existing conditions for each selected VC within the Project area. The following information will be included for each selected VC:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed. Whether the existing conditions of the particular VC at the site have been well documented by existing and proposed projects in the area, and the EEE will reference those existing reports wherever possible. Additional studies conducted, when required, to define the existing conditions will be described.
- A description of baseline conditions within the study area in sufficient detail to enable potential Project-VC interactions to be identified, understood, and assessed.
- Reference to natural and/or human-caused trends that may alter the environmental, economic, social, heritage, and health setting, irrespective of the changes that may occur as a result of the Project or other project and/or activities in the area.
- An explanation of whether and how other past and present projects and activities in the study area have affected or are affecting each VC.

- Baseline conditions for each VC will draw upon available Traditional Use Studies and Traditional Knowledge.

The EEE will contain the existing (or baseline) technical reports in the Appendices and will summarize key findings contained in these technical reports directly in the EEE, in a manner that allows the reader to understand each VC's effects assessment.

4.4. Project Interactions and Potential Effects

The EEE will identify Project effects on the existing conditions for each VC within the relevant Project study boundaries.

A project interaction table will be developed for each VC. The table will identify the anticipated interactions between Project construction, operation, or decommissioning activities and each VC. Table 7 below identifies preliminary Project interactions with identified VCs. Potential effects related to the identified interactions will be described in the EEE.

Table 7: Preliminary Project Interactions Table

Project Activity and Physical Works	VCs										
	Air Quality and GHG	Noise	Visual/Light	Terrestrial	Marine	Freshwater Fish and Freshwater Habitat	Soils and Terrain	Archaeology	Socio-Economic	Marine Use and Navigation	Human Health
Construction											
Site clearing (approximately 30 hectares)	x		x	x		x	x	x	x		
Construction road traffic	x			x			x		x		x
Site grading, including blasting, and fill	x	x	x	x		x	x	x	x		x
Construction of project facilities on land (civil, mechanical and electrical & instrumental work)	x	x	x	x		x	x		x		
Construction of marine jetty and berths	x	x	x	x	x		x	x	x	x	x
Dredge and disposal of dredgate	x			x	x				x	x	
Reclamation and clean up			x	x			x		x		
Commissioning, systems testing, including hydrotesting					x	x			x		

Table 7 (Cont'd): Preliminary Project Interactions Table

Project Activity and Physical Works	VCs										
	Air Quality and GHG	Noise	Visual/Light	Terrestrial	Marine	Freshwater Fish and Freshwater Habitat	Soils and Terrain	Archaeology	Socio-Economic	Marine Use and Navigation	Human Health
Operations											
Railway operations associated with inbound train unloading and outbound train staging	x	x		x		x	x		x		x
LPG cooling process	x	x							x		
Product storage	x						x		x		
Vessel berthing	x	x	x	x	x				x	x	
Cargo loading	x	x		x	x				x		
General terminal operations (24 hours, 365 days) (power, lighting, security, ancillary building operations, staffing, water requirements during operations, flaring for maintenance and emergency purposes)	x	x	x	x		x	x		x		x
Routine maintenance and inspections	x	x		x					x		
Associated activities: marine and rail shipping within PRPA jurisdiction	x			x	x		x		x	x	x
Decommissioning											
Decommissioning and reclamation			x	x			x		x	x	

KEY:
x=Potential adverse effect requiring mitigation, carried forward to effects assessment.

4.5. Mitigation Measures

For the EEE, mitigation measures will be developed as appropriate to address the potential effects identified above. *CEAA 2012* defines mitigation measures as "measure for the elimination, reduction or control of adverse environmental effects". Under BCEAA, mitigation refers to "practical means of preventing or reducing to an acceptable level of any potential adverse effects of the project."

For each VC, the assessment will:

- Describe the mitigation measures incorporated into the Project, including site selection, Project scheduling, Project design (e.g., equipment selection, placement, emissions abatement measures), and construction and operation procedures and practices.
- Describe effective and established mitigation proposed to be implemented, including consideration of best management practices, emergency response plans, and other general practices.

- A risk-based approach, as described in CEA Agency (2014) will be used in the assessment whereby effort and analysis increases with an increase in the number of likely adverse environmental effects for which effective and established mitigation measures are not available.
- Evaluate the anticipated success of each mitigation measure and describe rationale and analysis for these evaluations. If there is little relevant/applicable experience with a proposed mitigation measure and there may be some question as to its effectiveness, describe the potential risks and uncertainties associated with use of the mitigation.
- Include the time required for mitigation to become effective, to enable understanding of the duration of residual effects and the temporal characteristics of reversibility.

Mitigations will be summarized along with the potential Project-related effect in a Table format shown below in Table 8. Where the application of mitigation does not eliminate a Project effect, a residual effect will be identified with a Y (Yes) and carried forward to be characterized as presented in section 4.6.

Table 8: Table Format - Summary of Potential Project-related Effects and Mitigation

Potential Effect	Proposed Mitigation	Potential Residual Effect? (Y/N)
Construction		
Operations		
Decommissioning		

4.6. Residual Effects Characterization and Proponents Determination of Significance

The potential residual effects identified in Table 8 will be characterized using the metrics summarized in Table 9. Ultimately, the project-VC interactions identified with the potential for significant adverse effects will be clearly described in sufficient detail to enable a non-technical reviewer to understand the cause, type, and nature of the potential effects.

Table 9: Criteria for the Characterization of Residual Effects

Criteria	Description	Definitions
Magnitude	Expected size or severity of the effect	Defined on a VC specific basis – see individual VC assessment sections for definition
Extent	Spatial scale over which the residual effect is expected to occur	Defined on a VC specific basis. • Site-specific; • Local; • Regional; and • Out of scope.
Duration	Length of time over which the residual effect is expected to persist	Definitions vary by VC, taking into account VC-specific temporal cases: • short term; • long term; and • permanent.
Frequency	How often the residual effect is expected to occur	Definitions vary by VC, taking into account VC-specific temporal cases: • infrequent; • frequent; and • continuous.
Reversibility	Whether or not the residual effect can be reversed once the physical work or activity causing the effect ceases	• fully reversible; • partially reversible; and • irreversible.
Ecological Context	Sensitivity and resilience of the VC to Project related change.	Defined on a VC specific basis and draws on the existing conditions

The characterization and assessment of potential residual Project effects will be based on professional judgement, discussion with federal authorities, input gathered through consultation with potentially affected Aboriginal groups, previously documented interactions of other projects, and will consider the likelihood of occurrence, the level of consequence, and the significance of the residual effect.

The assessment will present the process and methodology used to define and evaluate the significance of residual effects, including how the term “significance” has been used in relation to each VC using available quantitative and qualitative thresholds (CEA Agency 2015; EAO 2013).

For the EEE, Vopak will determine the significance of the potential residual effect, including consideration of likelihood of the effect, confidence in the assessments prediction of the effect and the associated risk (i.e., likelihood x consequence) of the effect.

For each identified residual effect, Vopak will summarize the characterization and determination of significance in a table as exampled below in Table 10.

Table 10: Table Format – Summary of Residual Effect Characterization Related to <identified residual effect X>

Criteria	Rating	Rationale
Magnitude		
Extent		
Duration		
Frequency		
Reversibility		
Proponents Determination of Significance		
Likelihood		
Significance		
Confidence		

4.7. Cumulative Effects Assessment

The EEE will include a cumulative effects assessment. The EEE will summarize the process and methodology used to conduct a cumulative effects assessment, including the identification of potential cumulative effects, identification of additional mitigation measures, and evaluation of (residual) cumulative effects using the same methodology described in the assessment for the residual effects in section 4.4 through 4.6 above.

The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities within the regional assessment boundaries as defined for each VC.

The following is a list of currently operating projects near the Project area. These include the following:

- Fairview Container Terminal Phase I;
- Northland Cruise Terminal;
- Odin Seafood;
- Prince Rupert Ferry Terminal;
- Prince Rupert Grain Limited;
- Prince Rupert Industrial Park;
- Ridley Terminals Inc.; and
- Westview Wood Pellet Terminal.

Other certain or reasonably foreseeable projects include:

- RTI Berth Expansion Project
- Fairview Container Terminal Phase II;
- Pembina Prince Rupert LPG Export Terminal;
- Ridley Island Propane Export Terminal; and
- Expected activities including fishing, hunting, and recreation and tourism.

5. ENVIRONMENTAL EFFECTS EVALUATION

The EEE will include an assessment of identified VCs. The assessment will be conducted in accordance with the methodology specified in Section 4, Methodology.

5.1. Air Quality and Greenhouse Gas Emissions

The air quality and greenhouse gas (GHG) emissions effects evaluation is divided into two subcomponents:

The Air Quality subcomponent will assess criteria air contaminant (CAC) emissions from Project construction and operation activities.

The GHG Emissions subcomponent will assess project-related GHG emissions within a provincial and national GHG management context.

5.1.1. Assessment Boundaries

Table 11 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 11: Air Quality and GHG Emissions Local and Regional Study Boundaries

VC	Subcomponent	LSA	RSA
Air Quality and GHG Emissions	Air Quality	Includes sensitive receptor sites that may be affected by Project-related activities. The LSA is a 10 km by 10 km area centered on the Project location. This domain is chosen based on an expectation that model predictions at the LSA boundaries would be 1/10th or less than the ambient air quality objectives (as suggested in the BC dispersion modelling guidelines).	Includes broader areas to evaluate cumulative effects. The RSA is a 20 km by 20 km area centered on the Project location. The RSA is chosen for the purposes of evaluating other significant emission sources within 5 km of the project, with an expectation that model predictions at the RSA boundaries would be 1/10th or less than the ambient air quality objectives.
	GHG Emissions		

Administrative Boundaries for the GHG Emissions VC are relevant with respect to provincial and national GHG emissions management targets and objectives. The assessment boundaries for GHG emissions will be the Province of BC, to provide context as to the Project-related GHG emissions contribution to provincial targets as well as nationally, using federal GHG emissions targets.

The temporal boundaries of potential effects specific to the Project for this VC include:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase;
- Short-term – Decommissioning Phase, as relevant.

5.1.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 12: Indicators of Air Quality and GHG Emissions assessment

VC	Subcomponents	Indicators	Linked VCs
Air Quality and GHG Emissions	Air Quality	Ambient concentrations of CACs, including suspended particulate matter (as Total Suspended Particles, Particulate Matter (PM_{10} and $PM_{2.5}$), nitrogen oxides (NOx), sulfur dioxide (SO_2), volatile organic compounds (VOCs) and carbon monoxide (CO).	• Human Health; • Terrestrial Resources; • Visual Quality; • Freshwater Fish and Fish Habitat; and • Socio-Economic Condition.
	GHG Emissions	Total Project (annual) GHG emissions during operations.	• Human Health; • Terrestrial Resources; • Visual Quality; and • Socio-Economic Condition.

5.1.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
Canadian Environmental Protection Act, 1999
British Columbia Ministry of Environment Air Quality Dispersion Modelling Guideline, 2015
British Columbia Ambient Air Quality Objectives, 2016
Canadian Council of Ministers of the Environment Canadian Ambient Air Quality Standards, 2014
Port Emissions Inventory Tool and manual
Environment and Climate Change Canada National Marine Emissions Inventory model (2015) and report
United States Environmental Protection Agency CALPUFF dispersion model User Guide
World Resources Institute's Greenhouse Gas Protocol
Environment and Climate Change Canada National Inventory Report

5.1.4. Baseline Assessment

For each selected VC, the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed.
- Additional studies conducted, when required, to define the existing conditions.

Existing Information and Data Sources

Existing conditions will be identified by summarizing the existing ambient air quality monitoring in the region. Current and historical monitoring is conducted by the BC Ministry of Environment and Climate Change Strategy (BC ENV) and made available through a public data repository. In addition, ECCC develop climate norms for every region of the country. The air quality baseline will be developed through such data summaries, additionally identifying the major, existing emission sources within the airshed the Project is situated in.

Existing GHG emissions will be characterized by community-level emissions estimates developed by the BC Government through its Community Energy & Emissions Inventory initiative.

The baseline information that will support the assessment of the Air Quality and GHG Emissions VC is listed in the table below.

Existing Information/Data Sources

Data/Information
Envistaweb data repository for ambient air quality data in BC (envistaweb.env.bc.ca)
Canadian Climate Normals (climate.weather.gc.ca)
Community Energy & Emissions Inventory (BC) (www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei)
Environment and Climate Change Canada National Inventory Report, 2017
Other EAs listed in Section 4 of this document, as relevant
Prince Rupert Airshed Study, September 2016, BC Ministry of Environment

Field and Desktop Studies

The EEE will include a desktop assessment utilizing existing ambient air quality data for the Prince Rupert airshed.

Emissions Inventory

The Vopak air emissions inventory will be developed for the EEE and will consider:

- The number of rail and marine movements each year associated with the terminal throughput;
- The terminal infrastructure with energy/emissions profile; and
- Rail, marine and mobile source equipment details and usage patterns from available literature and databases.

The inventory will be compared to the PRPA total inventory for relevance, which is compiled each year, and is inclusive of its tenant terminal operations.

The expected construction activities will be documented to the level of detail possible, identifying the expected total emissions (including fugitive emissions associated with land disturbance) to confirm that these activities would not cause adverse air quality beyond the LSA. Equipment and operation 'profiles' are expected to be used for the construction emissions assessment.

Guidance documents for the operations and construction emissions estimates would include two Canadian sources, notably the Port Emissions Inventory Tool (PEIT) and manual (developed and maintained for TC) and the ECCC National Marine Emissions Inventory model and report (2015 calendar year). PEIT leverages best practice emissions data and models supported by the US Environmental Protection Agency, including the Motor Vehicle Emission Simulator and Nonroad engines, equipment and vehicles emissions models.

Air Dispersion Model

The air dispersion model will use the US Environmental Protection Agency CALPUFF dispersion model, which is an accepted 'refined' model by BC ENV for complex terrain (including coastal settings).

The model will be configured for the Prince Rupert setting, using local meteorology, terrain and land use data, in a manner consistent with the BC ENV Dispersion Modelling Guidelines (2015). The modeling will be completed such that compliance with all applicable ambient objectives and standards can be demonstrated. GHG estimates will be organized in a manner which follows the World Resources Institute's GHG Protocol.

The dispersion modelling will also be used to identify potential deposition of contaminants to soil and water within the RSA. This information will be used to inform the assessment of Water and Soil Quality VCs.

5.1.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Air Quality and GHG Emissions VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 13: Potential Project-related Effects Associated with Air Quality and GHG Emissions

Project Activity/Interaction	Potential Project-related Effect
Construction	
Site clearing (approximately 30 hectares)	Potential for dust generation, affecting ambient particulate matter concentrations. Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Construction road traffic	Potential for dust generation, affecting ambient particulate matter concentrations. Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Site grading, including blasting, and fill	Potential for dust generation, affecting ambient particulate matter concentrations. Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Construction of project facilities on land (civil, mechanical and electrical & instrumental work)	Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Construction of marine jetty and berths	Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Dredge and disposal of dredgate	Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Operations	
Railway operations associated with inbound train unloading and outbound train staging	Locomotives consume diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
LPG cooling process	Equipment usage consumes energy and fuel and will contribute to the Project CACs and GHG emissions.
Product storage	Product storage may release fugitive CACs and could adversely affect air quality conditions.
Vessel berthing	Vessels and tugs consume diesel fuel / fuel oil and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
General terminal operations (24 hours, 365 days) (power, lighting, security, heating, ancillary building operations, staffing, water requirements during operations, flaring for maintenance and emergency purposes)	Equipment usage consumes fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Routine maintenance and inspections	General maintenance may include use of equipment or venting of storage tanks that would release CACs and GHGs and could adversely affect air quality conditions.
Associated activities: marine and rail shipping within PRPA jurisdiction	Transportation related emissions release CACs and GHGs and could adversely affect air quality conditions.

5.1.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.1.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.1.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities within the RSA.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.2. Noise

The Noise effects evaluation will be conducted to assess the potential effects of Project-related noise on humans. Noise at Ridley Island is currently influenced by existing operations or construction at neighbouring facilities. Noise effects are of particular concern for sensitive receptors, which includes homes, hospitals, supported living facilities, and wildlife.

5.2.1. Assessment Boundaries

Table 14 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 14: Noise Local and Regional Study Boundaries

VC	LSA	RSA
Noise	1.5 km from Project noise sources, based on BC Oil and Gas Commission Noise Control Best Practices Guideline	The RSA is set to 3 km from the Project noise sources, to add an additional 1.5 km buffer from the LSA based on BC Oil and Gas Commission Noise Control Best Practices Guideline, to consider cumulative effects.

The potential effects specific to the Project are based on the three main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase;
- Short-term – Decommissioning Phase, as relevant.

5.2.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 15: Indicators of Noise assessment

VC	Subcomponents	Indicators	Linked VCs
Noise	NA	Ambient sound levels Incremental change in noise level from construction of the project Incremental change in noise level from facility operations	• Human Health; • Marine Resources; • Terrestrial Resources; • Human Health; and • Socio-Economic Condition (e.g., local economy, marine use).

5.2.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and relevant to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
British Columbia Oil and Gas Commission Noise Control Best Practices Guideline
District of Port Edward Noise Control Bylaw No. 520
Health Canada's Useful Information for Environmental Assessments, Section 6

5.2.4. Baseline Assessment

For each selected VC, the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed.
- Additional studies conducted, when required, to define the existing conditions.

