

DRAFT Amendment Application Information Requirements

*Expansion of Kitimat LNG Terminal Project
(E06-01 Amendment #3)*

Proposed by:
KM LNG Operating General Partnership

Rev 1.0 – October 7, 2019

Pursuant to the Environmental Assessment Act, S.B.C. 2002, c.43



VERSION CONTROL

Rev	Date	Description
Rev 0.0	September 6, 2019	DRAFT to Owner's Team for internal review and discussion.
Rev 0.1	September 19, 2019	Revisions to address Owner's Team comments.
Rev 0.2	October 3, 2019	Revisions to address EAO comments.
Rev 1.0	October 7, 2019	Revisions to address further EAO comments.

PREFACE TO THE AMENDMENT APPLICATION INFORMATION REQUIREMENTS

On behalf of KM LNG Operating General Partnership (KM LNG) (the Holder), Chevron has applied in writing for an amendment to Environmental Assessment Certificate E06-01 (EAC E06-01) pursuant to section 19(1) of the British Columbia *Environmental Assessment Act*, S.B.C. 2002, c. 43 (BCEAA). The BC Environmental Assessment Office (EAO) has accepted that amendment request for review under BCEAA.

The Amendment Application Information Requirements specifies the information that the Holder is required to provide in support of its section 19(1) application to amend EAC E06-01 in order to expand the Kitimat LNG Terminal Project (the Amendment Application).

The Holder is proposing to expand the Kitimat LNG Terminal Project, as described in the Project Description [\[Link\]](#) and as shown in Figures A1, Figure A2, and Figure A3 of Appendix A.

The Kitimat LNG Terminal Project (KLNG Project) has been previously approved to be developed, operated, and decommissioned at Bish Cove within the District of Kitimat, BC., and on Haisla Nation reserve land. In 2005 and 2006, the KLNG Project was subject to a Harmonized Federal-Provincial Environmental Assessment (EA) Review, resulting in the preparation of a Joint Assessment Report/Comprehensive Study Report. The EA review concluded the proposed KLNG Project was not likely to result in significant adverse effects. Provincial Environmental Assessment Certificate (EAC) E06-01 was issued on June 1, 2006 under BCEAA to Kitimat LNG Inc. (the former Proponent/Holder) for the KLNG Project. The KLNG Project includes a liquefied natural gas (LNG) plant, marine terminal, power line, connecting natural gas pipeline, condensate return pipeline, access road, and the use of existing shipping routes in BC coastal waters. The KLNG Project includes the production, storage, and loading of LNG for marine transportation to overseas markets.

Two amendments to EAC E06-01 have been previously issued by the EAO for the KLNG Project:

- **Amendment #1** – Issued January 9, 2009 to include either natural gas “regasification or liquefaction” processing facilities, allowing for either import or export of LNG.
- **Amendment #2** – Issued March 24, 2010 to reflect KM LNG as the name of the new Holder of the EAC.

On September 8, 2015, the EAO determined that the KLNG Project had been substantially started. As a result, EAC E06-01 remains in effect for the life of the KLNG Project, subject to the Minister of Environment and Climate Change Strategy’s (the Minister) power to cancel and suspend an EAC due to non-compliance.

KM LNG remains the current Holder of EAC E06-01. Chevron Canada Limited (Chevron) and KM LNG are co-venturers in the development of the KLNG Project.

On July 8, 2019, Chevron, on behalf of KM LNG, applied in writing for an amendment to EAC E06-01 under section 19(1) of the BCEAA for a number of changes to the Approved KLNG Project design concept that enhance the project's cost, schedule, execution, and operating and environmental performance. EAC 06-01 Amendment #3 will consist of the following phases which together comprise the proposed **KLNG Expansion Project**:

- **KLNG Foundation Project (Compact E-drive Design)** – Optimization of the two (2) LNG Train configuration to use a compact, all-electric drive design with a combined output capacity of 12 MTPA, an optimized marine terminal and reduced LNG storage capacity, and
- **Third LNG Train Expansion** – Potential expansion that includes an additional LNG processing train (three (3) LNG trains with total combined output capacity of 18 MTPA), an LNG storage tank and an additional LNG loading berth on the KLNG Foundation Project site.

On July 11, 2019, EAO accepted Chevron's amendment request for review. A new *Environmental Assessment Act* was passed in November 2018 (EAA 2018), which is expected to come into force sometime in Fall 2019. Consistent with the transitional provision in section 78(9) of the pending EAA 2018, the EAO confirms that the assessment of Chevron's requested amendment will proceed under the BCEAA, S.B.C. 2002, c. 43.

Also on July 11, 2019 the EAO advised that it had made a request to the Canadian Environmental Assessment Agency (CEA Agency) to substitute the provincial environmental assessment process under BCEAA for the federal assessment under CEAA 2012. On August 20, 2019 the Minister of Environment and Climate Change Canada approved the substitution request with conditions. The EAO will conduct a single assessment that the federal and provincial governments would rely upon to make separate EA decisions.

Canadian Environmental Assessment Act 2012 (CEAA 2012) Applicability

The KLNG Project also received a federal EA decision under the *Canadian Environmental Assessment Act*, S.C. 1992, c. 37 (former CEAA) on August 1, 2006 (CEAR# 05-03-10430). Following this decision, the CEA Agency (IAAC, now Impact Assessment Agency of Canada) referred the KLNG Project to the responsible authorities (*i.e.*, Transport Canada, Environment Canada (ECCC, now Environment and Climate Change Canada) and Indigenous and Northern Affairs Canada (INAC, now Crown-Indigenous Relations and Northern Affairs Canada) for appropriate action under section 7 of the former CEAA. Transport Canada, ECCC and INAC issued their course of action decisions on the KLNG Project on January 25, 2007. In addition, Fisheries and Oceans Canada (DFO) issued a positive EA decision on the KLNG Project on March 20, 2008, as a result of a screening under the former CEAA.

In November 2010, the Haisla Nation voted to approve the lease of Bees IR No. 6 for the KLNG Project. A two (2) LNG Train 10 MTPA facility was being contemplated at that time. No additional lands, new infrastructure or additional federal approvals were determined to be required for the increase in production capacity to 10 MTPA; therefore, no additional federal EA was required at that time. Federal approvals acquired during this period included:

- Timber Permit from INAC for clearing of the facility site on April 8, 2011.

- Non-Metallic Minerals Approval from INAC for removal of material from Bees IR No. 6, on March 16, 2012.
- *Navigable Waters Protection Act* approvals from Transport Canada for construction related infrastructure, including the access road bridge over Bish Creek, barge landing facilities, and a site access jetty between July 2011 and January 2012.
- A 20-year export license from the National Energy Board (NEB, now Canadian Energy Regulator) to serve international markets from a 10 MTPA facility on November 14, 2011.
- *Fisheries Act* authorization from DFO for impacts to fish habitats associated with the KLNG Project (marine, facility, access road and interconnecting infrastructure) on December 1, 2011.

CEAA 2012 came into force on July 6, 2012. On March 15, 2013, KM LNG requested confirmation from the CEA Agency that the planned two (2) LNG Train 10 MTPA facility would not require further review under CEAA 2012. On April 19, 2013, the CEA Agency advised that, pursuant to the Section 128 (Non-application of this Act) transitional provisions of CEAA 2012, the planned 10 MTPA capacity did not require further review.

On June 24, 2019, the CEA Agency advised that the proposed KLNG Expansion Project from 10 MTPA to 18 MTPA would constitute a designated activity under section 15(d) of the Regulations Designating Physical Activities as “an expansion of a facility for the liquefaction, storage or regasification of liquefied natural gas that would result in an increase in the LNG processing or storage capacity of 50% or more and a total LNG processing capacity of 3 000 t/day or more or a total LNG storage capacity of 55 000 t or more”. On July 8, 2019, KM LNG submitted a Project Description for the proposed KLNG Expansion Project to the CEA Agency for screening under CEAA 2012 to determine whether a federal EA was required.

On August 20, 2019, following a 20-day public comment period on the Project Description, the CEA Agency decided that a federal review of the proposed KLNG Expansion Project was required and issued a Notice of Commencement of an EA under CEAA 2012. Also on August 20, 2019, the federal Minister of ECCC granted substitution of the federal EA to British Columbia (B.C.) in accordance with the Memorandum of Understanding between the CEA Agency and the EAO on the Substitution of Environmental Assessments (2013) (the Memorandum of Understanding). The federal Minister approved the substitution request given that BC has committed to meeting the following conditions:

- The designated project to be assessed is the expansion of an LNG and marine export facility and any incidental physical activities proposed by KM LNG;
- The substituted EA will include a consideration of the factors set out in subsection 19(1) of CEAA 2012;
- B.C. will ensure that any relevant Orders or procedural letters under BCEAA require the subsection 19(1) factors of CEAA 2012;
- The public will be given an opportunity to participate in the EA;
- The public will have access to records in relation to the EA to enable their meaningful participation;
- At the end of the EA, B.C. will submit a report to the CEA Agency that includes the findings and conclusions of the EA with respect to the factors as set out in subsection 19(1) of CEAA 2012; and

- The report will be made available to the public.

The Minister also established the following additional conditions:

- B.C. will include an assessment of the potential environmental effects of marine shipping activities associated with the Project, including potential effects of malfunctions or accidents and any potential cumulative environmental effects, the significance of those effects, suggested mitigation measures and requirements of any follow-up program that may be warranted;
- B.C. will involve expert federal authorities in the B.C. EA process;
- B.C. will provide an Assessment Report to the CEA Agency within a time frame to enable the Minister to make decisions under subsection 52(1) of CEAA 2012 within the time limits set out in CEAA 2012;
- B.C. will conduct procedural aspects of Indigenous consultation in accordance with the process set out in the Memorandum of Understanding; and
- B.C. will make available to Indigenous groups funding provided by the CEA Agency to support Indigenous consultation during the substituted EA.

The EA will focus on the expansion of the Approved KLNG Project (*i.e.*, the Kitimat LNG Project certified under EAC E06-01 last amended March 24, 2010), potential incremental changes and associated adverse effects. Interactions associated with the Approved KLNG Project concept that are not affected by the proposed KLNG Expansion Project will not be re-evaluated.