Existing Information and Data Sources

The baseline information that will support the assessment of the Noise VC is listed in the table below.

Existing Information/Data Sources

Data/Information
Prince Rupert Port Authority Noise Monitoring Data
Other EAs listed in Section 4 of this document, as relevant

Field and Desktop Studies

The EEE will include a desktop-based assessment utilizing available ambient noise data near the proposed Project.

The noise assessment will include a determination of existing baseline sound levels utilizing monitoring results from PRPA's noise monitoring program. The assessment will predict the noise effects of normal Project activities on receptors (dwellings, schools, hospitals, etc.) nearest to the proposed Project to determine appropriate mitigation measures during construction and operation.

Noise modelling will predict the sound levels from the facility at the nearest receptors and a comparison of those levels to standards from the BC Oil and Gas Commission Noise Control Best Practices Guideline and Health Canada's Guideline on Evaluation Human Health Impacts from Noise in Environmental Assessments, as well as the District of Port Edward Noise Control Bylaw No. 520.

5.2.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Noise VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 16: Potential Project-related Effects Associated with Noise

Project Activity/Interaction	Potential Project-related Effect
Construction	
Construction road traffic	Construction equipment and activities may contribute to ambient noise levels.
Site grading, including blasting, and fill	Construction equipment and activities may contribute to ambient noise levels.
Construction of project facilities on land (civil, mechanical and electrical & instrumental work)	Construction equipment and activities may contribute to ambient noise levels.
Construction of marine jetty and berths	Construction equipment and activities may contribute to ambient noise levels.
Commissioning, systems testing, including hydrotesting	Construction equipment and activities may contribute to ambient noise levels.
Operations	
Railway operations associated with inbound train unloading and outbound train staging	Transportation sources may contribute to ambient noise levels
LPG cooling process	Cooling equipment may contribute to ambient noise levels
Vessel berthing	Vessel activities may contribute to ambient noise levels
Cargo loading	Cargo equipment may contribute to ambient noise levels
General terminal operations (24 hours, 365 days) (power, lighting, heating, security, ancillary building operations, staffing, water requirements during operations, flaring for maintenance and emergency purposes)	Terminal operation equipment may contribute to ambient noise levels
Routine maintenance and inspections	Maintenance and inspections may have associated equipment use and/or activities that contribute to ambient noise levels

5.2.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.2.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.2.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.3. Visual Quality – including Ambient Light

The Visual Quality effects evaluation will include the potential Project-related effects of Project lighting and a change in viewscape on Ridley Island from various viewpoints related to Project land clearing and infrastructure.

5.3.1. Assessment Boundaries

Table 17 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 17: Visual Quality Local and Regional Study Boundaries

VC	LSA	RSA
Visual Quality/Ambient Light	The LSA will be an 8 km area surrounding the outside boundary of the Project. The 8 km distance is a standard applied to most projects in BC for the visual assessment of a project. It is generally accepted that at an 8 km distance the naked eye can determine detail. This threshold is based on Visual Quality Objectives set out in the *Forest and Range Practices Act* and on key design concepts and principles as set out in the Visual Landscape Design Training Manual (BC Ministry of Forests, 1994) and the Visual Impact Assessment Guidebook (BC Ministry of Forests 2001).	The RSA will be the distance viewing area up to 25 km from the Project location. This will incorporate the viewshed and potential long distance view of the project site. This is a standard distance used in most projects in BC for the visual assessment of a project. The 25 km distance threshold represents the background distance where details on the landscape may not be visible but larger features, or alterations to landscape are visible (cleared trees, lighting at night, taller features).

The potential effects specific to the Project are based on the main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase
- Short-term – Decommissioning Phase, as relevant.

5.3.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 18: Indicators of Visual Quality assessment

VC	Subcomponents	Indicators	Linked VCs
Visual Quality/Ambient Light	Visual Quality	Change in visual quality (i.e. modified viewscape as defined in guidance listed below), resulting from project activities and land development	• Socio-economic Condition; • Air Quality; and • Human Health.
	Ambient Light	Change in levels of light trespass, glare, and sky glow	• Socio-economic Condition; • Air Quality; • Human Health; and • Marine Resources.

5.3.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and relevant to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
Visual Impact Assessment guidebook, Second Edition, Province of British Columbia
Visual Landscape Inventory: Procedures and Standard Manual, Province of British Columbia
Protocol for Visual Quality Effectiveness Evaluation Procedures and Standards, Forest and Range Evaluation Program, British Columbia Ministry of Forest Range and British Columbia Environment & Climate Change.
Visual Quality Objectives, *Forest and Range Practices Act*
Visual Landscape Design Training Manual, British Columbia Ministry of Forests, Lands and Natural Resources
Visual Impact Assessment Guidebook, British Columbia Ministry of Forests, Lands and Natural Resources
Visual Resource Contrast Rating Manual, Bureau of Land Management, United States of America

5.3.4. Baseline Assessment

For each selected VC, the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed.
- Additional studies conducted, when required, to define the existing conditions.

Existing Information and Data Sources

A review of previous light assessments conducted in the Prince Rupert area will be completed to understand baseline ambient light conditions. Lights assessments were included in the EAs for Pacific NorthWest LNG Export Terminal (2014) and the Canpotex Potash Export Terminal (2011).

The baseline information that will support the assessment of the Visual Quality VC is listed in the table below.

Existing Information/Data Sources

Data/Information
AECOM. 2012. Prince Rupert Port Authority 2020 Land Use Management Plan. Prepared for PRPA.
AECOM. 2014. Prince Rupert LNG. Environmental Impact Statement Guidelines. Prepared for BG Group.
Stantec. 2016. Pacific NorthWest LNG Project. Environmental Impact Assessment and Technical Data Reports. Prepared for Pacific NorthWest LNG Limited Partnership.
DataBC. 2018. iMapBC Public Mapping Application. Available: http://ilmbwww.gov.bc.ca/content/e-services/geobc/imapbc.
SNC-Lavalin Inc. 2016. Ridley Island Propane Export Terminal. Environmental Effects Determination. Prepared for AltaGas Ltd.
Stantec. 2011. Canpotex Potash Export Terminal. Environmental Impact Statement and Technical Data Reports. Prepared for Canpotex Terminals Ltd.
Stantec. 2012. Fairview Terminal Expansion. Comprehensive Study Report and Technical Data Reports. Prepared for CN Rail.
Natural Resources Canada. 2016. Canadian Digital Elevation Model
Natural Resources Canada. 2016. Canadian Digital Surface Model
Additional spatial data from the City of Prince Rupert, Port Edward, Port of Prince Rupert, and North Coast Regional District may be used for the purposes of this assessment.

Field and Desktop Studies

For this VC, the effects of landscape change on visual quality and ambient light will be determined using Canadian and American methods for assessing change. Using a combination of photographic analysis and geospatial analysis in a 3D environment the landscape change will be modeled and visualized. Guidelines available from the Bureau of Land Management and the Province of BC will be used to assess the extent of that change and quantify that change.

For Ambient Light, the analysis will be based on existing research and studies in the project area. These existing studies may be augmented with photographic interpretation of potential change in light.

For this VC, the effects assessment will include a combination of a field visit and desktop analysis. The first stage of the project involves a background review and spatial analysis to determine the viewshed of the project and existing visual landscape characteristics. Viewpoints will be identified from a combination of existing studies and visual landscape objectives. A field visit will be conducted to take photos from proposed viewpoints towards the project location.

The second phase will involve the analysis of those viewpoints and photos using a combination of 3D analysis in geographic information system (GIS) and photographic analysis and editing. The analysis will draw upon existing guidelines for visual quality assessment to quantify the change from project activities. Additionally, the assessment will look at cumulative change in visual landscape using historic aerial and 3D scene generation in GIS.

5.3.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 19: Potential Project-related Effects Associated with Visual Quality

Project Activity/Interaction	Potential Project-related Effect
Construction	
Site clearing (approximately 30 hectares)	Visual quality may be changed by alteration of view scape. The extent and shape of these cleared areas as well as materials being added will need to be factored into visual quality modelling.
Site grading, including blasting, and fill	Changes to the site grading and filling may impact the visual landscape and will need to be assessed. Fill material will be incorporated into visual quality assessment.
Construction of Project facilities on land (civil, mechanical and electrical & instrumental work)	New buildings will change the visual landscape. These buildings and changes will be incorporated into a 3D model for visual assessment.
Construction of marine jetty and berths	New marine features may change the visual quality.
Operation	
Vessel berthing	Vessel berthing could impact visual quality and add to ambient light.
General terminal operations (24 hours, 365 days) (power, lighting, security, ancillary building operations, staffing, water requirements during operations, flaring for maintenance and emergency purposes)	Additional lighting may contribute to ambient light.

5.3.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.3.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.3.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.4. Marine Resources

The Marine Resources effects evaluation will be conducted to assess the Project-related effects on the following subcomponents:

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

5.4.1. Assessment Boundaries

Table 20 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 20: Marine Resources Local and Regional Study Boundaries

VC	LSA	RSA
Marine Resources	The LSA includes: • The Project Water Lot area and a 250 m buffer around the western portion of the water lot that has potential to be affected by berthing vessels, trestle and loading platform construction, and other activities associated with the construction and operation of the Project.* • The area within 500 m on either side of the marine access route between the Project's marine terminal and the Triple Island pilot boarding area.	The RSA includes the area bound by the PRPA marine navigational jurisdiction, as well as the LSA area within 500 m on either side of the marine access route between the Project's marine terminal and the Triple Island pilot boarding area. The PRPA jurisdiction is an area designated for port related activities and includes currently operating projects that will be included in a Project specific cumulative effects assessment.*

*The LSA and RSA spatial boundaries may be revised upon consultation with local authorities on disposal sites. Both on-land and marine disposal locations may be identified through this exercise.

The potential effects specific to the Project are based on the main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase.
- Short-term – Decommissioning Phase, as relevant.

5.4.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 21: Indicators of Marine Resources assessment

VC	Subcomponents	Indicators	Linked VCs
Marine Resources	Marine Habitats (including foreshore and shallow subtidal)	Habitat quality & quantity	• Visual Quality (Light); • Freshwater Fish and Fish Habitat; and • Human Health.
	Marine Mammals, including Species at Risk	Marine mammal or species at risk presence/absence Habitat quality & quantity Change in ambient underwater noise	• Visual Quality (Light); and • Noise.
	Marine Water Quality Marine Sediment Quality	Water properties (physical and chemical) Sediment properties (physical and chemical), including but not limited to: metals, moisture content, pH, particle size, total oxygen content, F1-F2, BTEX)	• Freshwater Fish and Fish Habitat; and • Human Health.
	Marine Fish and Benthic Invertebrates	Fish species presence/absence and benthic invertebrate diversity/abundance Habitat quality & quantity Change in ambient underwater noise	• Visual Quality (Light); • Freshwater Fish and Fish Habitat; • Human Health; and • Noise.

5.4.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and relevant to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
Fisheries Act
Species at Risk Act
Canadian Environmental Protection Act, 1999
Sediment Management: A Proponent's Guide for the Prince Rupert Region, final – October 2016.
British Columbia Marine Conservation Analysis. 2009. Physical Representation - Benthic Classes. British Columbia Marine Conservation Analysis Atlas. Website:http://bcmca.ca/datafeatures/eco_physical_benthicclasses/.
British Columbia Ministry of Environment. 2016. British Columbia Approved Water Quality Guidelines, updated March 2016.
British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2005. Repetitive Shore Type – Line, Shorezone (Theme). Coastal Resource Information System.
Clarke, C.L., and G.S. Jamieson. 2006. Identification of Ecologically and Biologically Significant Areas in the Pacific North Coast Integrated Management Area: Phase I – Identification of Important Areas. Canadian Technical Report of Fisheries and Aquatic Sciences 2678. vi + 89 pp.
Environment Canada. 2014. Interim Guidance for the Assessment of Risks from Dioxins and Furans in Sediments Proposed for Disposal at Sea in Pacific and Yukon Region. April, 2014.

Guidance and Legislation
Environment Canada. 1997. A marine ecological classification system for Canada. Environment Canada Lee E. Harding (Ed.). Marine Environment Quality Advisory Group.
Fisheries and Oceans Canada. 2007. *Interim Marine Habitat Information Requirements*.
Fisheries and Ocean Canada. 2010. Practitioners Guide to the Risk Management Framework for DFO Habitat Management Staff. Habitat Management and Environmental Science. Fisheries and Oceans Canada. 25 pp.
Fisheries and Oceans Canada. 1986. Policy for management of fish habitat. Fish Habitat Management Branch. Department of Fisheries and Oceans. 32 pp.
Fisheries and Oceans Canada. 2011. Pacific Region Integrated Fisheries Management Plan. Salmon, Northern BC, June 1, 2011 – May 31, 2012.
Fisheries and Oceans Canada. 2013. Evaluation of Proposed Ecologically and Biologically Significant Areas in Marine Waters of British Columbia. Canadian Science Advisory Secretariat Science Advisory Report 2012/75. February 2013.
Fisheries and Oceans Canada. 2013. Evaluation of proposed ecologically and biologically significant areas in marine waters of British Columbia. DFO Canadian Science Advisory Secretariat Research Document 2012/075.
Harper, J.R., B. Emmett, D.E. Howes and D. McCullough 1998. Seabed imaging and mapping system – seabed classification of substrate, epiflora and epifauna. In Proceedings of the1998 Canadian Hydrographic Conference, Victoria, BC, 13p.
Harper, J.R., B.D. Bornhold, P. Thuringer and D. McCullough 1999. Application of Underwater Video Imaging for Seabed Engineering and Habitat Assessment. In Proceedings of the 1999 Canadian Coastal Conference, Victoria, BC, 12p.
Howes, D., J. Harper and E. Owens. 1994. Physical Shore-Zone Mapping System for British Columbia.
Howes, D.E., M.A. Zacharias and J.R. Harper. 1997. British Columbia Marine Ecological Classification: Marine Ecosections and Ecounits. Prepared for The Resource Inventory Committee Coastal Task Force. Website: http://ilmbwww.gov.bc.ca/cis/coastal/mris/mec.htm.
Puget Sound Action Team (1997) Recommended Quality Assurance and Quality Control Guidelines for the Collection of Environmental Data in Puget Sound. Prepared for U.S. Environmental Protection Agency Region 10, Seattle, WA and Puget Sound Water Quality Authority, Olympia, WA by King County Environmental Lab, Seattle, WA. 108 pp.
Searing, G.F. and H.R. Frith. 1997. British Columbia Biological Shore-Zone Mapping System. Resource Information Standards Committee, Province of British Columbia. Website: http://www.ilmb.gov.bc.ca/risc/pubs/coastal/bioshore/index.htm. Accessed: May 2013.
Williams, G.L. 1993. Coastal/estuarine Fish Habitat Description and Assessment Manual, Part II, Habitat Description Procedures H. M. D. Department of Fisheries and Oceans, Pacific Region. Nanaimo, BC.
Zacharias, M.A., Howes, D.E., Harper, J.R., Wainwright, P. 1998. The British Columbia marine ecosystem classification: rationale, development, and verification. Coastal Management 26, 105-124.

5.4.4. Baseline Assessment

For each selected VC, the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed; and
- Additional studies conducted, when required, to define the existing conditions.

Existing Information and Data Sources

The baseline information that will support the assessment of the Marine Resources VC is listed in the table below.

Existing Information/Data Sources

Data/Information
Det Norske Veritas (DNV). 2013. Prince Rupert Marine Risk Assessment. Navigational Risk Assessment Report produced for Prince Rupert Port Authority. Report No./DNV Reg. No.: / 13JIMVK-8 Rev 3, 2012-02-29.
DFO. 2007. Ecosystem Overview: Pacific North Coast Integrated Management Area (PNCIMA). Canadian Technical Report of Fisheries and Aquatic Sciences 2667.
Government of Canada. 2016. Species at Risk Public Registry.
AECOM. 2012. Prince Rupert Port Authority 2020 Land Use Management Plan. Prepared for PRPA.
AECOM. 2014. Prince Rupert LNG. Environmental Impact Statement Guidelines. Prepared for BG Group.
CEA Agency. 2016. Pacific NorthWest LNG Project. Environmental Assessment Report.
Altagas Ltd. 2018. RIPET Project Updates. Available: https://www.altagas.ca/infrastructure/projects/ridley
Ambach, M. and J. Casey. 2011. Final Report: Identification and mapping of fish habitat within and around Prince Rupert Harbour. February 2011. WWF
BC Conservation Data Centre. 2018. BC Species and Ecosystems Explorer. B.C. Ministry of Environment, Victoria, B.C.
McCrodan, A. and Hannay, D. 2013. Modelling of Underwater Noise for Pacific NorthWest LNG Marine Construction and Shipping Scenarios Marine Construction and Shipping Scenarios. JASCO Document 00669, Version 2.14. Technical report by JASCO Applied Sciences.
PRPA. 2018. Prince Rupert Port Authority website. Existing Operations and Marine Mammal Program.
SNC-Lavalin Inc. 2016. Ridley Island Propane Export Terminal. Environmental Effects Determination. Prepared for AltaGas Ltd.
Stantec. 2011. Canpotex Potash Export Terminal. Environmental Impact Statement and Technical Data Reports. Prepared for Canpotex Terminals Ltd.
Stantec. 2012. Fairview Terminal Expansion. Comprehensive Study Report and Technical Data Reports. Prepared for CN Rail.
Stantec. 2016. Pacific NorthWest LNG Project. Environmental Impact Statement and Technical Data Reports. Prepared for Pacific NorthWest LNG Limited Partnership.
Stantec. 2016a. Aurora LNG. Environmental Assessment Certificate Application and Technical Data Reports. Prepared for Nexen Energy.
WorleyParsons. 2012. Ridley Terminals Expansion. Parcel A and Energy Bulk Export Terminal Pre-Feasibility Study and Parcel A: An Archaeological Impact Assessment

Field and Desktop Studies

There are four primary marine baseline and field programs that will inform the current status of Marine Resources VC and subcomponents. Marine habitat quality will be informed by indicators of environmental quality and will include both physical abiotic and biological assessments. The abiotic assessments will characterize the water, sediment, underwater noise, and physical nature of the habitat that support the biological communities potentially affected by the Project.