List of Reviewing Agencies

The following government agencies, municipal and regional agencies, Indigenous Groups and the public will have the opportunity to review and comment on the draft Amendment Application Information Requirements:

Provincial Agencies:

- BC Oil and Gas Commission (OGC)
- Climate Action Secretariat (CAS)
- Ministry of Environment and Climate Change Strategy (ENV)
- Ministry of Energy, Mines and Petroleum Resources (MEMPR)
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)
- Ministry of Jobs, Trade and Technology
- Ministry of Transportation and Infrastructure
- Ministry of Municipal Affairs and Housing
- Northern Health

Federal Agencies:

- Impact Assessment Agency of Canada (IAAC, formerly CEA Agency)

- Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)
- Environment and Climate Change Canada (ECCC)
- Fisheries and Oceans Canada (DFO)
- Health Canada (HC)
- Transport Canada (TC)
- Natural Resources Canada (NRC)

Municipal and Regional Agencies:

- District of Kitimat
- City of Terrace
- Kitimat-Stikine Regional District

Indigenous Groups:

- Gitga'at First Nation
- Gitxaala Nation
- Haisla Nation
- Kitselas First Nation
- Kitsumkalum First Nation
- Lax Kw'alaams Band
- Métis Nation BC
- Metlakatla First Nation

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TABLE OF CONCORDANCE

A Table of Concordance will be included in the Amendment Application. The Table of Concordance will demonstrate where the information required to support an application to amend EAC E06-01 are found in the Amendment Application submitted, with volume, section, and page references and following the format of Table 1.

Table 1: Table of Concordance between the Amendment Application Information Requirements and the Amendment Application

Amendment Application Information Requirements Section and Page No.	Amendment Application Information Requirements Title	Amendment Application Information Requirements Section Language	Amendment Application Section Title	Amendment Application Volume Section, Sub-Section, Page Number	Relevant Appendix

ABBREVIATIONS AND ACRONYMS

Approved KLNG Project	Kitimat LNG Terminal Project certified under EAC E06-01 last amended March 24, 2010.
B.C.	British Columbia
BCEAA or Act	British Columbia <i>Environmental Assessment Act</i> , S.B.C. 2002, c. 43
Bcfd	Billion cubic feet per day
BCMCA	BC Marine Conservation Analysis
BEC	Biogeoclimatic Ecosystem Classification
BPD	Barrels per day
BC Hydro	BC Hydro and Power Authority
CEAA	<i>Canadian Environmental Assessment Act</i> , S.C. 1992, c. 37
CEAA 2012	<i>Canadian Environmental Assessment Act</i> , S.C. 2012, c. 19
CEA Agency	Canadian Environmental Assessment Agency (now the Impact Assessment Agency of Canada)
CEA Area	Cumulative Effects Assessment Area
Chevron	Chevron Canada Limited
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CMT	Culturally modified tree
CWH	Coastal Western Hemlock
DAS	Disposal at Sea
DFO	Fisheries and Oceans Canada
DMP	Decommissioning Management Plan
DMR	Dual Mixed Refrigerant
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAC E06-01	Environmental Assessment (EA) Certificate E06-01
EAO	British Columbia Environmental Assessment Office
ECCC	Environment and Climate Change Canada
ENV (formerly MOE)	British Columbia Ministry of Environment and Climate Change Strategy (formerly Ministry of Environment (MOE))
FEED	Front End Engineering Design
FID	Final investment decision

FLNRORD	British Columbia Ministry of Forests, Lands and Natural Resource Operations and Rural Development (formerly Ministry of Forests, Lands and Natural Resource Operations (FLNRO))
FNLP	First Nations Limited Partnership
FRPA	<i>Forest and Ranch Practices Act</i>
FSC	Food, Social, and Ceremonial
ha	hectares
HC	Hydrocarbon
HCA	<i>Heritage Conservation Act</i>
HES	Health, Environment, Safety
HNS	Hazardous and Noxious Substances
Holder	KM LNG Operating General Partnership, the holder of EAC E06-01
IAAC	Impact Assessment Agency of Canada (IAAC, formerly CEA Agency)
INAC	Indigenous and Northern Affairs Canada (now Crown-Indigenous Relations and Northern Affairs Canada)
IMO	International Maritime Organization
ISBL	Inside Battery Limits
KLNG Expansion Project	Kitimat LNG Expansion Project
KLNG Foundation Project	Kitimat LNG Foundation Project (Compact E-drive Design)
KLNG Project	Kitimat LNG Terminal Project
km	Kilometer
KM LNG	KM LNG Operating General Partnership
LAA	Local Assessment Area
LBW	Land Backed wharf
LNG	Liquefied Natural Gas
m	metre
m ³ /d	cubic metres per day
MEMPR	British Columbia Ministry of Energy Mines, and Petroleum Resources (formerly Ministry of Energy and Mines (MEM))
MMcfd	Million cubic feet per day
MTPA	Million tonnes per annum
NEB	National Energy Board (now the Canadian Energy Regulator)
OGC	British Columbia Oil and Gas Commission

OSBL	Outside Battery Limits
PFMA	Pacific Fisheries Management Areas
PPT	parts per thousand
Pre-FEED	Preliminary Front End Engineering Design (<i>i.e.</i> , concept definition)
PTP	Pacific Trail Pipeline
RAA	Regional Assessment Area
ROW	Right-of-way
SARA	<i>Species at Risk Act</i>
TC	Transport Canada
TERMPOL	Technical Review Process of Marine Terminal Systems and Transshipment Sites
TRP	TERMPOL Review Process
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UWR	Ungulate winter range
VC	Valued Component
WHA	Wildlife habitat area
Woodside	Woodside Energy International (Canada) Limited

AMENDMENT APPLICATION SUMMARY

The Amendment Application will include a summary, including the following:

- A summary of the proposed KLNG Expansion Project including the project scope, project benefits and applicable permits.
- A brief overview of the assessment process including project reviewability, and the procedural review steps of the EA;
- A brief overview of consultation approaches with Indigenous groups, the public and government agencies to date;
- A summary of the key issues raised by Indigenous 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; and
- Holder's conclusions regarding the potential for significant adverse effects on Valued Components.

Amendment Application Information Requirements

Part A - Introduction

PART A - INTRODUCTION

1.0 OVERVIEW OF PROPOSED PROJECT DESCRIPTION

A description of the Holder is included in the Project Description at this [Link to Project Description](#) on EAO's website.

The Amendment Application will:

- Describe the Holder, including history, type of company or organization, affiliations;
- Provide contact information for the Holder; and
- Include a list of parties involved in the preparation of the Amendment Application, their qualifications, and the section(s) for which they were responsible.

1.1 Description of Proposed KLNG Expansion Project

A description of the proposed KLNG Expansion Project is included in the Project Description at this [Link to Project Description](#) on EAO's website.

The Amendment Application will:

- Describe the purpose of the proposed KLNG Expansion Project from the perspective of the Holder, and identify whether the objectives of the proposed KLNG Expansion Project relate to any broader private or public sector policies, plans, or programs;
- Describe the location of the proposed KLNG Expansion Project and the latitude and longitude coordinates of the site and include maps showing both regional context (identifying nearby communities and geographic features) and the specific location of the proposed KLNG Expansion Project;
- Describe the location of the proposed KLNG Expansion Project relative to Indigenous groups' asserted traditional territories, and/or Treaty Nation territories;
- Describe all phases of the proposed KLNG Expansion Project, including their duration and proposed scheduling;
- Describe all on-site and off-site components associated with the proposed KLNG Expansion Project, with figures;
- Describe the activities associated with the components and phases of the proposed KLNG

Expansion Project, with figures;

- Discuss the relevant history of the proposed KLNG Expansion Project, including exploratory or investigative history;
- Summarize existing and planned land and marine use that overlaps the proposed KLNG Expansion Project components and activities or may be potentially impacted by the changes from the Approved KLNG Project, including:
 - Land ownership [*e.g.*, private land, provincial Crown land, federal land (including Indian Reserves), Aboriginal title];
 - Local government zoning or plans;
 - Tenures (municipal, provincial, federal), licences, permits or other authorizations;
 - Non-tenured current land uses;
 - Current and planned marine use plans;
 - Provincial land use plans (*e.g.*, Land and Resource Management Plans) and provincial land use designations (*e.g.*, Agricultural Land Reserve, Old Growth Management Areas, Forests and Range Practices Act designations) and provincial land use management objectives;
 - Any other development or activities, whether or not directly related to the proposed KLNG Expansion Project;
 - Maps showing location of other uses referenced above in relation to the proposed KLNG Expansion Project; and
 - References to the Amendment Application section that assesses land use and potential overlaps/impacts in more detail.
- Describe the proposed KLNG Expansion Project's economic benefits.
 - Capital construction cost estimates, including:
 - Breakdown of costs (*e.g.*, land, buildings, equipment) associated with the proposed KLNG Expansion Project;
 - Estimated operating costs over the life of the proposed KLNG Expansion 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 (PY) jobs for construction and decommissioning and full-time equivalent (FTE) 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, licence rent, property tax, etc.) and jurisdiction (*e.g.*, local, provincial, federal), for all phases of the proposed KLNG Expansion Project;
- Any benefits the proposed KLNG Expansion Project may have to the five pillars of assessment (Environmental, Economic, Social, Health and Heritage);
- All Canadian dollar estimates will be provided in real dollars, with an explanation of how they are measured (*e.g.*, discount rates); and
- State all assumptions and references for the above information.

1.2 Applicable Authorizations

A list of required federal and provincial authorizations, to the extent that is known at this time, is presented in Table 2 below.

Table 2: Authorization Table

Name of Authorization	Authorizing Agency	Statute	Description Need for Authorization
Federal			
EA Decision	Impact Assessment Agency of Canada	<i>Canadian Environmental Assessment Act 2012</i>	A federal environmental assessment is required for the changes from the 10 MTPA KLNG Project to the proposed KLNG Expansion Project. Substitution of the federal EA has been substituted to B.C.
Export Licence	National Energy Board	<i>National Energy Board Act</i>	To export LNG outside of Canada to international markets; export licences are typically approved for 20-40-year terms, which terms begin upon commencement of exports. Existing 20-year Export Licence for 10 MTPA facility obtained Nov 14, 2011. Export Licence application for 18 MTPA facility for 40 years was submitted April 1, 2019.
<i>Fisheries Act</i> Authorization	Fisheries and Oceans Canada	<i>Fisheries Act</i>	Existing Authorization for impacts to fish habitats associated with all aspects of the 10 MTPA KLNG Project (marine, facility, access road and interconnecting infrastructure) issued December 1, 2011. New <i>Fisheries Act</i> Authorization and habitat offsetting required for the removal of additional fish habitat and the construction of the Land Backed Wharf (LBW) for the Compact E-drive Design. Temporary and permanent docks. Temporary and permanent onshore infrastructure in and around streams.
<i>Navigation Protection Act</i> Approval	Transport Canada	<i>Navigation Protection Act</i>	LNG marine terminal facilities. Offloading docks. Existing approvals for construction related infrastructure, including the access road bridge over Bish Creek, barge landing facilities, and a site access jetty issued between July 2011 and January 2012.