Marine Water Quality Program

The EEE will utilize the pre-existing data set to undertake the assessment of the VC. Marine water quality monitoring in PRPA waters has been ongoing since 2013. As part of the marine water quality program, oceanographic properties recorded at depth, whereas heavy metals, polycyclic aromatic hydrocarbons (PAHs), and bacteriological components (fecal coliform and enterococcus) are collected from both surface and at depth. Six water sampling sites are established in Chatham Sound along Ridley Island, while four sites are located in Porpoise Harbour. Quarterly water quality data is available from the last five years (2013-2017).

Vopak is in the process of identifying options for disposal sites of dredgate, which will likely include at-sea location(s). Once identified, these sites will be assessed in accordance with the information requirements for the DAS Permit application[2].

Marine Sediment Quality and Benthic Invertebrates Program

Marine Sediment Quality

Existing baseline information collected from previous EAs will be supplemented with new data collection. The marine sediment quality program will focus on the collection of sediment samples from 10 sites within the proposed marine development area. Sediment samples will be sent to an accredited laboratory and analyzed for the following parameters:

- Metals;
- PAHs;
- Moisture content;
- Total Organic Carbon;
- F1-F4, BTEX;
- PCBs;
- Particle size; and
- Dioxins and Furans.

Results will be compared to Canadian Council of Ministers of Environment guidelines for the protection of aquatic life, both the Interim Sediment Quality Guidelines and Probable Effects Levels.

Marine Benthic Invertebrates

The EEE will utilize summary data on marine benthic invertebrates gathered from EAs, in addition to new data collection to undertake the assessment of the VC. The information acquired from the benthic infauna and sediment sampling will represent baseline conditions and will inform the EEE with respect to project interactions (e.g. construction and operation) with the seabed resulting in sediment disturbance and subsequent effects on habitat and the water column, and benthic community alteration, disruption or destruction.

[2] https://www.canada.ca/en/environment-climate-change/services/disposal-at-sea/permit-applicant-guide/guide-dredged-material.html

A standard operating procedure for seabed sampling will be followed, which involves rigorous station and log keeping as well as sample handling techniques that adhere to protocols outlined in the Puget Sound Estuary Program (PSEP 1987). A stainless steel Wildco Van Veen grab sampler will be deployed and retrieved with a hydraulic winch for benthic infauna sample collection. When the grab sampler touches bottom, the final Differential Global Positioning System (DGPS) position as well as local time referenced to the DGPS and water depth at touchdown are recorded on the station log. At a minimum, a total of 10 benthic invertebrate samples will be collected within the marine lot with emphasis on areas immediately adjacent to or at the proposed jetty location.

Vopak is in the process of identifying options for disposal sites of dredgate, which will likely include at-sea location(s). Once identified, these sites will be assessed in accordance with the information requirements for the DAS Permit application[2].

Marine Fish and Fish Habitat Program

The marine fish and fish habitat subcomponent consists of intertidal and subtidal field studies described below. Intertidal studies will support the characterization of the foreshore environment adjacent to proposed marine development area, whereas subtidal studies will characterize the area affected by the marine berth, causeway and trestle.

Foreshore and intertidal surveys

The survey methodology for these surveys will be guided by DFO's Marine Foreshore Environmental Assessment Procedures.

Intertidal transects will be conducted perpendicular to the shoreline (distance between transects will be determined based on local conditions and habitats present) along the Ridley Island shoreline in areas likely to be affected by the marine footprint. At a minimum, a total of 20 transects will be completed to ensure that all habitat types along the Vopak marine lot are adequately characterized. Each transect will span the intertidal zone from approximately 2 m to 3 m above the Higher High Waterline to the low tide waterline at the time of the survey (+1 m or lower, relative to chart datum).

Upper and lower transect positions will be mapped with UTM coordinates. Measurements of slope distance and vertical elevation will be taken at every major change in biota and/or substrate along each transect. Elevations will be corrected to chart datum based on the tidal height prediction at the time of each transect using tidal prediction software (Tides and Currents Pro).

Qualitative observations of key biota zones (biobands) such as mussel/barnacle, rockweed (*Fucus* sp.), red/green algae, and bladed kelps will be recorded for each habitat zone (i.e., low, mid and high intertidal zones), as well as substrate type. Vegetation will be reported as percent cover identified to species or species group (e.g., biobands as summarized above). Fauna will be reported as either percent cover (for sessile invertebrates) or as an estimate of abundance (i.e. present, common and abundant) for mobile invertebrates and identified to species or the next highest taxonomic classification. Species listed as at-risk, rare, or invasive will also be recorded. Substrate will be classed as bedrock, boulder, cobble, gravel, sand and silt/mud/clay consistent with DFO classifications and recorded on a percent basis.

The foreshore and intertidal biophysical surveys are to be conducted during the more productive spring and summer months during low tide events. At that time, macroalgal species are more readily identifiable, enabling a better assessment of the productive capacity of the site.

Subtidal surveys

The subtidal survey will include a towed underwater video survey utilizing *Seabed Imaging and Mapping System*, which consists of a towfish that incorporates a high-resolution camera, a digital video recording system, and a data processing system that records and captions DGPS fixes and the depth of the towfish at one second intervals. Survey trackline spacing will range between 150 m and 200 m with finer resolution (i.e., 50 m) in the focal areas (i.e. sensitive habitats and project footprint). The towfish elevation will generally stay within one meter of the seabed depending on underwater visibility conditions.

The survey is completed during periods of lower flow in the Skeena River, and therefore less turbidity to optimize visibility in the video. The Skeena River peak discharge is typically in May/June resulting in turbid water – translating to less than one meter of visibility within the Project area. Days with low tidal exchange and current will be selected to provide more ideal survey conditions.

Every second of towed video imagery will be classified and interpreted by a biologist using physical and biological codes. A set of biological and physical maps will be created from the classification results and will present distribution and/or percent cover of classified features.

Marine Mammals Program

There is an extensive body of knowledge collected from EAs of proposed developments on the north coast and within the RSA. The EEE and assessment of the marine mammals subcomponent will incorporate publicly available scientific research on the northern coast of BC, management plans and risk assessments completed for other industrial projects in the region, Committee on the Status of Endangered Wildlife in Canada species assessment reports, SARA species status reports, SARA recovery planning documents, wildlife tourism general information, work conducted by the Port of Prince Rupert, as well as engagement/consultation documentation from past development proposals. Local sightings data will be reviewed from marine mammal databases, such as the British Columbia Cetacean Sightings Network. Existing hydrophone networks, such as that overseen by Oceans Network Canada will be utilized, if made available, would also be incorporated into the EEE.

An underwater noise assessment will be completed using existing data to assess the noise effects on marine mammals and fish associated with the construction of the marine infrastructure of the Project. It is anticipated that current acoustic data can be obtained from existing data sources including existing hydrophone networks such as Oceans Network Canada.

5.4.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Marine Resources VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 22: Potential Project-related Effects Associated with Marine Resources

Project Activity/Interaction	Potential Project-related Effect Marine Resources
Construction	
Construction of marine jetty and berths	Change in marine water quality, alteration and loss of subtidal and intertidal fish habitat; Harm or change in behaviour from underwater noise; and Increased marine traffic.
Dredge and disposal of dredgate	Change in marine water quality; Deposit of potentially deleterious materials and alteration of fish habitat; Direct mortality of fish and marine mammals; Harm or change in behaviour from underwater noise; and Increased marine traffic.
Commissioning, systems testing, including hydrotesting	Interaction with marine water, potential change in marine water quality related to discharge of hydrotest sea water (if sea water is used).
Operations	
Vessel berthing	Alteration of subtidal fish habitat (shade effects); Increased marine traffic resulting in vessel strike risk for marine mammals; and Deposit of potentially deleterious materials.
Associated activities: marine shipping within PRPA jurisdiction	Increased marine traffic resulting in vessel strike risk for marine mammals; and Harm or change in behaviour from underwater noise.

5.4.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.4.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.4.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures, and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.5. Soils and Terrain

The Soils and Terrain effects evaluation will be conducted to assess the Project-related effects on the following subcomponents:

- Soils, including potential effects on soil quality; and
- Terrain, including potential effects related to terrain stability.

5.5.1. Assessment Boundaries

Table 23 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 23: Soil and Terrain Local and Regional Study Boundaries

VC	LSA	RSA
Soil and Terrain	The LSA will be defined as the Vopak landside Project footprint in order to capture all areas disturbed by the project. This LSA supports the quantification of the spatial extent of terrain/soil loss.	The RSA will be defined as the Project Land Lot Area to include areas proximal to the disturbed project footprint. The RSA provides context for the extent of loss within the Project Land Lot Area.

The potential effects specific to the Project are based on the main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase.
- Short-term – Decommissioning Phase, as relevant.

Potential effects on soils during the phases of the Project from potential accidental spills or leaks will be assessed in the Accidents and Malfunctions section of the EEE.

5.5.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 24: Indicators of VC assessments

VC	Subcomponents	Indicators	Linked VCs
Soil and Terrain	Soil Quality	Soil contaminants	• Terrestrial Resources • Air Quality
	Terrain	Terrain stability Spatial extent of Project footprint	• Terrestrial Resources

5.5.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and relevant to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
Canadian Environmental Quality Guidelines, Canadian Council of Ministers of the Environment, Winnipeg Manitoba, including updates to 2015
Canadian Soil Quality Guidelines
Canada Wide Standards for Petroleum Hydrocarbons in Soil, Canadian Council of Ministers of the Environment, Winnipeg, Manitoba, January 1, 2008
British Columbia Contaminated Sites Regulation, B.C. Reg. 375/96, including amendments up to B.C. Reg. 253/2016, November 1, 2017 • British Columbia Contaminated Sites Regulation Commercial Land standards are considered applicable for the majority of municipal landfills in BC and may be applicable for the Project during handling and management of excess soils generated during construction work.

5.5.4. Baseline Assessment

For each selected VC, the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed.
- Additional studies conducted, when required, to define the existing conditions.

Existing Information and Data Sources

The baseline information that will support the assessment of Soils and Terrain VC is listed in the table below.

Existing Information/Data Sources

Data/Information
iMapBC (DataBC 2018)
Golder Associates. 2009. Onshore Geophysical Investigation, Ridley Island, British Columbia. Prepared for Canpotex Terminals Limited.
Trow Associates. 2009. Geotechnical Investigation for Proposed Transportation Corridor, Ridley Island, BC. Prepared for PRPA
Geological Survey of Canada, GEOSCAN Database, mapsheet 1557a
Geological Survey of Canada, GEOSCAN Database, mapsheet 1472a
Stantec. 20111. Environmental Impact Statement, Canpotex Potash Export Terminal and Ridley Island Road, Rail and Utility Corridor, Ridley Island, Prince Rupert, B.C. 555p.
SNC-Lavalin. 2015. Limited Phase II Environmental Site Assessment, Ridley Terminal Inc. Coal and Petroleum Coke Storage/Transfer Facility, Ridley Island, Prince Rupert, BC – DRAFT.
SNC-Lavalin. 2016. Limited Phase I Environmental Site Assessment, Ridley Terminal Inc. Coal and Petroleum Coke Storage / Transfer Facility, Ridley Island, Prince Rupert, BC – DRAFT.

Field and Desktop Studies

The EEE will incorporate findings of past studies listed above, as well as results from geotechnical investigations planned for the landside footprint in 2018. The geotechnical investigation will profile the chemistry of the soil, subsurface stratigraphy, including bedrock depth in the location of the tank farm/facility footprint.

5.5.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Soils and Terrain VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 25: Potential Project-related Effects Associated with Soils and Terrain

Project Activity/Interaction	Potential Project-related Effect
Construction	
Site clearing (approximately 30 hectares)	Reduced permeability or loss of permeability as a result of soil removal. Disturbance of potentially contaminated soil within the site clearing boundaries.
Site grading, including blasting, and fill	Soil compression resulting in reduced permeability or complete loss of permeability. Accidental introduction of contaminated fill for site grading.
Construction of Project facilities on land (civil, mechanical and electrical & instrumental work)	Soil compression resulting in reduced permeability or complete loss of permeability.
Construction of marine jetty and berths	Potential for the introduction of untreated contaminated sediment to the on-site disposal area at Ridley Island, unless the dredge material is disposed of at sea.

5.5.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.5.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.5.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.6. Terrestrial Resources

The Terrestrial Resources effects evaluation will include an assessment of Project-related effects on the following subcomponents:

- Wildlife and wildlife habitat;
- Marine birds;
- Vegetation; and
- Wetland function.

5.6.1. Assessment Boundaries

Table 26 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 26: Terrestrial Resources Local and Regional Study Boundaries

VC	LSA	RSA
Terrestrial Resources	The lands and waters within the Vopak Lot areas and within a 500 m buffer surrounding the lot areas to capture local Project-related effects on terrestrial resources (including marine birds).	The statutory lands and waters controlled by PRPA

The LSA boundary was chosen because the Project LSA buffered by 500 m is sufficient to capture local Project-related effects for the majority of terrestrial resources (including marine birds), based upon the existing habitat, the type of proposed development, and the terrestrial resources that will be affected by the Project (Wilson 2016). Most of the area more than 500 m to the north of the proposed LSA is already developed industrial land. Baseline information indicates that there is little to no use of Ridley Island by wide-ranging wildlife (e.g. grizzly bear) due to the current level of human disturbance. ECCC guidelines recommend anchoring ships no less than 500 m from seabird colonies (ECCC 2017). The RSA boundary was chosen as it is the planning area under a single jurisdiction, in which the Project is located.

The potential effects specific to the Project are based on the main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase;
- Short-term – Decommissioning Phase, as relevant.

5.6.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 27: Indicators of Terrestrial Resources assessment

Valued Component	Subcomponents	Indicators	Linked VCs
Terrestrial Resources	Wildlife and Wildlife Habitat, including non-marine birds, migratory birds, and species at risk	Quantity and distribution of suitable habitat and sensitive habitat features. Quantity and distribution of identified critical habitat or residences for federal species at risk. Presence and distribution of wildlife, including birds protected under the *Migratory Birds Convention Act*. Mortality risk.	• Air Quality; • Noise; • Ambient Light/Visual Quality; • Soils; • Freshwater Fish and Fish Habitat (surface water quality) • Marine Resources (marine sediment and water quality)

Table 27 (Cont'd): Indicators of Terrestrial Resources assessment

Valued Component	Subcomponents	Indicators	Linked VCs
Terrestrial Resources (Cont'd)	Marine Birds, (including migratory and species at risk)	• Quantity and distribution of suitable habitat and sensitive habitat features. • Quantity and distribution of identified critical habitat or residences for federal species at risk. • Presence and distribution of wildlife, including birds protected under the *Migratory Birds Convention Act*. • Mortality risk.	• Air Quality; • Noise; • Ambient Light/Visual Quality; • Soils; • Freshwater Fish and Fish Habitat (surface water quality) • Marine Resources (marine sediment and water quality)
	Vegetation, including rare plants	• Quantity and distribution of terrestrial ecosystems. • Quantity and distribution of terrestrial ecosystems at risk. • Presence and distribution of vegetation species at risk.	• Air Quality; • Soils; and • Freshwater Fish and Fish Habitat (Surface Water Quality)
	Wetland Function	• Quantity and distribution of wetland ecosystems (by class). • Qualitative indicators of wetland function, as correlated with wetland ecosystem classes.	• Freshwater Fish and Fish Habitat • Terrestrial Resources (Marine Birds, Vegetation, Wildlife)

5.6.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and relevant to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
Species at Risk Act
Migratory Birds Convention Act, 1994
Migratory Birds Regulation
Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia
Guidelines for Amphibian and Reptile Conservation During Urban and Rural Development in British Columbia - 2014
Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia - 2013
Best Management Practices for Bats in British Columbia - 2016
Reducing risk to migratory birds (Environment and Climate Change Canada)
Government of Canada. 1991. Federal Policy on Wetland Conservation

5.6.4. Baseline Assessment

For each selected VC the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed.
- Additional studies conducted, when required, to define the existing conditions.

Existing Information and Data Sources

The baseline information that will support the assessment of the Terrestrial Resources VC is listed in the table below.

Existing Information/Data Sources

Data/Information
AECOM. 2012. Prince Rupert Port Authority 2020 Land Use Management Plan. Prepared for PRPA.
AECOM. 2014. Prince Rupert LNG. Environmental Impact Statement Guidelines. Prepared for BG Group.
CEA Agency. 2016. Pacific NorthWest LNG Project. Environmental Assessment Report.
BC Conservation Data Centre. 2018. BC Species and Ecosystems Explorer. B.C. Ministry of Environment, Victoria, BC. Available: http://a100.gov.bc.ca/pub/eswp/
BC Conservation Data Centre (CDC): Conservation Data Centre Mapping Service [web application]. 2008. Victoria, British Columbia, Canada. Available: http://maps.gov.bc.ca/ess/sv/cdc/
BC Species Inventory Web Explorer (WSI database portal) http://a100.gov.bc.ca/pub/siwe/search_reset.do
Campbell, R. W., N. K. Dawe, I. McTaggert-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The birds of British Columbia volume 2: nonpasserines, diumal birds of prey through woodpeckers. UBC Press in cooperation with Environment Canada, BC Ministry of Environment, Lands and Parks, and the Royal BC Museum, Victoria, BC.
Campbell, R.W., N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1997. The birds of British Columbia. Vol. 3 – Flycatchers through vireos. Royal BC Museum, Victoria and Canadian Wildlife Service, Delta, BC.
Campbell, R.W., N.K. Dawe, I.M. Cowan, J. Cooper, G. Kaiser, A.C. Stewart, and M. McNall. 2001. The Birds of British Columbia. Volume 4. Passerines. Royal British Columbia Museum, Victoria, BC.
DataBC. 2018. iMapBC Public Mapping Application. Available: http://ilmbwww.gov.bc.ca/content/e-services/geobc/imapbc.
Ecora Resource Group Ltd. 2013. North Coast Level R Terrestrial Ecosystem Mapping – Landscape Units: Kaien, Quotoon, Scotia, Brown, Kumealon, Hevenor. Available at: https://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=40877.
Jacques Whitford AXYS Ltd. 2008. Ridley Island Western Toad Survey. September 2008. Memo report to PRPA.
SNC-Lavalin Inc. 2016. Ridley Island Propane Export Terminal. Environmental Effects Determination. Prepared for AltaGas Ltd.
Stantec. 2011. Canpotex Potash Export Terminal. Environmental Impact Statement and Technical Data Reports. Prepared for Canpotex Terminals Ltd.
Stantec. 2012. Fairview Terminal Expansion. Comprehensive Study Report and Technical Data Reports. Prepared for CN Rail.
Stantec. 2014. Prince Rupert Gas Transmission Project. Application for an Environmental Assessment Certificate.
Stantec. 2016. Pacific NorthWest LNG Project. Environmental Impact Assessment and Technical Data Reports. Prepared for Pacific NorthWest LNG Limited Partnership.
Stantec. 2016a. Aurora LNG. Environmental Assessment Certificate Application and Technical Data Reports. Prepared for Nexen Energy.

Field and Desktop Studies

Additional information will be required to form the baseline and the following field programs will be used to augment the existing data.

Bat Acoustic Surveys

Bat acoustic surveys will be carried out using battery-operated remote acoustic detectors to identify the presence and areas of activity for the SARA-listed little brown myotis (*Myotis lucifugus*) and other bat species in the LSA. The detectors will be deployed during the growing season at sites where bats are expected to be active (near water and forest edges). Recorded bat calls will be identified to species or species group to produce a species list of bats present on Ridley Island.

Western Toad Survey

Western toads (*Anaxyrus boreas*) are federally of Special Concern on *SARA's* Schedule 1. EAs of previous projects on Ridley Island have included collection of field data on toads, but additional development affecting the island's wetlands has occurred since those surveys. Western toad juvenile migration surveys will be conducted according to methods described in Resources Inventory Committee (1998b).

Songbird Surveys

Migratory birds are protected by the *Migratory Birds Convention Act* and *Regulations*, the *BC Wildlife Act*, and some species are listed on Schedule 1 of SARA. ECCC also identifies migratory bird use of wetlands as an important component for wetland function. Point count surveys spaced at 200 m intervals along stratified transects will be conducted to assess songbird diversity and relative abundance, following methods described in Resources Inventory Committee (1999).

Common Nighthawk Survey

The Common Nighthawk (*Chordeiles minor*) is a *SARA*-listed bird species that often nests in areas with limited overhead vegetation cover (e.g., anthropogenic sites, fields, wetlands). Targeted surveys for nighthawks will be used to assess presence and distribution in the LSA. Nighthawk surveys will be carried out using methods described in Knight (2018), using a two-person crew to conduct unlimited radius point count surveys.

Western Screech-owl Survey

Call-playback surveys will be conducted for Western Screech-owls to assess their occupancy and nesting status in the LSA. Surveys will follow call-playback methods described in Hausleitner (2006), and will be completed by a crew of two persons conducting call playback stations separated by 400 m along a transect. Survey standards for this species identify that surveys should occur between mid-April and August (Hausleitner 2006).

Marine Bird Surveys

Marine birds, shorebirds and waterfowl (e.g., ducks, geese, swans, grebes, gulls, murres, murrelets, phalaropes, plovers, sandpipers, and cormorants) are important components of the biodiversity of the coast around Prince Rupert. Shore-based stationary point counts and fixed-width boat transects will be used to assess bird use of the shoreline and near-shore waters in proximity to the Project, based on methods described in Resources Inventory Committee (1997). The marine birds survey will collect data regarding presence and location of marine bird species at risk, and marine birds protected by legislation.

Terrestrial Ecosystem Mapping

Terrestrial Ecosystem Mapping (TEM) was prepared for the surrounding North Coast Timber Sales Area in 2013 at a scale of 1:20,000. For the EEE, the 2013 TEM will be utilized and updated based on recent changes to ecosystems and land use in the Project area. The updates will be completed using recent aerial and satellite imagery to edit polygon line work and TEM database attributes, followed by field plots to confirm the accuracy of the changes. Field data collection will follow provincially developed methodology (BC Ministry of Forests and Range and BC Ministry of Environment 2010). Incidental wildlife observations will also be recorded. The updated TEM will be used to quantify vegetation communities, ecosystems and wildlife habitat that will be affected by the Project.

TEM fieldwork will also include data collection to refine information on wetland classification and function within the Project area. The Federal Policy on Wetland Conservation (Government of Canada 1991) includes the objective of no net loss of wetland functions on all federal lands and waters. Information on wetland classification and function will assist with addressing their concerns and for determining appropriate mitigation and compensation, if required.

Rare Plant Survey

Surveys for rare plants were previously done on Ridley Island; however most of the detailed data for these surveys are not anticipated to be available. In addition, at-risk status of vegetation has changed in the interim from previous baseline data collection to the present, introducing new species to the at-risk list that were not searched for during past assessments. Surveys for rare plants are planned to be undertaken to identify rare plant species that may be affected by the Project and to assist with designing mitigation. The EEE will include the results from systematic transect surveys throughout the LSA. Rare plants observed will be recorded, and voucher specimens will be collected as needed to identify the plants in the office.

5.6.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Terrestrial Resources VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 28: Potential Project-related Effects Associated with Terrestrial Resources

Project Activity/Interaction	Potential Project-related Effect
Construction	
Site clearing (approximately 30 hectares)	Loss of habitat for wildlife and vegetation; loss of wetland function; mortality of wildlife, disturbance and displacement of wildlife
Construction road traffic	Mortality of wildlife due to collisions, disturbance and displacement of wildlife from traffic noise and light
Site grading, including blasting, and fill	Mortality of wildlife, disturbance and displacement of wildlife due to noise and human presence
Construction of Project facilities on land (civil, mechanical and electrical & instrumental work)	Mortality of wildlife, disturbance and displacement of wildlife due to noise and human presence

Table 28 (Cont'd): Potential Project-related Effects Associated with Terrestrial Resources

Project Activity/Interaction	Potential Project-related Effect
Construction (Cont'd)	
Construction of marine jetty and berths	Mortality of wildlife, disturbance and displacement of wildlife due to noise
Dredge and disposal of dredgeate	Mortality of wildlife, disturbance and displacement of wildlife due to noise, habitat loss for wildlife and vegetation at disposal site, loss of wetland function at disposal site
Reclamation and clean up	Mortality of wildlife, disturbance and displacement of wildlife due to noise
Operations	
Railway operations associated with inbound train unloading and outbound train staging	Mortality of wildlife due to train collisions, disturbance and displacement of wildlife due to noise, vibration and artificial light
General terminal operations (24 hours, 365 days) (power, lighting, security, ancillary building operations, staffing, water requirements during operations, flaring for maintenance and emergency purposes)	Potential mortality or health effects from heat/emissions to birds and bats flying over the stack during the flaring activity.
Vessel berthing	Disturbance and displacement of wildlife due to vessel movement, noise and artificial light
General terminal operations	Mortality of wildlife due to vehicle collisions, disturbance and displacement of wildlife due to human presence, noise and artificial light
Routine maintenance and inspections	Mortality of wildlife, disturbance and displacement of wildlife due to noise and human presence
Associated activities: marine and rail shipping within PRPA jurisdiction	Mortality of wildlife, disturbance and displacement of wildlife, introduction of invasive species

5.6.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.6.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.6.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.7. Freshwater Fish and Fish Habitat

The Freshwater Fish and Fish Habitat effects evaluation will assess the potential Project-related effects on components of freshwater fish habitat including ground and surface water quality, and freshwater sediment quality.

5.7.1. Assessment Boundaries

Table 29 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 29: Freshwater Fish and Fish Habitat Local and Regional Study Boundaries

VC	LSA	RSA
Freshwater Fish and Fish Habitat	The LSA will include the Vopak Land Lot area and watercourses found within a 250 m buffer of the land lot on Ridley Island in order to capture waters flowing into and out of project lot area.	Freshwater bodies on Ridley Island to demonstrate representative change in availability of freshwater habitat. The RSA captures potential Project-related changes to freshwater habitat quality and quantity in relation to total similar habitat on Ridley Island.

The potential effects specific to the Project are based on the main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase;
- Short-term – Decommissioning Phase, as relevant.

5.7.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 30: Indicators of Freshwater Fish and Fish Habitat assessment

VC	Subcomponents	Indicators	Linked VCs
Freshwater Fish and Fish Habitat	Ground and Surface Water Quality Sediment Quality Freshwater Fish	Ground and surface water quality parameters (such as metals, nutrients, contaminants, and in-situ measurements, e.g., pH, temperature, dissolved oxygen, turbidity) Fish presence/absence Habitat quality & quantity	• Marine Resources • Terrestrial Resources (i.e., Wetland function) • Soils and Terrain • Human Health • Air Quality

5.7.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and relevant to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
Resources Inventory Standards Committee. 2001. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Manual.
Johnston and Slaney. 1996.Level 1 Fish Habitat Assessment Procedure
BC Ministry of Environment, Lands and Parks. 1997. Fish Collection Methods and Standards, Aquatic Ecosystems Task Force,
BC Ministry of Environment, Lands and Parks. 1999a. Overview Fish and Fish Habitat Inventory Methodology.
BC Ministry of Environment, Lands and Parks. 1999b. Freshwater Biological Sampling Manual.
Resources Inventory Standards Committee, Ministry of Environment Science and Information Branch. Manual of British Columbia Hydrometric Standards.

5.7.4. Baseline Assessment

For each selected VC, the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed; and
- Additional studies conducted, when required, to define the existing conditions.

Information Sources

The baseline information that will support the assessment of Freshwater Resources VC are listed in the table below.

Existing Information/Data Sources

Data/Information
Golder Associates. 2009. Onshore Geophysical Investigation, Ridley Island, British Columbia. Prepared for Canpotex Terminals Limited.
Trow Associates. 2009. Geotechnical Investigation for Proposed Transportation Corridor, Ridley Island, BC. Prepared for PRPA.
AECOM. 2012. Prince Rupert LNG. Environmental Impact Statement Guidelines. Prepared for BG Group.
CEA Agency. 2016. Pacific NorthWest LNG Project. Environmental Assessment Report.
Ambach, M. and J. Casey. 2011. Final Report: Identification and mapping of fish habitat within and around Prince Rupert Harbour. , February 2011. WWF-Canada North Coast Program.
SNC-Lavalin Inc. 2016. Ridley Island Propane Export Terminal. Project Description. Prepared for AltaGas Ltd.
Stantec. 2011. Canpotex Potash Export Terminal. Environmental Impact Statement and Technical Data Reports. Prepared for Canpotex Terminals Ltd.
Stantec. 2016. Pacific NorthWest LNG Project. Environmental Impact Statement and Technical Data Reports. Prepared for Pacific NorthWest LNG Limited Partnership.
Stantec. 2016b. Aurora LNG. Environmental Assessment Certificate Application and Technical Data Reports. Prepared for Nexen Energy.
WorleyParsons. 2012. Ridley Terminals Expansion. Parcel A and Energy Bulk Export Terminal Pre-Feasibility Study.

Field and Desktop Studies

The EEE will incorporate information from existing reports relevant to the VC and subcomponents, in addition to field–based survey. A fish and fish habitat survey will characterize potential fish and fish habitat for the EEE. The abundance, distribution and species life-history phases using different habitat types will be assessed using standard provincial fish sampling and habitat assessment techniques i.e., RISC 2001.

The survey will verify and confirm the fish bearing status of watercourses (i.e., presence/absence) on the Vopak Project Land Lot Area. In-situ water quality measurements will be collected, in addition to in-situ turbidity measurements. The known stream to the southwest of the Vopak Project will also be investigated for the presence of spring spawners (i.e., sea-run cutthroat trout) as the stream may be subject to direct or indirect effects from the Project.

5.7.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Freshwater Fish and Fish Habitat VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 31: Potential Project-related Effects Associated with Freshwater Fish and Fish Habitat

Project Activity/Interaction	Potential Project-related Effect
Construction	
Site clearing (approximately 30 hectares)	Change in water quality, surface water drainage, Increased sediment and erosion risk
Site grading, including blasting, and fill	Change in water quality, surface water drainage, Increased sediment and erosion risk
Construction of Project facilities on land (civil, mechanical and electrical & instrumental work)	Change in water quality, surface water drainage, Increased sediment and erosion risk
Commissioning, systems testing, including hydrotesting	Interaction with freshwater, potential change in freshwater quality related to discharge of hydrotest freshwater (if freshwater is used).
Operations	
General terminal operations (24 hours, 365 days) (power, lighting, security, ancillary building operations, staffing, water requirements during operations, flaring for maintenance and emergency purposes)	Change in water quality

5.7.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.7.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.7.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.8. Socio-Economic Conditions

The EEE will include the assessment of socio-economic values. Social, community and economic conditions have been considered as important values to be assessed in the EEE. The effects evaluation will assess Project-related effects on the following subcomponents:

- Marine Use and Navigation:
  - Fishing, recreation and marine use;
  - Interference on navigation.
- Community Services and Infrastructure:
  - Local community services and infrastructure;
  - Local accommodation and housing.
- Economic Conditions:
  - Commercial business;
  - Labour force capacity or demand;
  - Job creation during construction and operation.

5.8.1. Assessment Boundaries

Table 32 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 32: Socio-Economic Condition Local and Regional Study Boundaries

VC	Subcomponent	LSA	RSA
Socio-Economic Condition	Marine Use and Navigation	The LSA includes the PRPA marine jurisdiction, as well as the area 500 m on either side of the marine access route between the Project marine terminal and Triple Island pilot boarding area.	Same as the LSA
	Community Services and Infrastructure	The LSA consists of the communities of Port Edward and Prince Rupert. The boundary is intended to capture communities in which the project will have direct interactions with the services and infrastructure provided.	Same as LSA
	Economic Conditions	The LSA consists of the communities within the mainland portion of the Skeena Queen Charlotte Regional District.	Same as LSA

The potential effects specific to the Project are based on the main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase
- Short-term – Decommissioning Phase, as relevant.

5.8.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 33: Indicators of Socio-Economic assessment

VC	Subcomponents	Indicators	Linked VCs
Socio-Economic Condition	Marine Use and Navigation	Shipping traffic in Prince Rupert harbour (ships per year) Marine vessel types Data on marine uses along shipping channel (i.e., fishing, aquaculture). Data on other uses (e.g., recreational boating routes, marine park locations, visitor frequency, and access) Visitor frequency, and access.	• Marine Resources; • Visual Quality; and • Human Health
	Community Infrastructure and Services Accommodations (including work camp)	Demand for and supply of community infrastructure and services (e.g., education and municipal services, emergency response services capacity, health and social care services) Local government expenditures on community infrastructure and services Traffic volume (daily) Availability (vacancy rates, inventory levels) and cost of accommodation ($)	• Socio-Economic Condition
	Economic Conditions (Labour Force Capacity and Commercial Business)	Quantitative indicators of the supply and demand for labour in the region (e.g., qualified labour supply, i.e., number of workers by occupation and region of residence, unemployment rates, wage rates, skill levels) Value of local and regional spending ($) related to population influx and related employment	• Marine Resources

5.8.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VCs and relevant to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
Navigation Protection Act
Canada Shipping Act
Canadian Ballast Water Control and Management Regulations
Canada Marine Act
Marine Transportation Security Act and Regulations
Transportation of Dangerous Goods Act and Regulations
Canadian Ballast Water Control and Management Regulations
Pilotage Act
SCHEDULE "A" of the Quality of Life - Official Community Plan Bylaw 3236, 2007 (City of Prince Rupert 2007)
Northern Health Authority's Guidelines for Industrial Camps (BC Reg 427/83 Industrial Camp Regulations; BC Reg 411/85 Sewage Disposal Regulations; BC Reg 230/92 Safe Drinking Water Regulations)
City of Prince Rupert Solid Waste Bylaw No. 3223, 2006 (City of Prince Rupert 2016a)

5.8.4. Baseline Assessment

For each selected VC the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed.
- Additional studies conducted, when required, to define the existing conditions.