Name of Authorization	Authorizing Agency	Statute	Description Need for Authorization
Certificates of Compliance	Transport Canada	<i>Marine Transportation Security Act</i> and Regulations	Operation of the LNG facility, port, and carriers.
Disposal at Sea Permit	Environment and Climate Change Canada	<i>Canadian Environmental Protection Act</i> and Disposal at Sea Regulation	Marine disposal of dredged material for the Compact E-drive Design as well as materials excavated from the proposed KLNG Expansion Project site to reach required grade.
Explosive Licences and Permits	Natural Resources Canada	<i>Explosives Act</i> and Regulations	Explosive Licence required for factories and magazines. Explosive Permit required for vehicles used for the transportation of explosives.
Provincial			
EAC E06-01 Amendment #3	B.C. Environmental Assessment Office	<i>Environmental Assessment Act 2002</i>	EAC E06-01 amendment required to reflect changes associated with the proposed KLNG Expansion Project.
LNG Facility Permit	B.C. Oil and Gas Commission	<i>Oil and Gas Activities Act and Regulation</i>	Construction and operation of the LNG facility
Crown Licence of Occupation	B.C. Oil and Gas Commission	<i>BC Land Act</i>	Occupation of foreshore area for LNG marine terminal facilities
Waste Discharge Permit	B.C. Oil and Gas Commission	<i>Environmental Management Act</i> <i>Oil and Gas Waste Regulation</i>	Facility air emissions, effluent discharges, and waste disposal
Heritage Inspection and Investigation Permit	B.C. Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, Archaeology Branch	<i>Heritage Conservation Act</i>	Systematic study and data recovery from a project archaeological site
Heritage Site Alteration Permit	B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Archaeology Branch	<i>Heritage Conservation Act</i>	Alteration of project archaeological site
Wildlife Act Permit	B.C. Ministry of Environment, Environmental Stewardship Division	<i>Wildlife Act</i>	Wildlife surveys and sampling of wildlife and their habitat

Name of Authorization	Authorizing Agency	Statute	Description Need for Authorization
Construction Permit for a Potable Water Well	B.C. Ministry of Health, Northern Health Authority	<i>Drinking Water Protection Act</i>	Exploration of a well for domestic water use
Water System Construction Permit	B.C. Ministry of Health, Northern Health Authority	<i>Drinking Water Protection Act</i>	Construction of a potable water system
Drinking Water System Operations Permit	B.C. Ministry of Health, Northern Health Authority	<i>Drinking Water Protection Act</i>	Operation of a potable water system
<i>Water Sustainability Act</i> Approvals/Licences	B.C. Ministry of Forests, Lands, Natural Resource Operations, and Rural Development	<i>Water Sustainability Act</i>	Short-term use of water approval from freshwater streams and lakes for construction purposes For changes in and about a stream including diversions, storage, and use of water Groundwater use.

The Holder does not intend to request concurrent permitting under the Act pursuant to the Concurrent Approval Regulation (BC Reg. 371/2002).

The Amendment Application will:

- List in table format all applicable licenses, permits and/or approvals that are already received or required for the phases of the proposed KLNG Expansion Project, and the associated responsible regulatory body.

1.3 Project Design and/or Alternative Means of Carrying out the Project

The Amendment Application will include:

- An assessment of the alternative means of carrying out the proposed KLNG Expansion Project that are technically and economically feasible;
- The rationale and criteria used to select the proposed means of undertaking the proposed KLNG Expansion Project; and
- The methodology and criteria used in the assessment of alternatives including those environmental effects listed under section 5 of CEAA 2012.

1.4 Alternatives to the Proposed Project

The Amendment Application will include an assessment of the alternatives to the proposed KLNG Expansion Project that were technically and economically feasible.

2.0 ENVIRONMENTAL ASSESSMENT PROCESS

2.1 Provincial EA Process

In 2005 and 2006, the KLNG Project was subject to a Harmonized Federal-Provincial EA Review, resulting in the preparation of a [Joint Assessment Report/Comprehensive Study Report](#). The KLNG Project was reviewed under BCEAA since the proposed marine facilities were on provincial Crown land and would result in a direct physical disturbance of greater than and equal to 2 hectares (ha) of marine coastal foreshore and submerged land. The original EA review concluded the proposed KLNG Project was not likely to result in significant adverse effects.

EAC E06-01 was [issued](#) on June 1, 2006. It was subsequently amended on January 9, 2009 ([Amendment #1](#)) and again on March 24, 2010 ([Amendment #2](#)). On September 8, 2015, the EAO determined that the KLNG Project had been [substantially started](#).

EAC E06-01 Amendment #3 will include a number of changes to the Approved KLNG Project design concept that optimize the project's cost, schedule, execution, and operating and environmental performance. The material changes to the Approved KLNG Project are presented in Table 3 and generally include:

- A change from a 5 MTPA facility to a compact, all-electric drive design configuration of up to three (3) LNG trains with a total combined output capacity of 18 MTPA.
- A change in LNG liquefaction facility from obtaining auxiliary power from gas turbines and diesel generator to an all-electric facility powered from the grid using electric motor driven technology for all process and utility compressors, pumps and fans.
- A change in marine terminal design from LNG loading jetty and separate material offloading facility to an optimized design (land-backed wharf) that includes up to two (2) LNG loading berths and provides material offloading functionality.
- A decrease in LNG storage capacity from two (2) full containment tanks with a combined storage capacity of 420,000 m³ to up to two (2) full containment tanks with a combined storage capacity of up to 390,000 m³.
- Increased marine traffic from 60 LNG carriers per year for the 5 MTPA design to 225-255 LNG carriers per year for the 18 MTPA design.

An overlay comparison of the LNG plant site and marine terminal components of the Approved KLNG Project and the proposed KLNG Expansion Project is presented in Figure 1-2 of the Project Description at this [Link to Project Description](#) on EAO's website (See Appendix A, Figure A4).

The Amendment Application will include:

- A statement that the proposed KLNG Expansion Project is subject to amendment review under section 19 of the Act since a major change to the design and layout of the Approved KLNG Project is being proposed;
- A statement that the Amendment Application has been developed in response to the Amendment Application Information Requirements approved by EAO and complies with relevant instructions provided in the Procedural Letter and any other direction provided by EAO;
- A table documenting applicable milestones, including, but not limited to, issuance of a Procedural Letter, anticipated working group meetings, site tour, any public comment periods or open houses and the issuance of the Amendment Application Information Requirements, including links to documents on EAO's public website;
- A list of the government agencies and Indigenous Groups that participated in the EAC amendment; a summary of their participation; and, a list of the key issues raised by each party and the status of issue resolution;
- The Holder will cross-reference, as appropriate, other sections of the Amendment Application that deal further with consultation and issues raised); and
- A summary of public participation in the EA, a list of the key issues raised, and the status of issue resolution (with cross-references, as appropriate, to other sections of the Amendment Application that deal further with consultation and issues raised).

2.2 Federal EA Process

The Amendment Application will include:

- The relevant review threshold that has been met under the federal Regulations Designating Physical Activities;
- Whether the Canadian Environmental Assessment Agency has determined that a federal EA is required, including a link to the relevant documents on the CEAA Registry
- Whether the proposed KLNG Expansion Project is undergoing a substituted, provincial review process; and
- A table documenting applicable completed and upcoming federal milestones. Milestones

include, but are not limited to, any public comment periods, notice of commencement and substitution approval, and eventual decision by the federal Minister under section 52(1) of CEAA 2012, as applicable.

- In table format, an overview of the approach to address CEAA 2012 requirements (*e.g.*, how the federal requirements align with the VC selection and assessments).

Table 3: Approved KLNG Project and Proposed KLNG Expansion Project Design Configurations

Approved KLNG Project	Proposed KLNG Expansion Project	
	Kitimat LNG Foundation Project Compact E-drive Design (2 LNG Trains, 12 MTPA Total)	Third LNG Train Expansion +1 LNG Train, +6 MTPA (3 LNG Trains, 18 MTPA Total)
Land-based Infrastructure and Activities		
Import or Export Terminal.	Export Terminal only.	Export Terminal only.
<p>Provincial: EAC 06-01 as amended in 2009: One (1) LNG Train (on Bees IR No. 6).</p> <p>Capacity:</p> <ul style="list-style-type: none"> ◆ 5 MTPA ◆ 700 MMcfd <p>(Note that EAC 06-01 defines the “Project” to exclude the components on Bees IR No. 6.)</p> <p>Federal: Two (2) LNG Trains.</p> <p>Capacity:</p> <ul style="list-style-type: none"> ◆ 10 MTPA (5 MTPA per LNG Train) <p>Federal permits contemplated a two (2) LNG train 10 MTPA facility and 10 MTPA export. In 2013, the CEA Agency determined that no further federal review was required under CEEA 2012 for the LNG processing capacity of 10 MTPA. The Holder has a commercial lease on Bees IR No. 6 which was approved by Haisla Nation in November 2010.</p>	<p>Provincial: Two (2) LNG Trains (6 MTPA per LNG Train).</p> <p>Average Annual Capacity:</p> <ul style="list-style-type: none"> ◆ +7 MTPA (12 MTPA total) ◆ 1.8 Billion cubic feet per day (Bcfd) <p>Federal: Two (2) LNG Trains (6 MTPA per LNG Train).</p> <p>Average Annual Capacity:</p> <ul style="list-style-type: none"> ◆ +2 MTPA (12 MTPA total) ◆ 1.8 Billion cubic feet per day (Bcfd) 	<p>Federal and Provincial: Addition of a Third (3rd) LNG Train.</p> <p>Average Annual Capacity:</p> <ul style="list-style-type: none"> ◆ +6 MTPA (18 MTPA Total) ◆ +0.9 Bcfd (2.7 Bcfd total)

Approved KLNG Project	Proposed KLNG Expansion Project	
	Kitimat LNG Foundation Project Compact E-drive Design (2 LNG Trains, 12 MTPA Total)	Third LNG Train Expansion +1 LNG Train, +6 MTPA (3 LNG Trains, 18 MTPA Total)
<p>Ancillary facilities (temporary work spaces for stockpiling).</p> <p>Temporary Use Spaces:</p> <ul style="list-style-type: none"> ◆ Area G, Area H, Area L (permitted) ◆ Storage Pit (permitted) ◆ Borrow Pit (permitted) 	<p>No change. Permanent use of permitted Temporary Use Spaces required.</p>	<p>No change from KLNG Foundation Project (Compact E-drive Design).</p>
<p>Operations facilities and buildings. Located on Bees IR No. 6 and in Kitimat.</p>	<p>Operations facilities and buildings To be located on permitted and disturbed lands (temporary workspaces) outside of Bees IR No. 6, including:</p> <ul style="list-style-type: none"> ◆ Area A facilities include the central control room, laboratory, crew room, security and emergency response buildings, staging warehouse and site maintenance workshop, operations camp and turn around camp. ◆ Small additional lands required adjacent to Area A. ◆ Northeast Logistics Area ◆ West Logistics Area 	<p>No change from KLNG Foundation Project (Compact E-drive Design).</p>