Existing Information and Data Sources

The baseline information that will support the assessment of Socio-economic Condition VC is listed in the table below.

Existing Information/Data Sources

Data/Information
SNC-Lavalin Inc. 2016. Ridley Island Propane Export Terminal. Project Description. Prepared for AltaGas Ltd.
Stantec. 2016. Pacific NorthWest LNG Project. Environmental Impact Assessment and Technical Data Reports. Prepared for Pacific NorthWest LNG Limited Partnership
Stantec. 2016b. Aurora LNG. Environmental Assessment Certificate Application and Technical Data Reports. Prepared for Nexen Energy.
Canada Starts Here: The BC Jobs Plan
Northwest Regional Workforce Table Regional Skills Training Plan 2013 - 2015 (2013)
City of Prince Rupert Preparing for Growth – KPMG Report (KPMG 2015)
Prince Rupert Housing Action Plan (Northern Development Initiative Trust [NDIT] 2015a)
Port Edward Housing Action Plan (NDIT 2015b)
Dodge Cove Official Community Plan (SQCRD 1990)
Northwest Regional Airport Master Plan (AirBiz 2014)

Field and Desktop Studies

The Socio-economic Condition VC will form baseline information using the following methods:

Marine Use and Navigation

A desktop study of relevant information including maps and spatial information marine use, tenure documentation and legal designations, government reports and statistics, academic and primary literature, and technical reports.

Literature sources may include DFO's Integrated Fishery Management Plans and statistical reports, other EAs relevant to the region, strategic north coast marine planning resources and multiple (land management and strategic planning) publications authored by the PRPA, quantitative data (e.g., landings, value, and licencing information) for commercial, recreational, and aboriginal fisheries. Spatial data for marine fisheries are available from the British Columbia Marine Conservation Analysis (BCMCA) online database. Spatial data for marine recreation and tourism activities (e.g., boating routes, marine accessible parks, and anchorages) can also be obtained from the BCMCA database.

Infrastructure and Services

The description of baseline conditions will be based on information contained in publicly available literature such as previous EA reports and peer-reviewed literature, interviews with key community stakeholders and service providers, and information obtained from Statistics Canada.

The City of Prince Rupert and the District of Port Edward have undertaken several studies to track their own socio-economic existing conditions. These studies are intended to inform the assessment of potential socio-economic effects that can result from large industrial projects.

Economic Conditions

Information on baseline economic conditions will be obtained from several statistical sources, including the 2011 and 2016 Statistics Canada censuses, industry reports, local and regional economic development plans, BC Stats, and the BC Ministry of Finance. Information will also be gathered from publicly available independent socio-economic assessments of projects within the LSA and RSA.

5.8.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Socio-Economic VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized below.

Table 34: Potential Project-related Effects Associated with Socio-Economic Condition

Marine Use and Navigation

Project Activity	Potential Project-related Effect
Construction	
Construction of marine jetty and berths	Construction and operation activities will bring additional vessels to the marine environment. The increase in vessel traffic will have the potential to affect navigation, fishing, public recreation and marine use.
Dredge and dredgate	Vessel traffic will increase in the LSA during construction of the facility, the jetty and supporting infrastructure. Support vessels (e.g., cranes, tug boats, drill rig, excavators and dredgers) will be required during construction for pile driving, dredging and disposal of dredge material. This increased traffic with operational safety buffers will mean less space for navigation of existing marine traffic, including fishers, boaters, and recreationalists such as kayakers.
Operations	
Vessel berthing	A safety zone that might preclude fishing activities in close proximity to the marine structures may be applied.
Associated activities: marine and rail shipping within PRPA jurisdiction	Increased shipping may have effects on recreation and fishing in the area.

Infrastructure and Services

Project Activity	Potential Project-related Effect
Construction	
Construction road traffic	Potential increase in road traffic related to workers and movement of material on local roads to and from the Project site.
Construction of Project facilities on land (civil, mechanical and electrical & instrumental work)	Short-term accommodation for construction workers will require a work camp. Potential effects of work camp related to public safety, services and infrastructure capacity, local spending. Short-term increased demand on local and regional services and infrastructure (i.e., first responders, health centers etc.).
Operations	
General terminal operations	Operation of the facility and supporting infrastructure will affect traffic and transportation infrastructure through routine service and supply requirements. Operation of the facility and supporting infrastructure may affect housing availability and affordability. Workers and their families living in Port Edward and Prince Rupert may increase demand on infrastructure and services.

Economic Conditions

Project Activity	Potential Project-related Effect
Construction	
Construction Activities	Increased labour demand in the region Increased activities for commercial businesses providing services for the Project
Operations	
Operations Activities	Increased labour demand in the region Increased activities for commercial businesses providing services for the Project

5.8.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.8.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.8.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.9. Archaeology

The EEE will include an effects evaluation of potential Project-related effects on the VC.

5.9.1. Assessment Boundaries

Table 35 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 35: Archaeology Local and Regional Study Boundaries

VC	LSA	RSA
Archaeology	Project footprint (land and marine)	Land and Water Lease Lot areas

The potential effects specific to the Project are based on:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase
- Short-term – Decommissioning Phase, as relevant.

5.9.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 36: Indicators of Archaeological assessment

VC	Subcomponents	Indicators	Linked VCs
Archaeology	NA	Number of affected sites; Location of recorded archaeological sites	NA

5.9.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and relevant to inform or guide the assessment are listed below.

Relevant Guidelines and Legislation

Guidance and Legislation
Canadian Environmental Assessment Agency. 1996. The *Canadian Environmental Assessment Act* reference guide on physical and cultural heritage resources. Ministry of Supply and Services Canada, Ottawa, ON.
British Columbia Archaeological Impact Assessment Guidelines (British Columbia Archaeology Branch 1998).
Archaeology Branch. 2001. Culturally modified trees of British Columbia: A handbook for the identification and recording of culturally modified trees. Ministry of Forests, Lands and Natural Resources Operations, Victoria, British Columbia.

5.9.4. Baseline Assessment

For each selected VC the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed; and
- Additional studies conducted, when required, to define the existing conditions.

Existing Information and Data Sources

The EEE will summarize existing conditions utilizing the following:

- Available Traditional Use Studies and Traditional Knowledge;
- Map of archaeological and heritage resources;
- Where available, background review of archaeological site forms to determine regional site type(s), artifact assemblages, and condition of previously recorded archaeological sites within the LSA; and
- Stakeholder and expert input into relative importance of affected resources.

Existing Information/Data Sources

Data/Information
Millennia Research Limited, 2008, "Archaeological Overview Assessment, Ridley Island, BC", prepared for the Prince Rupert Port Authority.
Millennia Research Limited, 2010, "Ridley Terminals Inc. Archaeological Impact Assessment", prepared for Ridley Terminals Inc.
Environmental Impact Statement: Canpotex Potash Export Terminal and Ridley Island Road, Rail and Utility Corridor, 2012.

Field and Desktop Studies

The EEE will rely primarily on existing studies to conduct the archaeological assessment. These studies have identified 17 archaeological sites on Ridley Island, four of which are situated within the proposed Project area. The four known archaeological sites include Culturally Modified Trees (CMTs) (GbTn-71, GbTn-72, GbTn-95, and GbTn-102).

Based on this knowledge, Vopak will identify mitigation measures in the EEE to be implemented prior to construction to avoid or minimize impacts to CMTs or archaeological sites which may overlap with the Project footprint.

5.9.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Archaeology VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 37: Potential Project-related Effects Associated with Archaeology

Project Activity/Interaction	Potential Project-related Effect
Site clearing (approximately 30 hectares)	Potential disturbance to archaeology sites within Project footprint associated with construction of both terrestrial and marine components.
Site grading, including blasting, and fill	
Construction of marine jetty and berths	

5.9.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.9.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.9.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

5.10. Human Health

The EEE will include an assessment of Human Health. The Human Health VC has been proposed because of potential Project-related effects on noise, air, light and marine foods with the potential to have indirect effects on human health and wellbeing.

5.10.1. Assessment Boundaries

Table 38 includes a description of the spatial assessment (both LSA and RSA) area for the VC. All boundaries are relevant to the VC assessment to sufficiently capture potential Project-related effects within the regional assessment boundaries as defined for the VC. Study boundaries are represented on maps found in Appendix A.

Table 38: Human Health Local and Regional Study Boundaries

VC	LSA	RSA
Human Health	The LSA will be the combined LSA boundaries of other linked VCs.	Same as LSA.

The potential effects specific to the Project are based on the main phases of the Project:

- Short-term (2 years) – Construction Phase;
- Long-term (minimum of 50 years) – Operations Phase
- Short-term – Decommissioning Phase, as relevant.

5.10.2. Subcomponents and Indicators

The indicators to be used for the VC assessment are presented in the table below along with relevant subcomponents for the VC, where relevant, and the other linked VC assessments that represent a pathway of effects.

Table 39: Indicators of Human Health assessment

VC	Subcomponents	Indicators	Linked VCs
Human Health	NA	Indicators as listed in the Air Quality, Noise, Visual (Light) and Marine Resources (marine sediments) VCs.	• Air Quality • Noise • Visual (Light) • Marine Resources

5.10.3. Regulatory Context

Relevant guidelines and legislation used in the regulation of the VC and relevant to inform or guide the assessment are listed below.

Human health effects assessments are governed by the methodologies and guidelines for the conduct of human health risk assessment in Canada and BC, including:

Relevant Guidelines and Legislation

Guidance and Legislation
Canadian Council of Ministers of Environment Guidelines for Canadian Drinking Water Quality (Health Canada)
British Columbia Approved and Working Water Quality Guidelines (Criteria) Reports for drinking water, irrigation, and recreation and aesthetics
Useful Information for Environmental Assessments (Health Canada 2010)
The noise limits described in the District of Port Edward Noise Control Bylaw No. 520, Prince Rupert Port Authority Noise Program, and British Columbia Oil and Gas Commission Noise Control Best Practices Guideline
Canadian Environmental Protection Act, 1999
British Columbia Ministry of Environment Air Quality Dispersion Modelling Guideline, 2015
British Columbia Ambient Air Quality Objectives, 2016
Canadian Council of Ministers of Environment Canadian Ambient Air Quality Standards, 2014

5.10.4. Baseline Assessment

For each selected VC the EEE will describe the existing conditions within the Project area. The following sections outline the baseline information that will be used to inform the EEE for each VC, including:

- Documentation of the methods and data sources used to compile information on existing conditions, including standards or guidelines followed.
- Additional studies conducted, when required, to define the existing conditions.

The EEE will include a description of baseline conditions through the following methods:

- Review of available information and reports of the linked VCs pertinent to human health and, where available, measurable changes in concentrations of relevant environmental media.
- Guidance published by federal agencies, and Health Canada's guidance on human health risk assessment.
- Review of available Traditional Knowledge and Traditional Use studies.
- Human Health will rely on findings from Air Quality Study, Noise and Vibration assessment, visual and lighting assessment, and Marine sediment quality assessment.
- Consideration of country foods of importance to Aboriginal groups' communities in the area.

5.10.5. Project Interactions and Potential Effects

The EEE will assess potential Project-related effects for each VC using the methodology described in Section 4 of this document.

Potential Project interactions with the Human Health VC, as identified in Table 7, in section 4.4, may result in potential Project-related effects as summarized in the table below.

Table 40: Potential Project-related Effects Associated with Human Health

Project Activity	Potential Project-related Effect
Construction	
Site clearing (approximately 30 hectares)	Potential for dust generation, affecting ambient particulate matter concentrations. Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Construction road traffic	Construction equipment and activities may cause high ambient noise levels Potential for dust generation, affecting ambient particulate matter concentrations. Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Site grading, including blasting, and fill	Construction equipment and activities may contribute to ambient noise levels. Potential for dust generation, affecting ambient particulate matter concentrations. Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Construction of Project facilities on land (civil, mechanical and electrical & instrumental work)	Construction equipment and activities may contribute to ambient noise levels. Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Construction of marine jetty and berths	Construction equipment and activities may contribute to ambient noise levels. Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions. Construction of the marine components may re-suspend potentially contaminated marine sediment with the potential to effect marine country foods.
Dredge and disposal of dredgate	Equipment usage consumes diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions. Potential for contaminated sediment resuspension may affect marine country foods.[3]
Commissioning, systems testing, including hydrotesting	Construction equipment and activities may contribute to ambient noise levels

[3] A Human Health Risk Assessment (HHRA) will be conducted if Project-related effects establish marine sediment contamination and potential for resuspension are present. The HHRA will look at risks associated with marine country food harvest.

Table 40 (Cont'd): Potential Project-related Effects Associated with Human Health

Project Activity	Potential Project-related Effect
Operations	
Railway operations associated with inbound train unloading and outbound train staging	Project transportation sources may contribute to increased ambient sound levels. Locomotives consume diesel fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
LPG cooling process	Cooling equipment may contribute ambient sound levels. Equipment usage consumes energy and fuel and will contribute to the Project CACs and GHG emissions.
Product storage	Product storage may release fugitive CACs and could adversely affect air quality conditions.
Vessel berthing	Vessel activities may contribute to ambient sound levels. Vessels and tugs consume diesel fuel or fuel oil and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Cargo loading	Cargo equipment may contribute to ambient sound levels.
General terminal operations (24 hours, 365 days) (power, lighting, security, ancillary building operations, staffing, water requirements during operations, flaring for maintenance and emergency purposes)	Terminal operation equipment may contribute to ambient sound levels. Equipment usage consumes fuel and will contribute to Project related emissions of CACs and GHGs and could adversely affect air quality conditions.
Routine maintenance and inspections	Maintenance and inspections may have associated equipment use and/or activities that contribute to ambient sound levels. General maintenance may include use of equipment or venting of storage tanks that would release CACs and GHGs and could adversely affect air quality conditions.
Associated activities: marine and rail shipping within PRPA jurisdiction	Transportation related emissions release CACs and GHGs and could adversely affect air quality conditions.

5.10.6. Mitigation Measures

The EEE will identify measures to avoid, manage or mitigate potential adverse effects to the selected VC consistent with section 4.5 (Mitigation Measures). Management and/or monitoring plans for relevant Project phases will be referenced.

5.10.7. Residual Effects Characterization and Determination of Significance

Where identified, the EEE will characterize an adverse residual effect to support a detailed assessment of the VC. The adverse residual effect will be presented in a manner which sufficiently describes the context of the VC, magnitude, extent, duration, reversibility and frequency as consistent with section 4.6 (Residual Effects Characterization and Determination of Significance).

5.10.8. Cumulative Effects Assessment

The EEE will assess the adverse residual effects of the selected VC using similar methodology described in section 4.4 to 4.6 of the TOR. The cumulative effects assessment identifies those residual effects from this Project that are considered likely to interact with similar effects in the same timeframe with those of past, existing, or foreseeable physical activities in the vicinity of the regional assessment boundaries as defined for the VC.

The EEE will include the following:

- Identification of potential cumulative effects, i.e., cumulative interactions between residual effects of the Project and the potential residual effects of other foreseeable developments or currently operating facilities;
- Identification of additional mitigation measures; and
- Description and evaluation of (residual) cumulative effects of the selected VC.

6. EFFECTS ON ABORIGINAL PEOPLES

6.1. Aboriginal Interests

The Aboriginal groups discussed in this section will include:

- Lax Kw'alaams;
- Metlakatla;
- Kitselas;
- Kitsumkalum;
- Gitxaala; and
- Gitga'at

The EEE will summarize Vopak's engagement with Aboriginal groups to characterize the adverse effects to Aboriginal groups.

The EEE will include:

- A summary of engagement activities;
- A summary of Aboriginal groups questions and issues related to the Project, and resolutions;
- Traditional Knowledge information, as available.
- A description of the Aboriginal Interests of each group identified through secondary research techniques or provided directly through engagement activities.
- A description of potential Project-related effects on Aboriginal groups;
- A description of measures to avoid, reduce or mitigate potential adverse effects; and
- A summary of conclusions respecting potential effects to Aboriginal groups.

6.2. Other Matters of Concern to Aboriginal Groups

The EEE will include:

- A list of other matters of concern raised by Aboriginal Groups with respect to potential environmental, economic, social, heritage and health effects of the proposed Project, which have not already been considered in the discussion about Aboriginal Interests or in the statutory requirements under CEAA 2012 where applicable;
- A description (or summary if described elsewhere in the EEE) of the mitigation measures to address potential effects on other matters of concern to Aboriginal Groups;
- A characterization of the residual adverse effects after mitigation, in a manner consistent with assessment methodology Section 4 of this TOR; and
- A description of how these matters of concern have been addressed from the perspective of the Aboriginal Groups and the Proponent.

7. ACCIDENTS AND MALFUNCTIONS

The EEE will describe potential accident and equipment malfunctions which may occur at each phase of the Project. Some accident and malfunctions may include, but are not limited to:

- Accidents involving workers and their vehicles or equipment;
- Spills of hazardous or deleterious material (e.g., bulk product, oil, lubricant or fuel);
- Project-related fire; and
- Mechanical, structural or electrical failure.