Approved KLNG Project	Proposed KLNG Expansion Project	
	Kitimat LNG Foundation Project Compact E-drive Design (2 LNG Trains, 12 MTPA Total)	Third LNG Train Expansion +1 LNG Train, +6 MTPA (3 LNG Trains, 18 MTPA Total)
<p>LNG Storage Tanks Two (2) full containment tanks (located on KLNG Plant site), each with a capacity of 210,000 m³ (420,000 m³ total capacity).</p>	<p>Reduced total storage capacity compared to Approved KLNG Project.</p> <ul style="list-style-type: none"> One (1) full containment tank with a working volume of 260,000 m³ to support two (2) LNG Trains (12 MTPA). 	<p>Reduced total storage capacity compared to Approved KLNG Project.</p> <ul style="list-style-type: none"> One (1) <u>additional</u> full containment tank, up to 130,000 m³ to support the addition of the third LNG Train, for a combined total of 390,000 m³ storage.
<p>LNG Liquefaction Process Electric drive for refrigeration and compressors. Auxiliary power provided by gas turbines and diesel generator.</p>	<p>The Compact E-drive Design will be an all-electric facility, utilizing electric motor driven technology for all process and utility compressors, pumps and fans. Power purchased from BC Hydro with limited on-site back-up diesel power generation.</p>	<p>No change from KLNG Foundation Project (Compact E-drive Design).</p>
<p>Site Preparation 3 Mm³ of waste rock to be disposed of at sea or on land.</p>	<p>Rock excavated from KLNG Plant site will be re-used for site preparation (LBW) construction, rockfill, surfacing, aggregate, etc.). No disposal of rock at sea.</p>	<p>No change from KLNG Foundation Project (Compact E-drive Design).</p>
<p>Waste materials to be disposed of in approved landfill.</p>	<p>No change.</p>	<p>No change.</p>
<p>Groundwater wells. Normal water use rate of 7.5 m³/hr, with peak rate of 156 m³/hr (approx. 43 L/s) for filling firewater tanks.</p>	<p>No change.</p>	<p>No change.</p>
<p>Process wastewater discharged into on-site retention pond. Sanitary wastewater collected in an on-site septic tank.</p>	<p>Process wastewater and sanitary wastewater to be treated and discharged into Bish Cove via on-site retention pond.</p>	<p>No change.</p>

Approved KLNG Project	Proposed KLNG Expansion Project	
	Kitimat LNG Foundation Project Compact E-drive Design (2 LNG Trains, 12 MTPA Total)	Third LNG Train Expansion +1 LNG Train, +6 MTPA (3 LNG Trains, 18 MTPA Total)
Marine Infrastructure and Activities		
<p>Material offloading facility (MOF), LNG loading jetty, and Ship berth.</p> <p>Marine structures include four berthing/ breasting dolphins, six shore moorings and one permanent unloading platform.</p>	<p>Modified marine terminal design - LBW that will provide both LNG loading and material offloading functionality.</p> <p>One LNG loading berth, inclusive of breasting dolphins, located outboard of LBW to support two (2) LNG Trains.</p> <p>LBW replaces previous marine terminal design.</p>	<p>A second LNG loading berth on the LBW to support the expansion to three (3) LNG Train output.</p> <p>No footprint change to the LBW from KLNG Foundation Project (Compact E-drive Design).</p>
<p>Provincial: 60 LNG carriers per year for 5 MTPA.</p> <p>Federal: 120 LNG carriers per year for 10 MTPA.</p>	<p>Provincial: + 90 to 110 LNG carriers per year (total 150 to 170 LNG carriers per year for two (2) LNG Trains).</p> <p>Federal: + 30 to 50 LNG carriers per year (total 150 to 170 LNG carriers per year for two (2) LNG Trains).</p> <p>NOTE: Transport Canada issued the <i>TERMPOL Review Process on the Kitimat LNG Project</i> report in October 2018, outlining their recommendations and findings following review of the technical studies submitted and consultation with the First Nations.</p> <p>KLNG Project TERMPOL submission to Transport Canada was for a two (2) LNG train single berth facility designed to handle approximately 150 LNG carriers per year ranging in size from of 125,000 to 217,000 m³.</p>	<p>Federal and Provincial: + 75 to 85 LNG carriers per year (total 225-255 LNG carriers per year for three (3) LNG Trains).</p>
Tug berths.	Tug moorings.	Tug moorings.

Approved KLNG Project	Proposed KLNG Expansion Project	
	Kitimat LNG Foundation Project Compact E-drive Design (2 LNG Trains, 12 MTPA Total)	Third LNG Train Expansion +1 LNG Train, +6 MTPA (3 LNG Trains, 18 MTPA Total)
<p>Dredging and Disposal at Sea Marine sourced – 500,000 m³ of dredge material from Bish Cove to be disposed at sea.</p>	<p><u>Marine sourced</u> – Dredge material from Bish Cove (400,000 to 800,000 m³) to prepare ground for installation of LBW in Bish Cove to be disposed at sea.</p> <p><u>Land sourced</u> – Disposal at sea of approximately 4.8 Mm³ of excavation materials from land (marine clay, sand and gravels).</p>	<p>No change from KLNG Foundation Project (Compact E-drive Design).</p>
<p>Freshwater discharge to marine environment (40 m³/h).</p>	<p>Marginal increase in volume of storm water treatment and discharge (volumes to be determined).</p>	<p>No change from KLNG Foundation Project (Compact E-drive Design).</p>
Other Facilities		
<p>Natural Gas Pipeline Approximately 14 km 30” natural gas pipeline.</p> <p>NGL Pipelines Three (3) 6” NGL pipelines (ethane, propane, butane) within 30m wide ROW.</p>	<p>Natural Gas Pipeline Approximately 16.7 km natural gas pipeline (42” diameter). Increased length largely attributable to a change location of the tie in along the approved Pacific Trail Pipeline (PTP).</p> <p>NGL Pipeline One (1) 6” hydrocarbon condensate pipeline within 42m wide ROW. 212 m³/d (1,333 bpd) condensate for export by rail (approx. 1.3 additional rail cars per day using existing trains) from the existing KLNG Project-owned industrial site in Kitimat.</p>	<p>No change to pipelines from KLNG Foundation Project (Compact E-drive Design).</p> <p>No change.</p> <p>+106 m³/d (+667 bpd) condensate for export by rail (approx. 0.7 additional rail cars per day using existing trains).</p>
<p>New 2.3 km access road connecting to the Bish Cove Forest Service Road (FSR). Bish Cove FSR Upgrades.</p>	<p>Additional plant access via a secondary access road and bridge connecting to the Bish Cove FSR.</p>	<p>No change from KLNG Foundation Project (Compact E-drive Design).</p>
<p>A 287 kV aerial transmission line from Kitimat to LNG Plant site at Bish Cove.</p>	<p>No change.</p>	<p>No change.</p>

Approved KLNG Project	Proposed KLNG Expansion Project	
	Kitimat LNG Foundation Project Compact E-drive Design (2 LNG Trains, 12 MTPA Total)	Third LNG Train Expansion +1 LNG Train, +6 MTPA (3 LNG Trains, 18 MTPA Total)
Contemplates use of local area accommodations.	<p>Early works and infrastructure construction camp(s) for 1,800-3,500 persons.</p> <p>Potential locations include Area A, floating accommodations in Bish Cove, and local area accommodations.</p>	<p>Infrastructure construction camp(s) for up to 1,000 persons for the Expansion Project using existing camps.</p> <p>Potential locations include Area A, floating accommodations in Bish Cove, and existing camp and local area accommodations.</p>



Environmental
Assessment Office

Amendment Application Information Requirements

*Assessment of Environmental, Economic, Social,
Heritage and Health Effects*

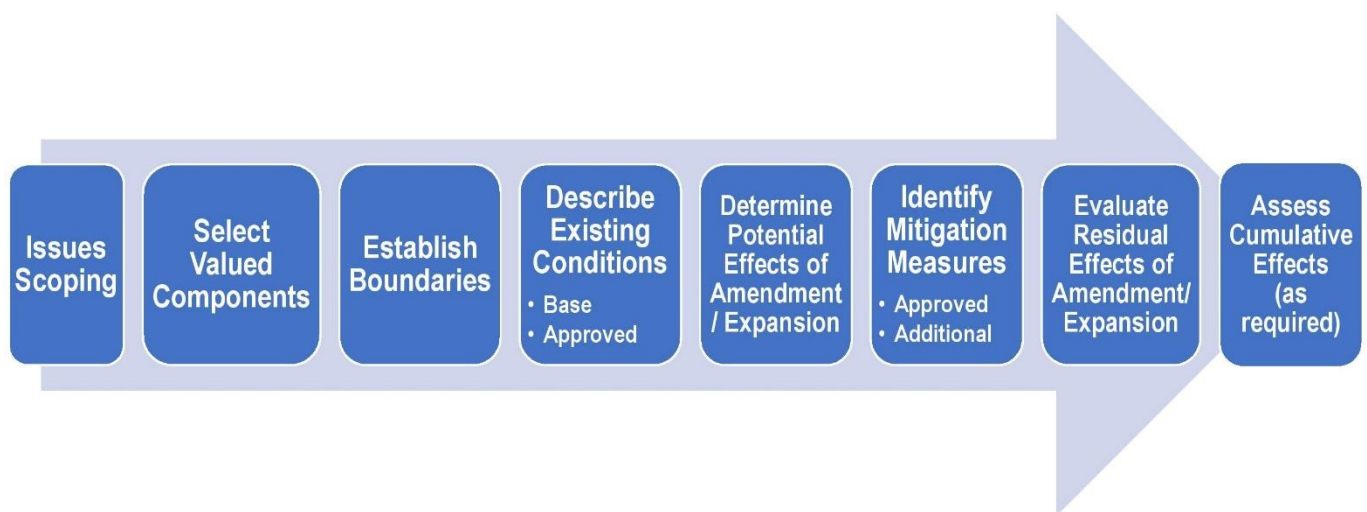


PART B - ASSESSMENT OF ENVIRONMENTAL, ECONOMIC, SOCIAL, HERITAGE AND HEALTH EFFECTS

3.0 ASSESSMENT METHODOLOGY

This section of the Amendment Application must describe the methods used to assess the potential adverse effects of the proposed KLNG Expansion Project, and specifically the potential incremental changes to the Approved KLNG Project and associated potential adverse effects. The assessment methodology will be based on the EAO's [Guideline for the Selection of Valued Components and Assessment of Potential Effects](#) (Figure 1).