The EEE will include:

- The overall methodology for assessing the potential risk of an event (likelihood and consequence);
- Definitions of each category of likelihood;
- Definitions for each category of consequence;
- An assessment of the likelihood of the event occurring, based on historical trends and predictive models;
- Describe proposed reasonable and feasible mitigation to prevent accidents and malfunctions, to minimize consequences and likelihood of accidents and malfunctions, including environmental management planning, emergency preparedness and response, and spill prevention and response.
- Assessment of consequence and likelihood of the event, in a manner consistent with the direct effects assessment, and
- Conclusions on the potential risk (likelihood multiplied by consequence) of the accident or malfunction.

8. EFFECTS OF THE ENVIRONMENT ON THE PROJECT

The EEE will include:

- The environmental factors deemed to have possible consequences on the proposed project, including, but not necessarily limited to, consideration of natural hazards such as:
  - Extreme weather (Heavy rains, snowfall, wind);
  - Seismic event;
  - Forest Fire; and
  - Climate change.
- A description of changes or effects on the proposed Project that may be caused by the above-mentioned environmental factors;
- Practical mitigation measures, including design strategies and environmental contingency plans, to avoid or minimize the likelihood and consequence of the effects of the environment on the proposed Project; and
- A conclusion about the potential risk of an effect of the environment on the proposed Project and to relevant VCs.

9. PUBLIC CONSULTATION

The EEE will include a report on the results of implementation of the approved Public Consultation Plan including:

- Background information:
  - Identification of local governments, residents, property owners, and other rights holders who are potentially impacted by the proposed Project;
  - Maps of local government boundaries, private land, tenures/authorizations, or residences with respect to the proposed Project; and
  - Background information about each potentially affected municipality and/or stakeholder group.
- Public Consultation:
  - A summary of the past and planned consultation activities;
  - A summary of proposed changes to the approved Public Consultation Plan as a result of feedback from local governments, stakeholders or individuals, or experience from consultation to date; and
  - A description of the key issues raised by the public that are relevant to the EA, the responses to those issues, and the status of their resolution.
- Summary Table:
  - Identification of concerns raised by the public and the measures to avoid, reduce or mitigate those impacts. This information will be provided in the form of a table.

10. MANAGEMENT PLANS

The EEE will include a list of Management Plans for the phases of the proposed Project including, but not limited to:

- Construction Environmental Management Plan, including subcomponent plans such as:
  - Sediment and Erosion Control Plan;
  - Spill Prevention and Emergency Response Plan; and
  - Water Management Plan.
  - Construction Waste Management Plan;
  - Air Quality, Noxious Weed Control, and Dust Control Plan;
  - Health And Safety Plan;
  - Archaeological Management Plan;
  - Wildlife Management Plan;
  - Riparian and Sensitive Sites Management Plan (inclusive of Wetland Habitat Compensation Plan);
  - Environmental Monitoring Plan; and
  - Site Restoration Plan.
- Operational Environmental Management Plan.

A comprehensive description of the contents of each Management Plan, including the identification of mitigation measures described in previous sections will be included within the plans.

11. MONITORING AND FOLLOW-UP PROGRAMS

Where a residual adverse effect and/or cumulative effect has been identified for a specific VC, the EEE will include a description of a follow-up strategy, where appropriate, that:

- Identifies the measures to evaluate the accuracy of the original effects prediction;
- Identifies the measures to evaluate the effectiveness of proposed mitigation measures; and
- Proposes an appropriate strategy to apply in the event that original predictions of effects and mitigation effectiveness are not as expected. This includes reference to further mitigation, involvement of key stakeholders, Aboriginal groups, government agencies and any other measures deemed necessary to manage the issue.

12. CONCLUSIONS

The EEE will:

- Provide Vopak's conclusions regarding the potential for significant adverse environmental effects;
- Acknowledge the need to successfully complete permitting/authorization processes prior to proceeding with proposed project construction, operation, and decommissioning; and
- Summary tables including:
  - previously identified residual effects, including cumulative effects; and
  - proposed mitigations measures.

13. REFERENCES

The EEE will include all references cited in the document.

TOR Reference List

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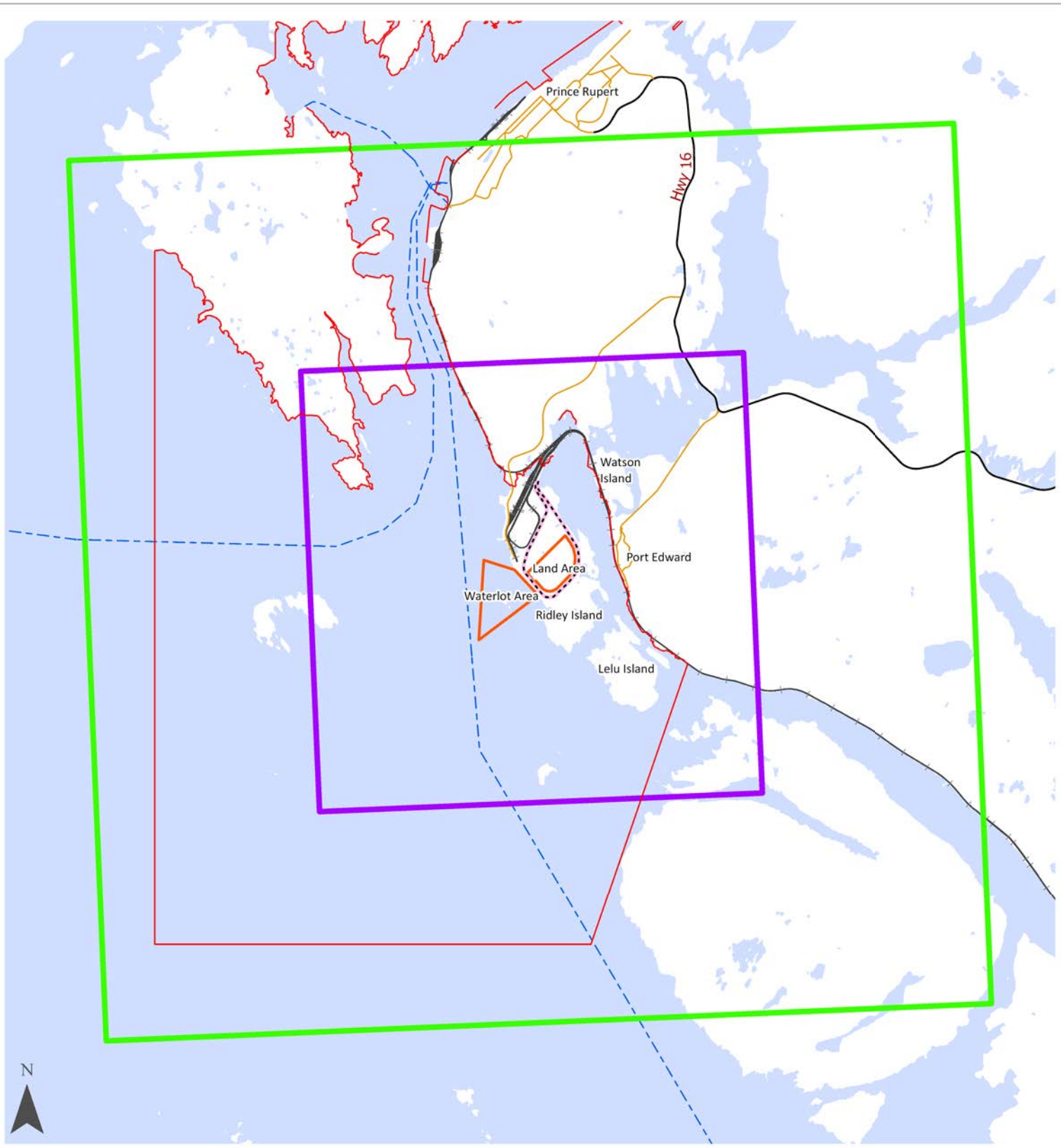
Appendices

The EEE will include appendices, including those appendices referenced in the EEE as well as information prepared by professionals and provided under their professional seal will be identified in the EEE and the related sealed studies will be included in an Appendix.

Appendix
VC Assessment Spatial Boundary Maps

Order of Appearance:

- Air Quality / GHG
- Noise
- Visual – including Ambient Light
- Marine Resources
- Soils and Terrain
- Terrestrial Resources
- Freshwater Fish and Fish Habitat
- Marine Use and Navigation
- Socio-Economic Conditions
- Archaeology
- Human Health



PRPA Jurisdiction
PRPA Road, Rail, Utility Corridor (RRUC)
Highways
Major Streets
Ferry/Water Routes
Railway
Air Quality Local Study Area
Air Quality Regional Study Area
Area of Interest
Ocean

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

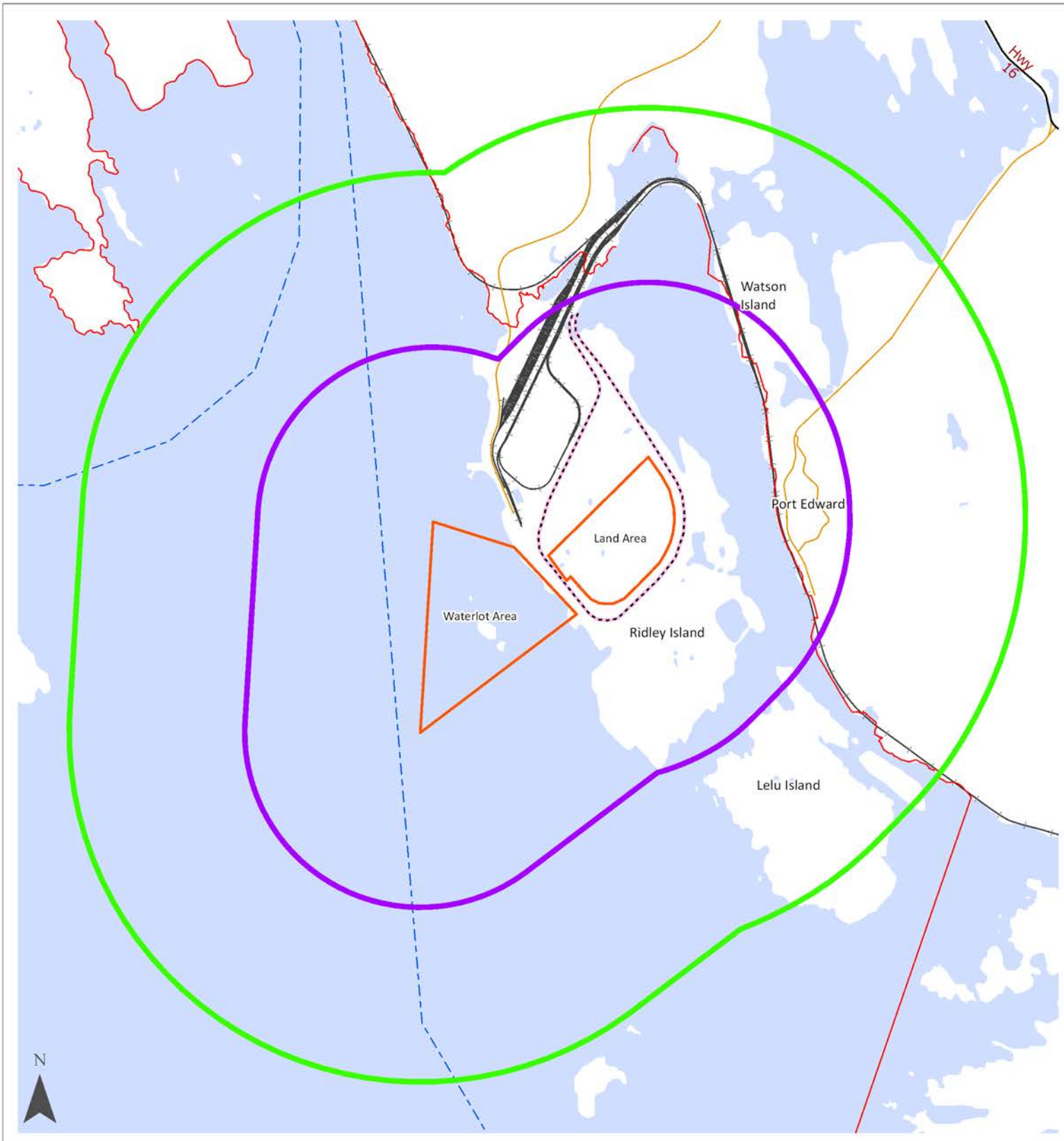
SNC·LAVALIN

Air Quality Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/08/01
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:120,000	Reference No: 655902-MD-4

0 1,250 2,500 5,000 7,500 10,000 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\653334 Desktop Study\4.0 Execution\4.5 GIS and Drawings\GIS\Map Documents\PRO\Project_Default_Pro.aprx



PRPA Jurisdiction
PRPA Road, Rail, Utility Corridor (RRUC)
Highways
Major Streets
Ferry/Water Routes
Railway
Noise Local Study Area
Noise Regional Study Area
Area of Interest
Ocean

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

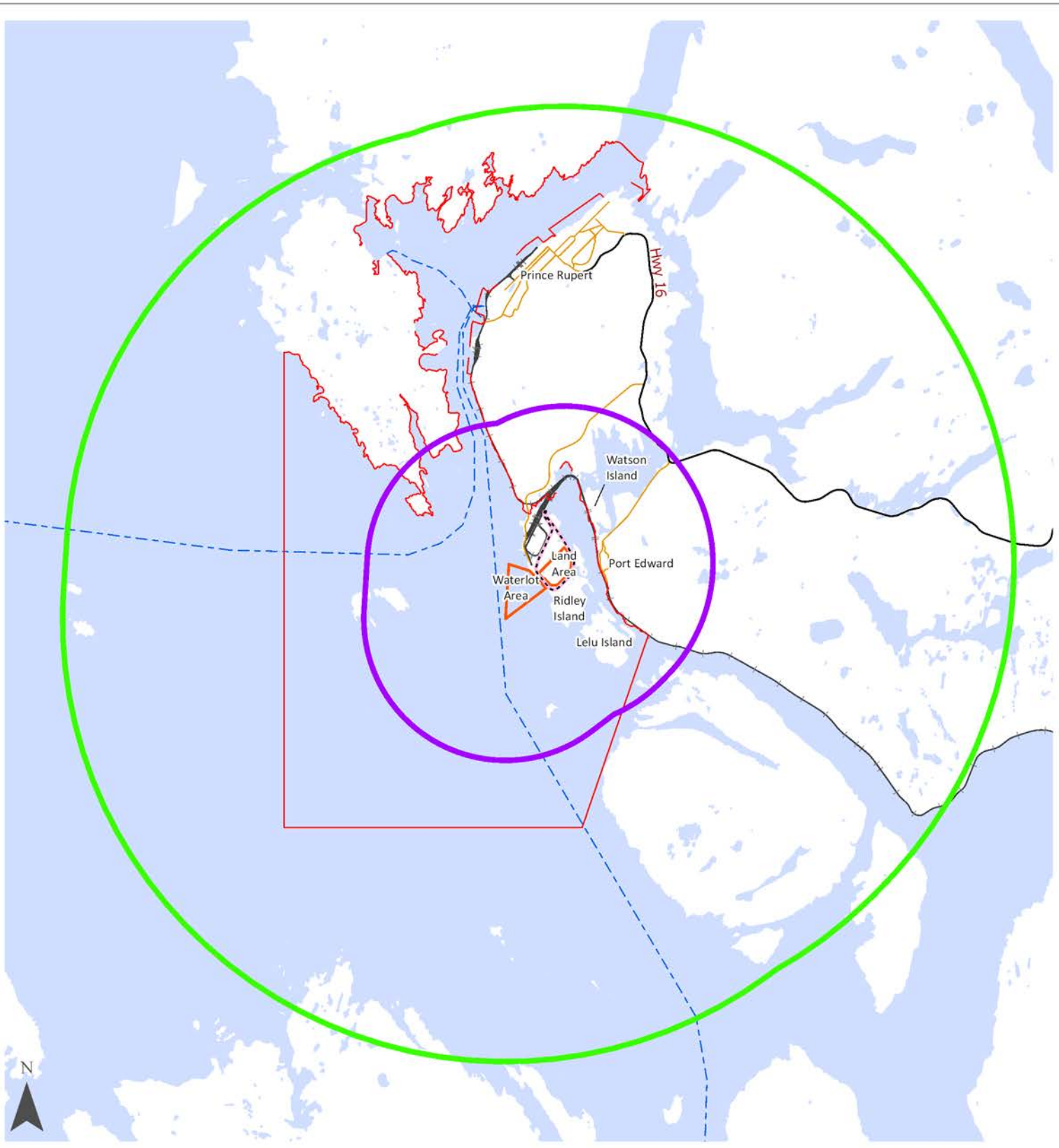
SNC·LAVALIN

Noise Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/07/31
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:45,000	Reference No: 655902-MD-8

0 500 1,000 2,000 3,000 4,000 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\656431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\656431_Pro_2.aprx



PRPA Jurisdiction

PRPA Road, Rail, Utility Corridor (RRUC)

Highways

Major Streets

Ferry/Water Routes

Railway

Ambient Light/ Visual Quality Local Study Area

Ambient Light/ Visual Quality Regional Study Area

Area of Interest

Ocean

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

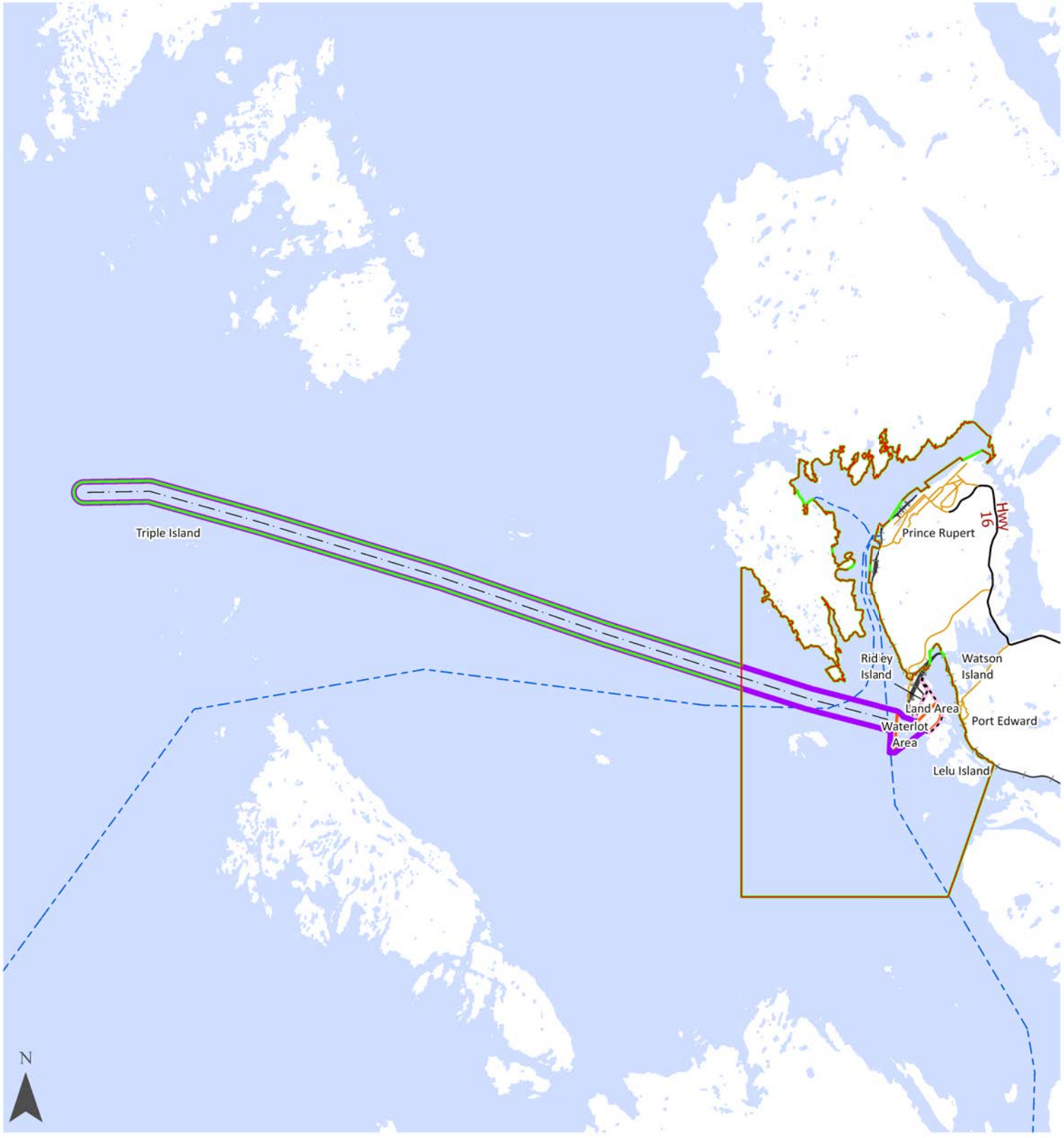
SNC·LAVALIN

Ambient Light/Visual Quality Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/07/31
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:175,000	Reference No: 655902-MD-5

0 2,000 4,000 8,000 12,000 16,000 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\656431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\656431_Pro_2.aprx



PRPA Jurisdiction
Marine Access Route
PRPA Road, Rail, Utility Corridor (RRUC)
Highways
Major Streets
Ferry/Water Routes
Railway
Marine Resources Local and Regional Study Area
Marine Resources Regional Study Area
Area of Interest
Ocean

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

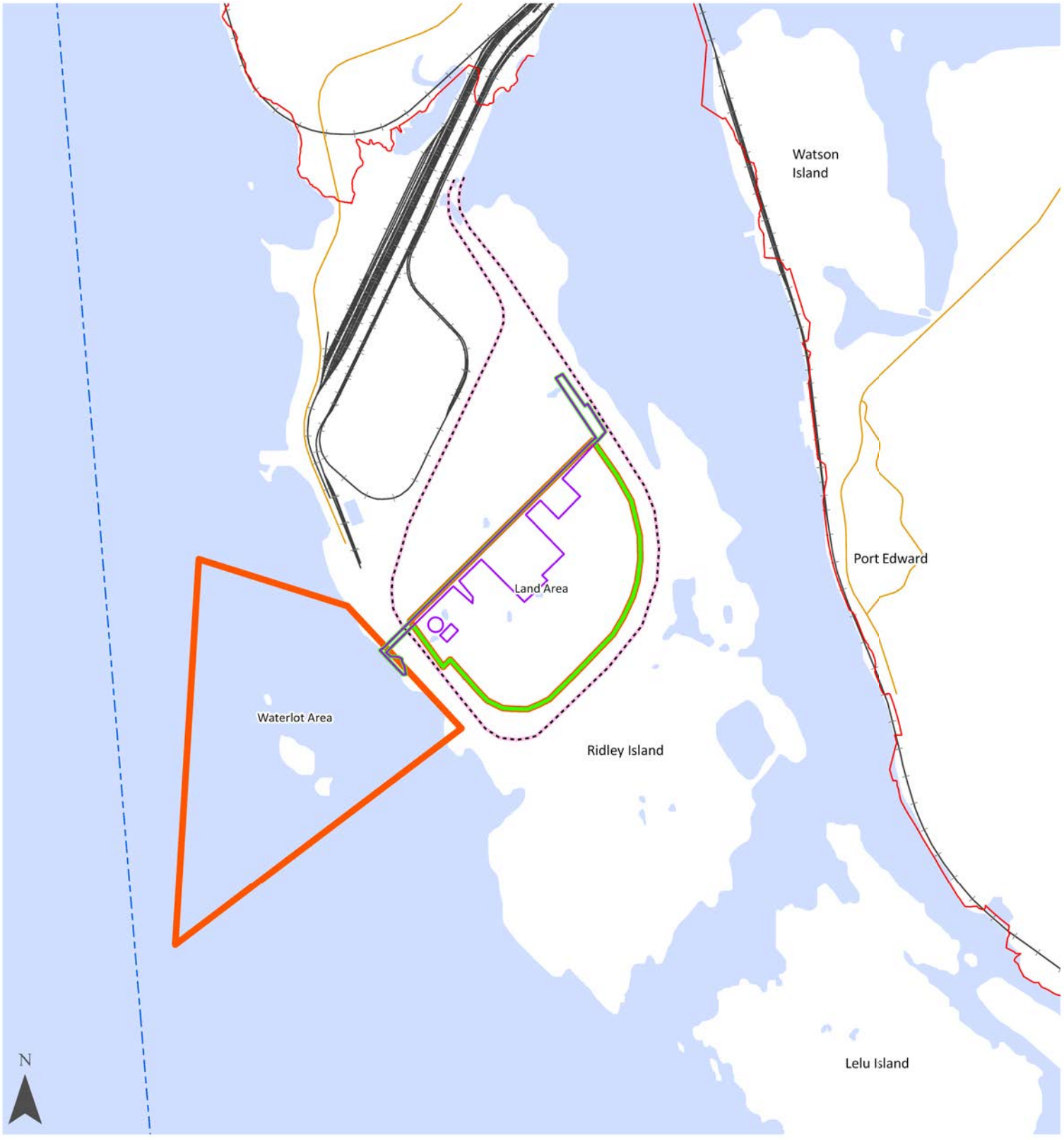
SNC·LAVALIN

Marine Resources Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/08/21
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:254,310	Reference No: 655902-MD-7

0 2,500 5,000 10,000 15,000 20,000 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\656431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\656431_Pro_2.aprx



PRPA Jurisdiction
PRPA Road, Rail, Utility Corridor (RRUC)
Highways
Major Streets
Ferry/Water Routes
Railway
Terrain and Soils Local Study Area
Terrain and Soils Regional Study Area
Area of Interest
Ocean

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

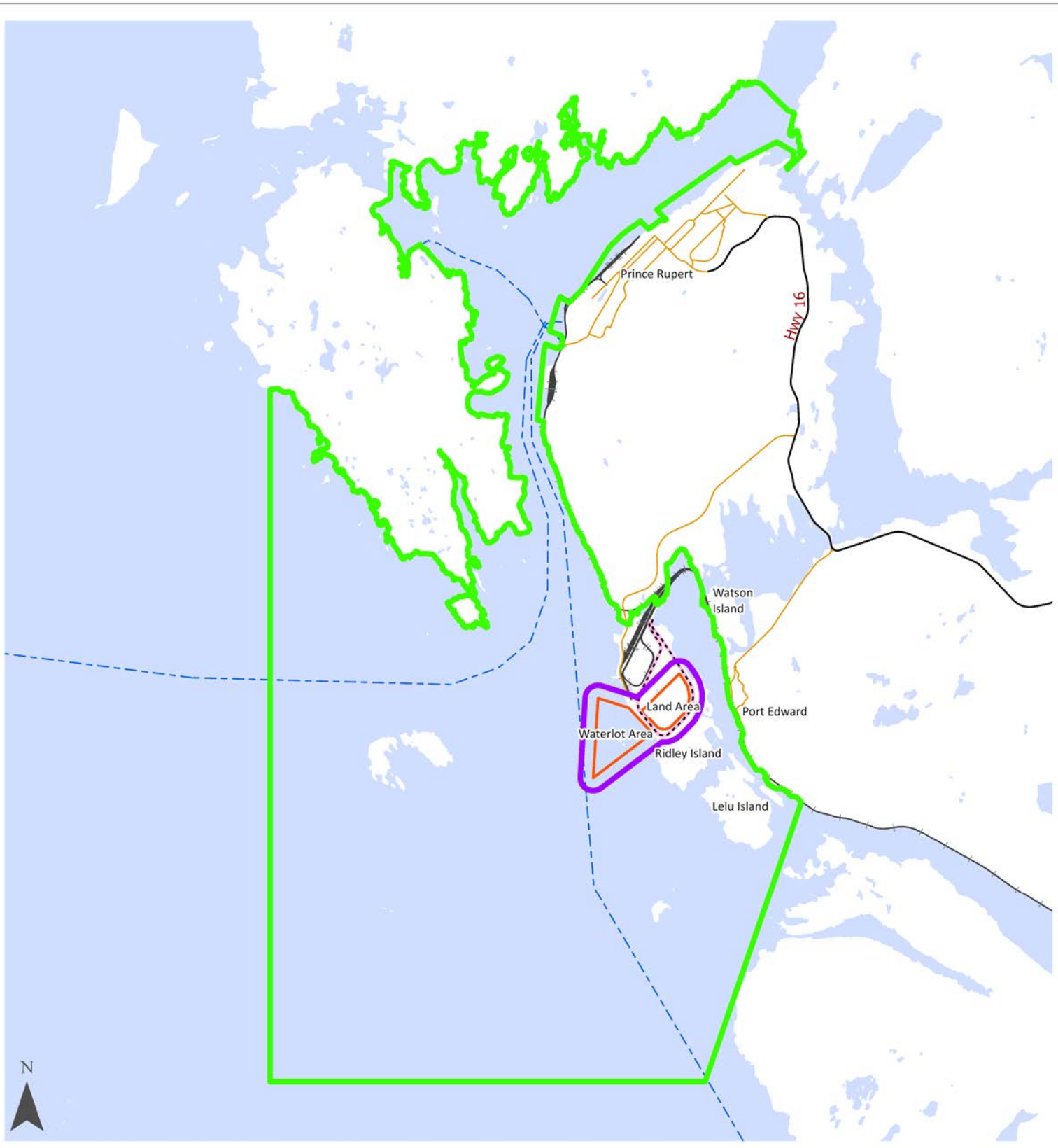
SNC·LAVALIN

Terrain and Soils Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/08/01
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:25,000	Reference No: 655902-MD-10

0 287.5 575 1,150 1,725 2,300 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\656431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\656431_Pro_2.aprx



PRPA Jurisdiction
PRPA Road, Rail, Utility Corridor (RRUC)
Highways
Major Streets
Ferry/Water Routes
Railway
Area of Interest
Ocean
Terrestrial Local Study Area
Terrestrial Regional Study Area

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

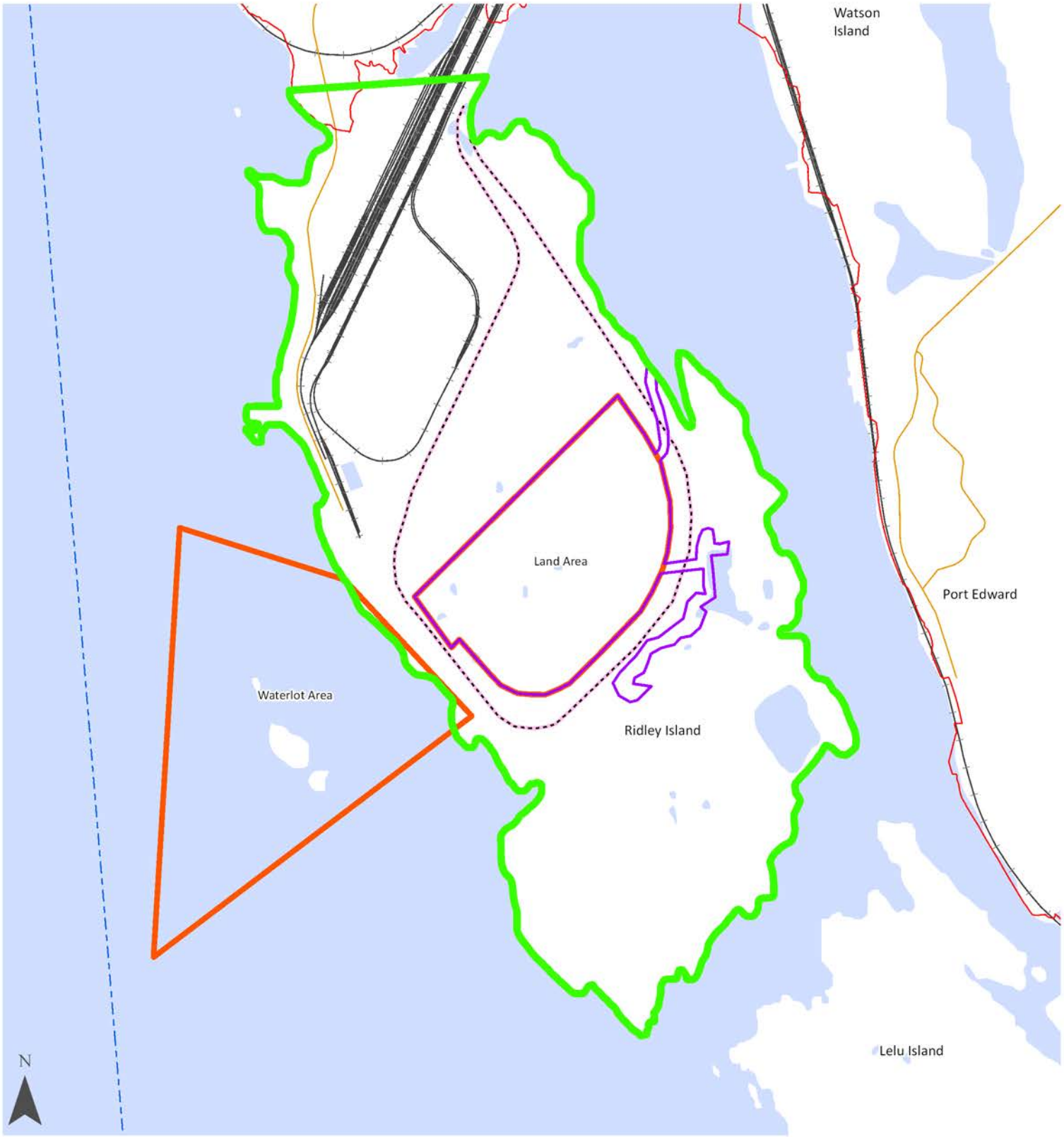
SNC·LAVALIN

Terrestrial Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/08/01
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:120,000	Reference No: 655902-MD-1

0 1,250 2,500 5,000 7,500 10,000 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\653334 Desktop Study\4.0 Execution\4.5 GIS and Drawings\GIS\Map Documents\PRO\Project_Default_Pro.aprx



PRPA Jurisdiction

PRPA Road, Rail, Utility Corridor (RRUC)