Figure 1 Summary of EA Methodological Steps



3.1 Issues Scoping and Selection of Valued Components

Provincial and federal EA authorities concluded in 2006 that the KLNG Project was not likely to result in significant adverse effects to selected Valued Components (VCs). The assessment of proposed changes to the Approved KLNG Project in 2008 to include liquefaction (EAC E06-01 Amendment #1) predicted no significant adverse effects to selected VCs; for many selected VCs, reduced or beneficial impacts were predicted. The selected VCs and conclusions of the earlier reviews of the Approved KLNG Project provide important context to the assessment of the proposed KLNG Expansion Project and are summarized in Table 4.

Table 4: Selected Valued Components and EA Conclusions from the 2005 and 2008 Environmental Assessments of the Approved KLNG Project

Approved KLNG Project				
Selected VCs	Subcomponents	2005 EA Application	2008 Application (Amendment #1)	
		EA Conclusion	EA Prediction	EA Conclusion
Environmental				
Atmospheric Environment	Climate	The proposed KLNG Project was not likely to result in significant adverse effects.	34% reduction in GHG emissions. No change in significance of potential adverse effects.	Residual effects will be less than significant.
	Air Quality	The proposed KLNG Project was not likely to result in significant adverse effects.	14% to 73% reduction in contaminant emissions. No change in significance of potential adverse effects.	Residual effects will be less than significant.
Vegetation Resources	Terrain and Soils	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
	Rare Plants Rare Plant Communities	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
Wildlife and Wildlife Habitat	Grizzly bear Black bear Mountain goat Moose Black-tailed deer Marten Coastal tailed frog	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.

Approved KLNG Project				
Selected VCs	Subcomponents	2005 EA Application	2008 Application (Amendment #1)	
		EA Conclusion	EA Prediction	EA Conclusion
Freshwater Fish and Fish Habitat	Water and Wastewater Management	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
	Riparian Habitat Instream Fish Habitats Direct Mortality of Fish and/or Fish Ova	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
Marine Environment	Marine Mammals	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
	Marine Fish	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential effects.	No change in significance of potential effects.
	Marine Water Quality	The proposed KLNG Project was not likely to result in significant adverse effects.	90% reduction in volume of waste water discharge. No change in significance of potential adverse effects.	Residual effects will be less than significant.
	Benthic Environment	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
Avifauna	Various indicator species	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
Economic				
Employment and Business	None	The proposed KLNG Project was not likely to result in significant adverse effects: - 700 person-years of employment during construction	Increased capital costs, construction workforce and operating labour force: - 1,500 person-years of employment during construction	Increased beneficial employment and economic effects.

Approved KLNG Project				
Selected VCs	Subcomponents	2005 EA Application	2008 Application (Amendment #1)	
		EA Conclusion	EA Prediction	EA Conclusion
		- 50 permanent jobs during operations	- 100 permanent jobs during operations	
Social				
Community and Regional Infrastructure and Services	None	The proposed KLNG Project was not likely to result in significant adverse effects.	Mainly beneficial and not significant. No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
First Nations Communities and Land Use	None	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
Land and Resource Use	None	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
Marine Navigation	None	The proposed KLNG Project was not likely to result in significant adverse effects.	30% reduction in tanker traffic. No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
Heritage				
Archaeological and Heritage Resources	None	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.
Health				
Public Health and Safety	None	The proposed KLNG Project was not likely to result in significant adverse effects.	No change in significance of potential adverse effects.	No change in significance of potential adverse effects.

Candidate VCs for the proposed KLNG Expansion Project and their alignment with the selected VCs for the approved KLNG Project are presented in Table 5.

Table 5: Proposed KLNG Expansion Project Candidate VCs and alignment with Selected VCs for 2005 and 2008 Environmental Assessments of the Approved KLNG Project

KLNG Project		Proposed KLNG Expansion Project		
Valued Components (VCs)	Subcomponents	Key Issue	Candidate VCs	Proposed Subcomponents
Environmental				
Atmospheric Environment	Climate	Atmospheric Environment	Greenhouse Gas (GHG) Management	None proposed
	Air Quality		Air Quality	None proposed
	Sound Quality		No Candidate VC proposed	None proposed. In-Air Noise and Light are pathway linkages to VCs (e.g., Wildlife and Wildlife Habitat)
Vegetation Resources	Terrain and Soils	Terrestrial Environment	No Candidate VC proposed	None proposed. Geology/Terrain and Soils are pathway linkages to VCs (e.g., Vegetation)
	Rare Plants Rare Plant Communities		Vegetation	Species-based: Plant species at risk Other plant species of management concern including (i.e., invasive plants) Ecosystem-based: Rare and sensitive ecological communities Wetlands Riparian ecosystems Old growth forests
Wildlife and Wildlife Habitat	Grizzly bear Black bear Mountain goat Moose Black-tailed deer	Wildlife and Wildlife Habitat	Wildlife and Wildlife Habitat	Wildlife Species of Conservation Concern Marine Birds Migratory Birds

K LNG Project		Proposed K LNG Expansion Project		
Valued Components (VCs)	Subcomponents	Key Issue	Candidate VCs	Proposed Subcomponents
	Marten Coastal tailed frog			Other Species of Interest
Freshwater Fish and Fish Habitat	Water and Wastewater Management	Water Resources	Surface Water Resources	Surface Water Quality Surface Water Quantity
	-		Groundwater Resources	Groundwater Quality Groundwater Quantity
	Riparian Habitat Instream Fish Habitats Direct Mortality of Fish and/or Fish Ova	Freshwater Fish and Fish Habitat	Freshwater Fish and Fish Habitat	Anadromous fish Resident fish
Marine Environment	Marine Mammals	Marine Resources	Marine Mammals	Steller sea lion Killer whale Harbour porpoise Humpback whale
	Marine Fish		Marine Resources	Marine Fish and Fish Habitat (consider Underwater Noise as a Pathway Component)
	Marine Water Quality			Marine Water Quality (Pathway Component)
	Benthic Environment			Benthic Fauna Marine Sediment Quality (Pathway Component)
Avifauna	Various indicator species			Marine Birds, including Migratory Birds (see Wildlife and Wildlife Habitat)
Economic				
Employment and Business	None	Economic Conditions	Economy	Labour Market Economic Development

K LNG Project		Proposed K LNG Expansion Project		
Valued Components (VCs)	Subcomponents	Key Issue	Candidate VCs	Proposed Subcomponents
				Local Government Finance
Social				
Community and Regional Infrastructure and Services	None	Socio-community	Socio-community	Housing Services and Infrastructure Road Transportation Community Wellbeing
First Nations Communities and Land Use	None	Current Use of Lands and Resources for Traditional Purposes	Current Use of Lands and Resources for Traditional Purposes	Food, Social, and Ceremonial (FSC) Marine and Land and Resource Use Intangible Cultural Heritage
Land and Resource Use	None	Marine and Land Resource Use	Marine and Land Resource Use	Navigation Commercial and Recreational Fishing Other Commercial and Non-Commercial Use
Marine Navigation	None			
-	-	Visual Resources	Visual Quality	None proposed
Heritage				
Archaeological and Heritage Resources	None	Heritage Resources	Heritage Resources	Archaeological Resources Historical Resources Palaeontological Resources
Health				
Public Health and Safety	None	Human Health	Human Health	None proposed

The Amendment Application will summarize the process and methodologies used to identify and select the VCs for assessment. The Amendment Application will also include the rationale for any differences in the list of VCs presented in the Amendment Application from those listed in the final Amendment Application Information Requirements.

3.2 Assessment Boundaries

3.2.1 Spatial, Temporal, Administrative and Technical Boundaries

The Amendment Application will describe the methods used in identifying spatial, temporal, administrative and technical boundaries. Information on spatial, temporal, administrative and technical boundaries for specific VCs will be included in the appropriate VC sections of this document and will encompass all relevant project phases, components and activities. Proposed spatial boundaries are presented in Table 6; maps of proposed local assessment areas (LAA) and regional assessment areas (RAA) are provided in Appendix A. The Amendment Application will include the rationale for any differences in boundaries from those presented in the final Amendment Application Information Requirements.

Table 6: Proposed Spatial Boundary Definitions

Spatial Boundary	Description of Assessment Area
Air Quality (Figure A5.1 and Figure A5.2)	
Local Assessment Area (LAA)	40 km by 40 km area centred on the Project plant site for assessing air quality compounds; 40 km by 100 km area for assessing acid deposition; 2 km on either side of the marine access route (plant site to Triple Island) for assessing marine emissions.
Regional Assessment Area (RAA)	75 km by 75 km area centred on the Project plant site for assessing air quality compounds; 40 km by 100 km area for assessing acid deposition; 5 km on either side of the marine access route (plant site to Triple Island) for assessing marine emissions.
Greenhouse Gas (GHG) Management	
Local Assessment Area (LAA)	Spatial boundaries will not be defined, as GHG and climate change are, by nature, both regional and global. Boundaries for GHG management will correlate with the provincial and federal GHG policy, regulations and legislation.
Regional Assessment Area (RAA)	
Cumulative Effects Assessment Area (CEA Area)	
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Vegetation (Figure A6)	
Local Assessment Area (LAA)	The LAA passes through four watersheds (Anderson Creek, Bish Creek, Kitimat River, Moore Creek) and is in the Coastal Western Hemlock (CWH) Biogeoclimatic Ecosystem Classification (BEC) zone, very wet maritime, submontane variant (CWHvm1) and the very wet maritime montane variant (CWHvm2). The LAA includes a 500 m buffer around the proposed new development area at the Plant Site in Bish Cove, and a 1 km buffered area along the proposed pipeline alignment from the Plant Site to Kitimat, BC. The LAA encompasses the area in which direct and indirect measurable effects on vegetation and ecosystems during construction, operations and decommissioning of the proposed KNLG Expansion Project are likely to occur. The LAA is 3,269.8 ha in size.
Regional Assessment Area (RAA)	The RAA covers an area of 79,913.1 ha and comprises 26 watersheds. It is bounded by Highway 37 and the Dahl Creek watershed and Nalbeelah Creek Wetlands Park to the north, by Nalbeelah Creek, Hirsh Creek and Dala River watersheds to the east, by the peninsula surrounded by Clio Bay and Gobeil Bay to the south, and by the ridge separating Jesse Creek and Bish Creek watersheds to the west. The RAA is large enough to assess direct and indirect

Spatial Boundary	Description of Assessment Area
	Project-related effects. The RAA was selected to include general environmental features present in and around the LAA to facilitate a comparison of habitat types, topographical breaks and watersheds that provide natural landscape barriers, and the home range of the wildlife species with the largest home range at the Project Area (<i>i.e.</i> , 22,000 ha for a coastal male grizzly bear [<i>Ursus arctos</i>]), and therefore covers a scale appropriate for assessing the effects of the proposed KLNG Expansion Project.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Wildlife and Wildlife Habitat (Figure A7.1)	
Local Assessment Area (LAA)	The LAA passes through four watersheds (Anderson Creek, Bish Creek, Kitimat River, Moore Creek) and is in the Coastal Western Hemlock (CWH) Biogeoclimatic Ecosystem Classification (BEC) zone, very wet maritime, submontane variant (CWHvm1) and the very wet maritime montane variant (CWHvm2). The LAA includes a 500 m buffer around the proposed new development area at the Plant Site in Bish Cove, and a 1 km buffered area along the proposed pipeline alignment from the Plant Site to Kitimat, BC. The LAA encompasses the area in which direct and indirect measurable effects on wildlife during construction, operations and decommissioning of the proposed KLNG Expansion Project are likely to occur. The LAA is 3,269.8 ha in size.
Regional Assessment Area (RAA)	The RAA covers an area of 79,913.1 ha and comprises 26 watersheds. It is bounded by Highway 37 and the Dahl Creek watershed and Nalbeelah Creek Wetlands Park to the north, by Nalbeelah Creek, Hirsh Creek and Dala River watersheds to the east, by the peninsula surrounded by Clio Bay and Gobeil Bay to the south, and by the ridge separating Jesse Creek and Bish Creek watersheds to the west. The RAA is large enough to assess direct and indirect Project-related effects. The RAA was selected to include general environmental features present in and around the LAA to facilitate a comparison of habitat types, topographical breaks and watersheds that provide natural landscape barriers, and the home range of the wildlife species with the largest home range at the Project Area (<i>i.e.</i> , 22,000 ha for a coastal male grizzly bear [<i>Ursus arctos</i>]), and therefore covers a scale appropriate for assessing the effects of the proposed KLNG Expansion Project.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Marine Birds (Figure A7.2)	
Local Assessment Area (LAA)	Incorporates the proposed shipping route with a 2 km wide buffer of marine areas and encompasses approximately 1,204 km ² of marine waters.
Regional Assessment Area (RAA)	Incorporates the proposed shipping route with a 10 km wide buffer of marine areas. The western boundary of the Marine Bird RAA extends 2.5 km west of the Triple Island Pilotage Station to include marine waters where pilot vessel activities may take place. The Marine Bird RAA encompasses approximately 3,401 km ² of marine waters.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Water Resources (Figure A8)	
Local Assessment Area (LAA)	The area encompassed by the existing Plant Site within IR6 and the KLNG expansion area north of Bish Cove, with a 250 m buffer to include unconsolidated groundwater aquifers within the valley bottom of Bish Creek.

Spatial Boundary	Description of Assessment Area
Regional Assessment Area (RAA)	Regional watershed of Bish Creek.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Freshwater Fish and Fish Habitat (Figure A9)	
Local Assessment Area (LAA)	The LAA is within Haisla Nation Traditional Territory. The LAA is situated within the Bish Creek watershed and is entirely within the very wet hypermaritime, submontane variant (CWHvm1) of the CWH Biogeoclimatic Ecosystem Classification (BEC) zone. The LAA includes the drainages within, and in the immediate area surrounding, the EAC amendment area. This includes all watercourses that drain directly into Bish Cove and into Bish Creek from the mouth upstream to mainstem km 5.2 and all watercourses located within the former Eurocan Site (<i>i.e.</i> , Beaver Creek watershed) and Kitimat River Oxbow Area.
Regional Assessment Area (RAA)	The RAA is within Haisla Nation Traditional Territory and encompasses Emsley Creek, Bish Creek, Lower Kitimat River, and Beaver Creek watersheds, and covers an area of 32,722 ha. The RAA is on a scale to assess direct and indirect Project-related effects, as well as potential cumulative effects on freshwater fish and fish habitat. The RAA includes the study reference area, within Emsley Cove. The reference area is located predominantly within the very wet maritime, submontane variant (CWHvm1) of the CWH BEC zone, but also contains the follow BEC zones; Moist maritime, windward variant (MHmm1) of the MH BEC zone; Very wet maritime, montane variant (CWHvm2) of the CWH BEC zone; and Moist maritime parkland (MHmmp) of the MH BEC zone.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Marine Mammals (Figure A10.1)	
Local Assessment Area (LAA)	Proposed KLNG Expansion Project shipping route (including southern shipping route) + 500 m buffer from the centerline.
Regional Assessment Area (RAA)	Proposed KLNG Expansion Project shipping route + buffer to the underwater noise modelling extent.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Marine Resources (Figure A10.2)	
Local Assessment Area (LAA)	Same as RAA.
Regional Assessment Area (RAA)	From the Kitimat Delta to Coste Island including the Project site.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Economy (Figure A11)	
Local Assessment Area (LAA)	Regional District of Kitimat Stikine, with a focus on Kitimat and Terrace. City of Prince Rupert. Haisla Nation. Indigenous Groups located along the Marine Transportation Corridor.
Regional Assessment Area (RAA)	British Columbia.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Socio Community (Figure A12.1)	

Spatial Boundary	Description of Assessment Area
Local Assessment Area (LAA)	District of Kitimat. Haisla Nation. Indigenous Groups located along the Marine Transportation Corridor.
Regional Assessment Area (RAA)	Same as LAA.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Current Use of Lands and Resources for Traditional Purposes	
Local Assessment Area (LAA)	The area of overlap between each Indigenous Group’s defined “area of use” (<i>i.e.</i> , established or asserted traditional territory, Statement of Intent area filed with the BC Treaty Commission) with the LAAs (and RAAs, if applicable) for VCs linked or interrelated to current use (<i>e.g.</i> , Fish and Fish Habitat, Marine Mammals, Noise, Vegetation, Wildlife and Wildlife Habitat, Visual Quality, Heritage Resources, and Marine and Land Resource Use). These areas of overlap will form the LAA for the assessment of potential effects to the current use of locations and resources associated with those VCs for each Indigenous Group.
Regional Assessment Area (RAA)	Same as the LAA.
Cumulative Effects Assessment Area (CEA Area)	Same as the RAA.
Marine and Land Resource Use – Navigation (Figure A12.2)	
Local Assessment Area (LAA)	Operational marine safety zone for LNG vessel berthing, manoeuvring, and transiting along the proposed shipping route. (defined by the marine area of the foreshore 'Tug and Tanker No Go Zone' + required turning basin of 790 m + navigational clearance of 350 m along shipping route + manoeuvring area in Wright Sound).
Regional Assessment Area (RAA)	Same as LAA.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Marine and Land Resource Use – Other (Figure A12.3 and Figure A12.4)	
Local Assessment Area (LAA)	Marine The Pacific Fisheries Management Areas (PFMA) covering Kitimat Arm, the eastern side of Douglas Channel, Wright Sound, Lewis Passage, Squally Channel, Otter Channel, Nepean Sound, Principe Channel, Browning Entrance, and the eastern portion of Chatham Sound to the Triple Island Pilotage station. (defined by the area of PFMA sub-areas 6-1, 6-2, 6-28, 6-6, 6-5, 6-9, 6-27, 6-28, 5-17, 5-13, 5-10, 5-11, 4-1, 4-2, 4-13, 105-1, 104-3, 104-2). Land Project footprint + 500 m buffer.
Regional Assessment Area (RAA)	Marine Same as LAA. Land Same as Wildlife and Wildlife Habitat RAA.
Cumulative Effects Assessment Area (CEA Area)	Marine

Spatial Boundary	Description of Assessment Area
	Same as RAA. Land Same as Wildlife and Wildlife Habitat RAA.
Visual Quality (Figure A12.5)	
Local Assessment Area (LAA)	The area within an 8 km viewing distance of the project site and shipping routes, and 1 km from the proposed natural gas pipeline corridor.
Regional Assessment Area (RAA)	The area within a maximum viewing distance of 15 km from the proposed project site, shipping route and proposed natural gas pipeline corridor.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Heritage Resources (Figure A13)	
Local Assessment Area (LAA)	The area of proposed new ground disturbance for the proposed KLNG Expansion Project, plus a 100 m buffer.
Regional Assessment Area (RAA)	Same as LAA.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.
Human Health (Figure A14)	
Local Assessment Area (LAA)	The LAA is a 40 km by 40 km area centred around the Plant Site for assessing Project-related emissions, other than marine shipping. The marine shipping LAA (Plant Site to Triple Island) is 2 km on either side of the marine access route for assessing marine emissions.
Regional Assessment Area (RAA)	The RAA is a 75 km by 75 km area centred around the Plant Site for assessing Project-related emissions, other than marine shipping. The marine shipping RAA (Plant Site to Triple Island) is 5 km on either side of the marine access route for assessing marine emissions.
Cumulative Effects Assessment Area (CEA Area)	Same as RAA.

3.3 Existing Conditions

For each VC section, (Environmental, Economic, Social, Heritage and Health), the Amendment Application will include:

- A description of the baseline conditions within the study area in sufficient detail to enable potential incremental interactions between selected VCs and the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project, to be identified, understood, and assessed;
- A description of the quality and reliability of the existing (or baseline) data and its applicability for the purpose used, including any gaps, insufficiencies and uncertainties, particularly for the purpose of monitoring activities;
- 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 proposed KLNG Expansion Project or other project and/or activities in the area;

- An explanation of if and how other past and present projects and activities in the study area have affected or are affecting each VC;
- Documentation of the methods and data sources used to compile information on existing (or baseline) conditions, including any standards or guidelines followed;
- Where additional project and VC-specific field studies are conducted, the scope and methods to be used will follow published documents pertaining to data collection and analysis methods, where these are available. Where methods used for the assessment deviate from applicable published guidance, the rationale for the variance will be provided in the Amendment Application; and
- Description of what Traditional Ecological Knowledge (TEK), including Indigenous Traditional Knowledge, was used in the VC assessment.

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

3.4 Potential Effects

The Amendment Application will summarize the overall process and methodologies used to identify and assess the potential effects of the proposed KLNG Expansion Project on the selected VCs. Unless otherwise stated, the base case for the purpose of the assessment will be the Approved KLNG Project.

For each VC section, the Amendment Application will:

- Identify the potential interactions of the proposed KLNG Expansion Project and the considered and selected VCs (a preliminary Project-VC Interaction Matrix is provided as Table 7);
- Identify and describe the potential adverse effects resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project (anticipated potential incremental effects are presented in Table 10 through Table 38);
- Demonstrate how feedback from Indigenous Groups, the public, stakeholders and government agencies on VC selection and assessment was incorporated, as appropriate.

The Amendment Application will identify any project activity-VC interactions that were excluded from further assessment, including the methods and criteria used to justify the exclusion and input received from EAO, government agencies, Indigenous groups and the public regarding the exclusion.