Major Streets

Ferry/Water Routes

Railway

Freshwater Fish and Fish Habitat Local Study Area

Freshwater Fish and Fish Habitat Regional Study Area

Area of Interest

Ocean

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

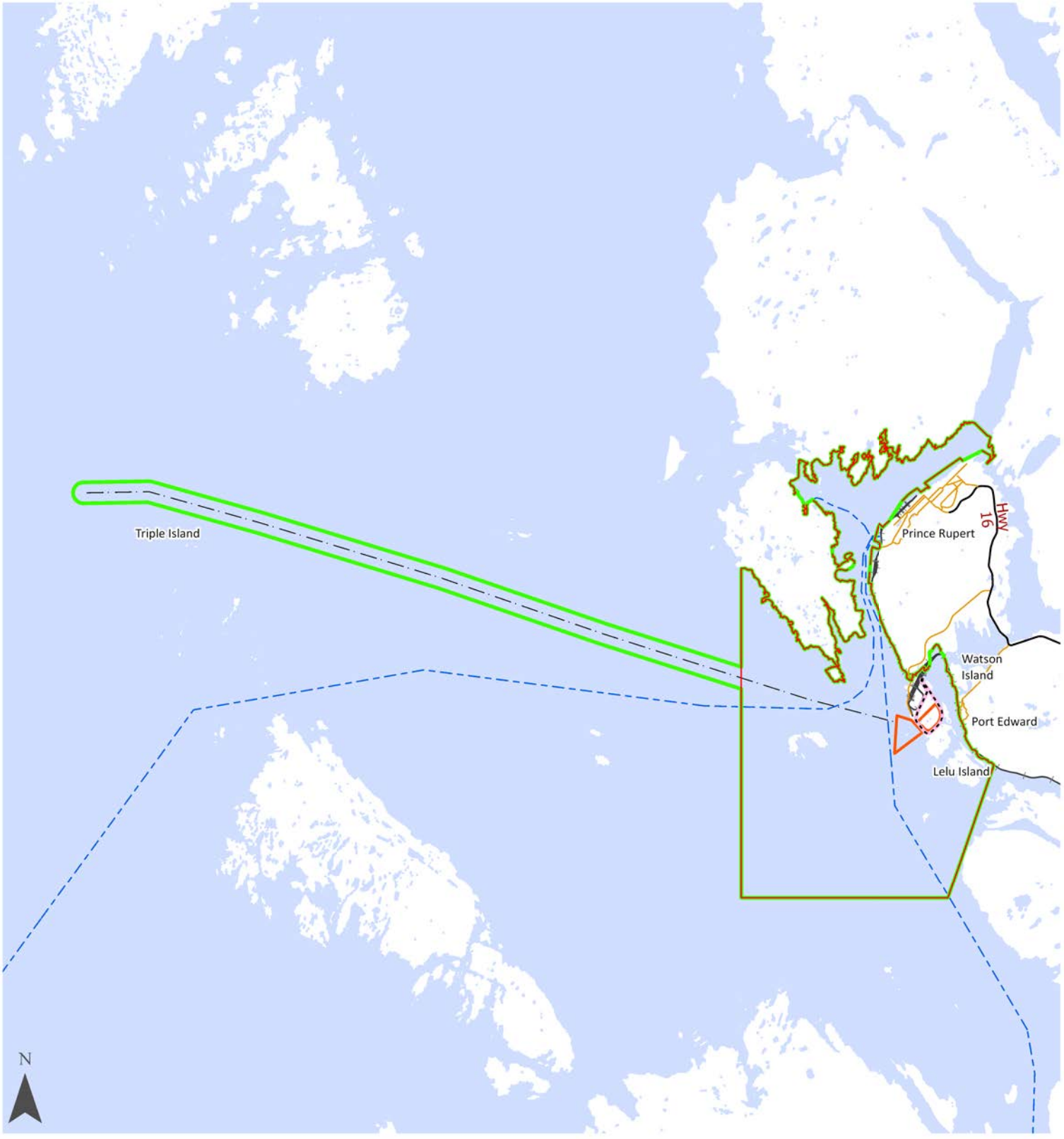
SNC·LAVALIN

Freshwater Fish and Fish Habitat Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/07/31
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:22,475	Reference No: 655902-MD-2

0 260 520 1,040 1,560 2,080 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\656431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\656431_Pro_2.aprx



PRPA Jurisdiction

Marine Access Route

PRPA Road, Rail, Utility Corridor (RRUC)

Highways

Major Streets

Ferry/Water Routes

Railway

Marine Use and Navigation Local and Regional Study Area*

Area of Interest

Ocean

* Local and Regional Study Area are identical

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

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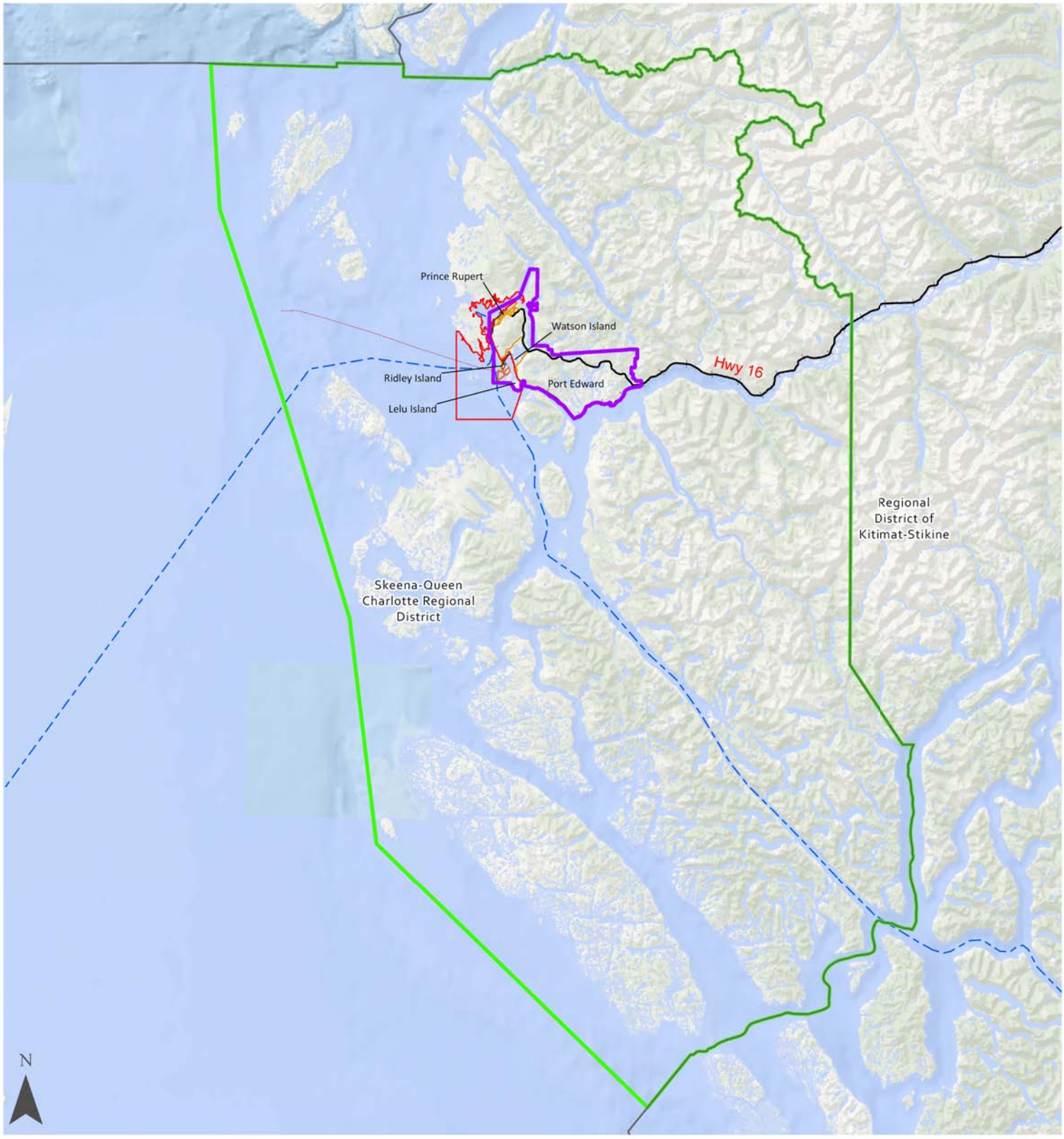
Marine Use and Navigation Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/08/21
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:254,310	Reference No: 655902-MD-12

0 2.75 5.5 11 16.5 22 Kilometers

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\656431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\656431_Pro_2.aprx



PRPA Jurisdiction
PRPA Road, Rail, Utility Corridor (RRUC)
Highways
Major Streets
Ferry/Water Routes
Railway
Economic Conditions Local and Regional Study Area*
Infrastructure and Services Local and Regional Study Area*
Area of Interest
Regional District Boundaries
Ocean

* Local and Regional Study Area are identical

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

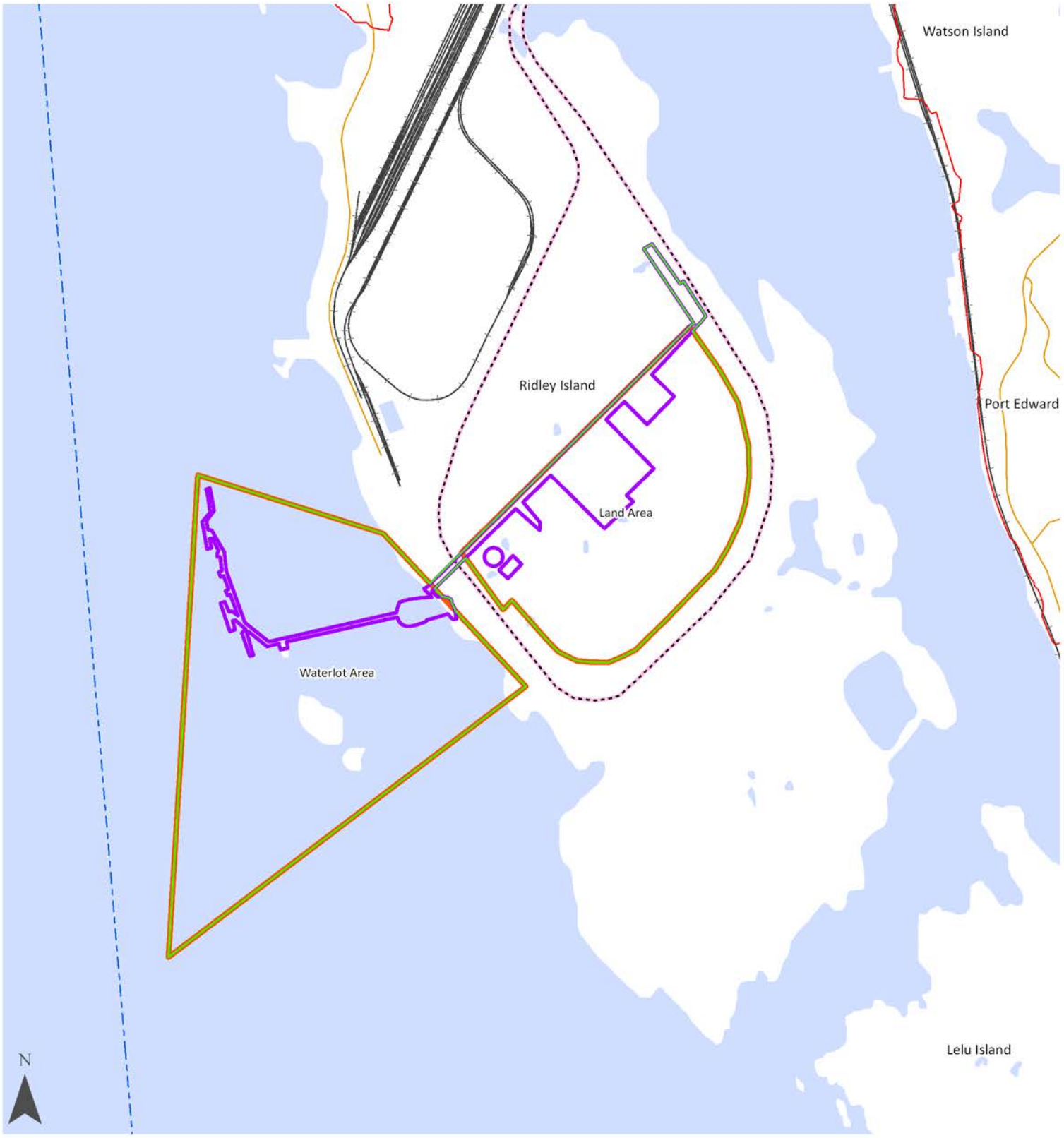
SNC·LAVALIN

Economic Conditions, Infrastructure and Services Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/08/21
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:950,000	Reference No: 655902-MD-9

0 10 20 40 60 80 Kilometers

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\656431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\656431_Pro_2.aprx



PRPA Jurisdiction
PRPA Road, Rail, Utility Corridor (RRUC)
Highways
Major Streets
Ferry/Water Routes
Railway
Archaeology Local Study Area
Archaeology Regional Study Area
Area of Interest
Ocean

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

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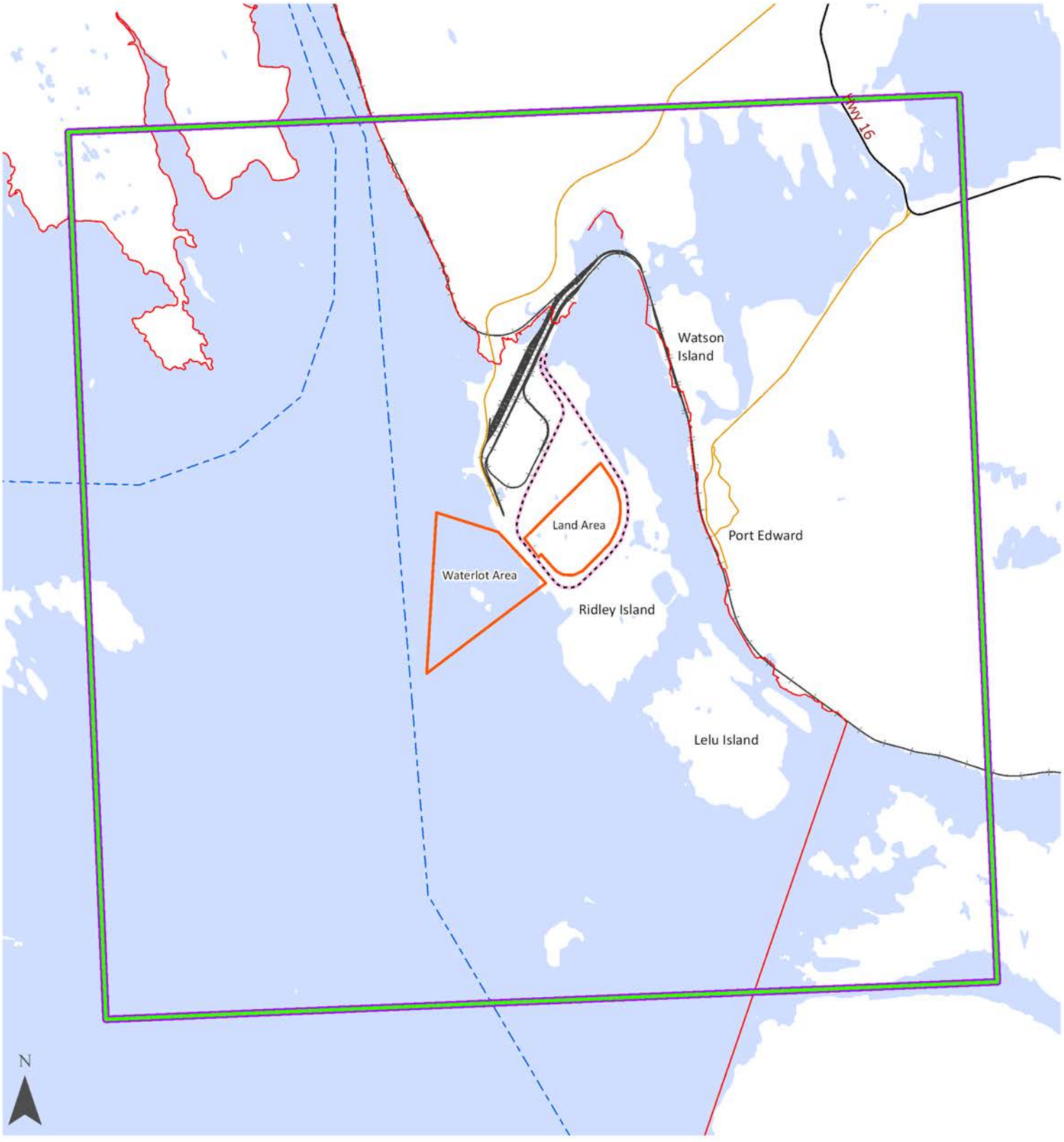
Archaeology Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/07/31
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:20,000	Reference No: 655902-MD-11

0 230 460 920 1,380 1,840 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\655431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\655431_Pro_2.aprx



PRPA Jurisdiction
PRPA Road, Rail, Utility Corridor (RRUC)
Highways
Major Streets
Ferry/Water Routes
Railway
Human Health Local Study Area*
Human Health Regional Study Area*
Area of Interest
Ocean

* Local and Regional Study Area are identical

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

SNC·LAVALIN

Human Health Local and Regional Study Areas

Created by: ECH	Checked by: MB/EM	Date: 2018/07/31
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:60,000	Reference No: 655902-MD-6

0 500 1,000 2,000 3,000 4,000 Meters

MXD Path: \\Sli2606\projects\Current Projects\Vopak Development\655431 Env Assmt\40_Execution\45_GIS_Dwgs\GIS\655431_Pro_2.aprx