Table 7: Preliminary Project-VC Interaction Matrix: Proposed KLNG Expansion Project

Project Activity	Environmental Assessment Pillars and Candidate Valued Components														
	Environmental								Economic	Social			Heritage	Health	
	GHG Management	Air Quality	Vegetation	Wildlife and Wildlife Habitat	Surface Water Resources	Groundwater Resources	Freshwater Fish and Fish Habitat	Marine Resources, including Marine Mammals	Economy	Socio-Community	Current Use of Lands and Resources for Traditional Purposes	Marine and Land Resource Use	Visual Quality	Heritage Resources	Human Health
1.0 CONSTRUCTION															
1.1 Land-based site preparation, clearing and construction	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●
1.2 Construction of marine-based infrastructure, including Land-Backed Wharf (LBW)	●	●	●	●	n/a	n/a	n/a	●	●	●	●	●	●	●	●
1.3 Demand for labour, goods and services	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	n/a	n/a	n/a	n/a	n/a
2.0 OPERATIONS															
2.1 LNG production	●	●	●	●	●	●	●	n/a	●	●	●	○	○	n/a	●
2.2 LNG storage	○	○	n/a	n/a	n/a	n/a	○	n/a	n/a	○	○	○	○	n/a	n/a
2.3 LNG carrier loading and shipping	●	●	n/a	n/a	n/a	n/a	n/a	●	●	●	●	●	●	●	●
2.4 Supporting infrastructure operations, including roads, pipelines, transmission lines, logistic areas and other facilities and buildings.	●	●	●	●	●	●	●	n/a	●	●	●	●	●	n/a	●
2.5 Demand for labour, goods and services	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	n/a	n/a	n/a	n/a	n/a
3.0 DECOMMISSIONING															
3.1 Decommissioning of the LNG facility	●	●	○	●	○	○	○	●	●	●	●	●	●	○	●

n/a – No/negligible Project-VC interaction or adverse effects anticipated; no further consideration warranted. ○ – No/negligible incremental change to Project-VC interaction or adverse effects anticipated; no further consideration warranted. ● – Potential incremental change to Project-VC interaction or adverse effects anticipated; warrants further consideration.

3.5 Mitigation Measures

Provincial EAC E06-01 requires the mitigation of potential adverse effects from the KLNG Project through implementation of commitments made during the original EA review and included as EAC Schedule B. Some of these commitments have been satisfied during the substantial start and ongoing development of the KLNG Project. For example, commitments that required the KLNG Project to be subject to Transport Canada's TERMPOL review process have been largely met by the KLNG Project TERMPOL Submission and by Transport Canada's subsequent recommendations. Many of the measures listed in EAC Schedule B remain relevant and will be effective means for mitigating potential effects of the proposed KLNG Expansion Project. Measures that will mitigate key potential incremental changes to Project-VC interactions and associated adverse effects include:

- The use of electric motor driven technology to increase the liquefaction capacity while limiting GHG emissions and eliminating combustion-related emissions for all process and utility compressors, pumps and fans; and
- Habitat offsetting in accordance with *Fisheries Act* Authorizations for the removal of eelgrass and other habitat that would be required for the construction of the LBW.

For each VC section, the Amendment Application will:

- Describe commitments included in EAC Schedule B that are designed to mitigate potential effects;
- Describe the approach to identify and analyze mitigation measures, including any management and compensation plans proposed by the Holder, which will be implemented to address potential effects;
- Describe the mitigation measures incorporated into the project, including site and route selection, project scheduling, project design (*e.g.*, equipment selection, placement, emissions abatement measures), and construction and operation procedures and practices;
- Describe any standard mitigation assumed or proposed to be implemented, including consideration of best management practices, environmental management plans, environmental protection plans, contingency plans, emergency response plans, and other general practices;
- Clearly indicate how the mitigation measures will mitigate the potential adverse effects on the VC;
- Provide the rationale for the proposed mitigation measures, including why further avoidance or reduction measures for adverse effects may not be considered feasible, and the need for and

scope of any proposed compensation or offset;

- 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; and
- Summarize the mitigation measures for potential Project effects by project phase and identify any mitigation measures that are in management or compensation plans.

3.6 Characterization of Residual Effects

The Amendment Application will describe, in a table format, the residual effects using the residual effects criteria context, magnitude, extent, duration, reversibility, and frequency, as defined in EAO's Guideline for the Selection of Valued Components and Assessment of Potential Effects. Where feasible, these criteria will be described quantitatively in the Amendment Application for each VC. When residual effects cannot be characterized quantitatively, the Amendment Application will characterize these effects qualitatively. Definitions will be provided when qualitative terms are used.

The use of any qualitative terms (*e.g.*, high, moderate, low, etc.) will be accompanied by distinct definitions for each of these rankings. An explanation will be included for the conclusion reached for each criterion used to characterize a residual effect.

When residual effects on a VC are determined and the VC is also considered a “pathway” for other potential effects on other VCs, the Amendment Application will identify the linkages between the VCs and the discipline-specific studies to which the information has been forwarded for further evaluation.

3.7 Likelihood

The Amendment Application will assess the likelihood for all residual adverse effects using appropriate quantitative or qualitative terms and sufficient description to understand how the conclusions were reached. Definitions of any qualitative terms, such as ‘low’, ‘moderate’, or ‘high’ probability will be provided.

3.8 Holder’s Determination of Significance

The Amendment Application 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 quantitative and qualitative thresholds.

A conclusion of significance of residual adverse effects will be provided for each VC.

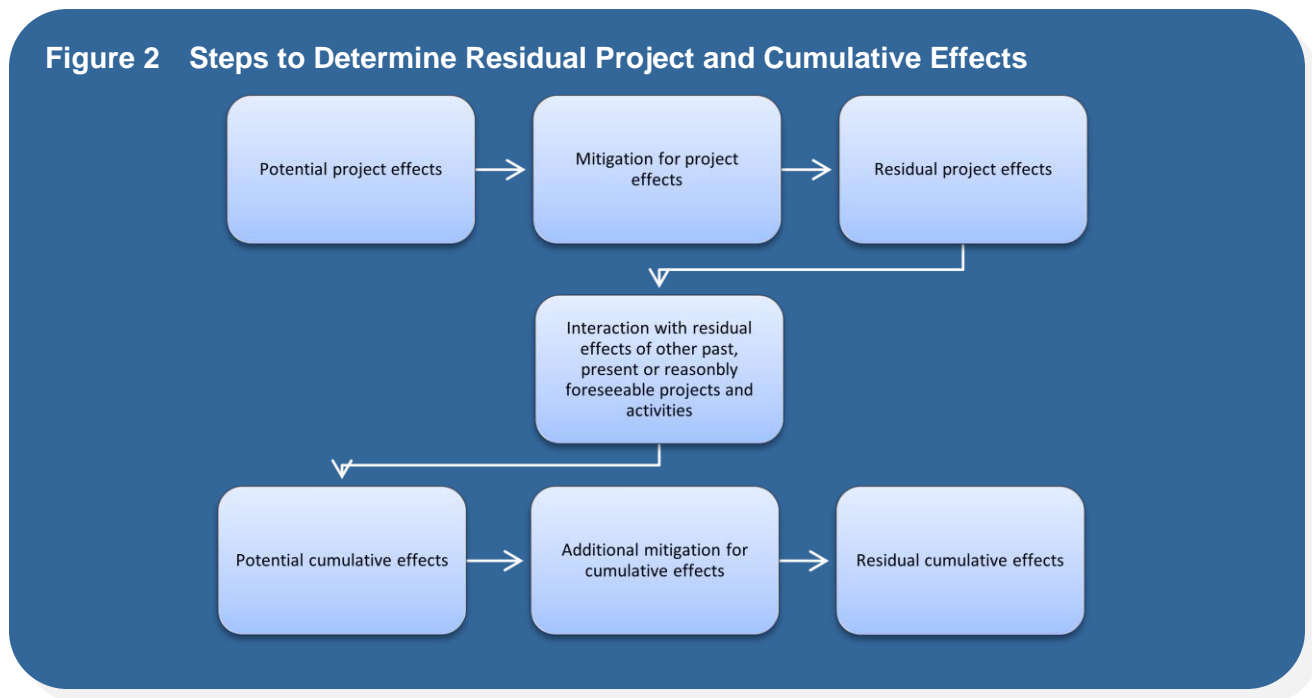
3.9 Confidence and Risk

The Amendment Application will summarize the process and methodology used to evaluate the levels of confidence associated with residual effects predictions and in particular, how any identified uncertainty may affect either the likelihood or the significance of the predicted residual effect. The Amendment Application will also describe any measures to reduce uncertainty through monitoring, adaptive management or other follow-up programs.

The Amendment Application will summarize the process and methodology used to determine if additional risk analysis is required. If additional risk analysis is required, the Amendment Application will summarize the process and methodology used for this analysis and the conclusions, including the range of likely, plausible and possible outcomes with respect to likelihood and significance.

3.10 Cumulative Effects Assessment

The Amendment Application will assess cumulative effects on VCs for which residual Project effects are predicted, as prescribed by the EAO’s [Guideline for the Selection of Valued Components and Assessment of Potential Effects](#) (Figure 2).



3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities

The following development categories will be considered in the Amendment Application:

- Projects or activities that have already been built or conducted for which the environmental effects overlap with those of the proposed KLNG Expansion Project (*i.e.*, certain); and
- Projects that are either proposed (public disclosure) or have been approved to be built, but are not yet built, for which the environmental effects overlap the proposed KLNG Expansion Project (*i.e.*, reasonably foreseeable).
- A preliminary list of past, present and reasonably foreseeable projects and activities that will, at a minimum, be included in the cumulative effects assessment, if required, is provided in Table 8.

Table 8: Past, Present and Reasonably Foreseeable Projects and Activities

No.	Proponent	Project/Activity
Past		
P1	Eurocan.	Eurocan Pulp and Paper Co site
P2	Methanex/Cenovus	Methanex/Cenovus Terminal
P3	Moon Bay	Marina
In Progress/Present/Ongoing		
IP1	Shell Canada Energy, Petronas, PetroChina, Mitsubishi Corp., and Kogas Canada LNG	LNG Canada Facility
IP2	Rio Tinto Alcan	Rio Tinto Alcan smelter
IP3	Rio Tinto	Terminal A Extension Project
IP4	BC Hydro	LNG Canada Load Interconnection Project
IP5	Prince Rupert Port Authority/ DP World	Fairview Container Terminal Expansion - Phase 2B
IP6	Pinnacle	Westview Wood Pellet Terminal
IP7	Ridley Terminals Inc.	Ridley Coal Terminal
IP8	Prince Rupert Port Authority	Northland Cruise Terminal
IP9	Prince Rupert Grain Ltd.	Prince Rupert Grain Terminal
IP10	AltaGas Ltd.	Ridley Island Propane Export Terminal
IP11	CN	Railway activity
IP12	Various	Forestry activities including log sorts and dumps
IP13	Various	Fishing and Aquaculture Activities
IP14	Various	Marine shipping activities
IP15	Various	Tourism
IP16	Various	Recreation
Reasonably Foreseeable		

No.	Proponent	Project/Activity
RF1	Chevron Canada Limited/ Woodside Energy Ltd.	Pacific Trail Pipeline
RF2	Cedar LNG Export Development Ltd.	Cedar LNG
RF3	Pacific Northern Gas Ltd.	Pacific Northern Gas Pipeline Looping Project
RF4	Pacific Future Energy Corp.	Pacific Future Energy Refinery
RF5	Pacific Traverse Energy	Kitimat LPG Export Project
RF6	Vopak Development Canada Inc.	Vopak Pacific Canada Storage and Export Facility
RF7	TransCanada Corp.	Prince Rupert Gas Transmission Project
RF8	Wolverine Terminals	Prince Rupert Marine Fuels Service Project
RF9	Pembina Pipeline Corp.	Watson Island Propane Export Terminal
RF10	Global Bio-Coal Energy Inc.	Biocoal Production Plant - Watson Island
RF11	Enbridge Inc.	Westcoast Connector Gas Transmission Project
RF12	Kinskuch Lake Hydro LP	Kinskuch Hydro Project

- A cut-off date of November 30, 2019 is proposed for incorporating any new future developments in the cumulative effects assessment in the Amendment Application since it is anticipated that the identification of potential residual effects will be completed by this date.

The Amendment Application will describe the methodology for identifying potential interactions between residual project effects and the effects of other developments, including a description of the following:

- The spatial boundaries for the cumulative effects assessment for each VC, including maps;
- The spatial and temporal boundaries of other developments; and
- The potential for interaction (spatial and temporal) and linkages (overlap) of VCs with other developments.

The Amendment Application will include:

- A table of all past, present and reasonably foreseeable developments that will be included in the cumulative effects assessment, should one be required for a particular VC;
- A general description of the information sources used to identify reasonably foreseeable developments and activities; and
- A map showing the location of the projects and activities.

3.10.2 *Conducting a Cumulative Effects Assessment*

The Amendment Application will summarize the process and methodology used to conduct the cumulative effects assessment, including the identification of potential cumulative effects, identification of additional mitigation measures, and evaluation of any (residual) cumulative effects using the same methodology described above in sections 3.6 to 3.9.

3.11 **Follow-up Strategy**

Where a residual adverse effect and/or cumulative effect has been identified for a specific VC, the Amendment Application 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, Indigenous groups, government agencies and any other measures deemed necessary to manage the issue.

4.0 ENVIRONMENTAL EFFECTS ASSESSMENT

The Amendment Application will include an assessment of Environmental Effects VCs identified in the Amendment Application Information Requirements. The assessment will be conducted in accordance with the methodology specified in section [3.0 Assessment Methodology](#) of the Amendment Application Information Requirements, using the organizational structure demonstrated in this section.

4.1 Atmospheric Environment

4.1.1 Valued Components

Candidate Atmospheric Environment VCs are:

- Air Quality
- Greenhouse Gas (GHG) Management

The Amendment Application will identify the VCs selected for assessment according to the methodology specified in Section [3.1 Issues Scoping and Selection of Valued Components](#). The Amendment Application will also include the rationale for any differences in the list of VCs presented in the Amendment Application from those listed in the final Amendment Application Information Requirements.

4.1.1.1 AIR QUALITY

The change in Project-related air emissions as a result of changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project have the potential to change ambient air quality in the Kitimat airshed. Project related emission to air are expected from marine vessels at arrival, berth, departure, LNG transfer and LNG processing activities. Air dispersion modelling will be used to evaluate the potential Project-related effects to air quality.

Background information for meteorology will also be presented to support an understanding of atmospheric processes and how they relate to air quality.

4.1.1.2 GHG MANAGEMENT

Greenhouse gas management has been selected as a VC since the changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project have the potential to change the level of Project GHG emissions.

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 9.

Table 9: Indicators and Measurable Parameters for Atmospheric Environment VCs

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Incremental change in emissions of Criteria Air Contaminants (CAC's). Incremental change in CAC concentrations in the Kitimat Airshed and along the marine shipping route between the proposed KLNG Expansion Project and Triple Island.	Air Quality	Concentrations of CAC's that have applicable air quality criteria, including NO ₂ , SO ₂ , CO, PM ₁₀ , and PM _{2.5}	Concentrations of CAC's that are emitted by the proposed KLNG Expansion Project and have applicable air quality criteria. CEAA 2012 requires assessment of environmental effects on air quality per section 5(2)
Incremental change in Project related GHG emissions. The effect of a changing climate on Project infrastructure.	Greenhouse Gas (GHG) Management	GHG emission levels of Carbon dioxide (CO ₂), Methane (CH ₄) and Nitrous Oxide (N ₂ O) expressed as CO ₂ equivalents.	Project-related GHG emissions. Requirements of the Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment (FPTCCCEA 2003) guidelines.

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

4.1.2 Context and Boundaries

The assessment will consider the construction, operation, and decommissioning phases of the proposed KLNG Expansion Project.

4.1.2.1 AIR QUALITY

Regulation and government context relevant to the Air Quality VC include:

- BC Ambient Air Quality Objectives (BC AAQOS); and
- Canadian Ambient Air Quality Standards (CAAQS) [not for direct comparison to model predictions at the fence line].

Potential Project-related effects to air quality will be evaluated against relevant ambient criteria using dispersion modelling. Dispersion modelling will be undertaken in consideration of MOE Guidelines for Air Quality Dispersion Modelling in BC (MOE 2015). The CAAQS will not be used for direct comparison to model predictions for this assessment since CAAQS are intended to support the implementation of the Air Quality Management System (AQMS) based on air quality monitoring data collected from the ambient air monitoring stations that are part of the National Air Pollution Surveillance (NAPS) network and airshed

studies.

The Amendment Application will consider emissions to air from the LNG facility, including upset scenarios undertaken for the Project operation phase, and associated shipping activities. The Amendment Application will describe the specific approach and methods used to determine potential incremental changes to air quality.

Shipping emissions from the Project's operational phase will be estimated. Shipping emissions will be predicted using a screening level assessment. The current shipping route extends from the Project to the south through the Douglas Channel, northeast through the Principe Channel and then north up to Browns Passage, for a total of 283 km. Impact from marine shipping and the facility will be considered cumulatively.

4.1.2.2 GHG MANAGEMENT

For the GHG management VC, the Amendment Application will adopt recommendations of the Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment (FPTCCCEA 2003) guidelines on how to incorporate climate change considerations into an EA through the following considerations:

- How will potential changes in climate affect the infrastructure associated with the Project?
- How will the operation of the Project contribute to GHG emissions, and are those contributions in keeping with sector, provincial and federal targets and norms?
- Will the GHG emissions from the Project affect climate change (*i.e.*, the Project's contribution to climate through the emission of GHG)?

The assessment will include how climate change may affect the proposed KLNG Expansion Project's infrastructure and identify which aspects of the Project may need to be assessed in greater detail because of a potentially changing climate. To understand how the climate has been changing, and may change in the future, climate trends will be analyzed by:

- Describing the existing climate using available long-term (30 year) data;
- Documenting how the climate has changed over the past 30 years in the Project region;
- Discussing the range of future climate projections; and
- Presenting a climate risk matrix.

In addition, the annual GHG emissions from the Project will be estimated for the Project operation phase, using the methodology described in the BC reporting regulations in the *Greenhouse Gas Reductions Target*

Act (Cap and Trade), and other commonly accepted methods where a methodology is not provided in the reporting regulation. Emissions will be compared to the provincial and national emissions to assess the relative contribution of the Project on a Canadian basis. Emissions during the construction and decommissioning phases will be considered as bounding conditions to the operation phase.

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

4.1.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment Application.

4.1.3.1 AIR QUALITY

Existing conditions for air quality will be characterized based on available regional ambient air quality monitoring data collected at regional air quality monitoring stations operated by Ministry of Environment and Climate Change Strategy (ENV). Existing meteorological conditions will be characterized based on available regional monitoring data collected by ENV, Environment and Climate Change Canada (ECCC), and will consider the data from the Project meteorological stations.

4.1.3.2 GHG MANAGEMENT

The Amendment Application will provide a characterization of existing GHG emissions. The Amendment Application will provide the following summarized information to characterize current conditions:

- Current provincial and federal GHG policies and legislation
- Provincial, national and global emission totals

Existing and future conditions without the Project for the climate change and GHG component will be based on available data for GHG emissions and long-term climate predictions. Predictions of a range in future climate conditions will be developed using available data from general circulation models in

conjunction with the various emission scenarios developed by the Intergovernmental Panel on Climate Change and historic climate data.

4.1.4 *Potential Effects*

A summary of anticipated Air Quality VC and GHG Management VC interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 10.

The Amendment Application will identify potential adverse effects to the Atmospheric Environment VCs resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

4.1.5 *Mitigation Measures*

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

4.1.6 *Residual Effects and their Significance*

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.1.7 *Cumulative Effects and their Significance*

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and

- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.1.8 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 10: Atmospheric Environment: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Air Quality	-	<p>Construction: emissions from land clearing, blasting, grading and earthworks, hauling, material handling, fuel combustion, power generation, vehicle traffic, shipping, flaring (for commissioning purposes only).</p> <p>Operations: emissions from material handling, fuel combustion, limited power generation, vehicle traffic, combustion of acid gas removal unit gases and ancillary operations, shipping, fugitive emissions, flaring (for emergency purposes only).</p> <p>Decommissioning: emissions from material handling, backfilling, contouring, fuel combustion, vehicle and supply vessel traffic, shipping, flaring (for emergency purposes only).</p>	<p>Change in air quality in the Kitimat airshed due to emissions of criteria air contaminants, resulting in potential impacts on human health and wildlife.</p> <p>Primary substances of concern include nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO), Hydrogen sulphide (H₂S), particulate matter (PM_{2.5} and PM₁₀) and volatile organic compounds.</p> <p>Potential acid deposition as a result of air emissions.</p>	<p>The LNG plant will use electric motor driven technology for all liquefaction process and utility compressors, pumps and fans. Use of electric drives largely eliminates combustion related emissions such as NO₂, SO₂, CO and particulate matter.</p> <p>See Atmospheric Environment (Air Quality) related commitments of EA Certificate E06-01 (Schedule B).</p>
Greenhouse Gas (GHG) Management	-	<p>Construction: emissions from fuel combustion, power generation, vehicle traffic, shipping, flaring (for commissioning purposes only).</p> <p>Operations: emissions from fuel combustion, limited power generation, vehicle traffic, shipping, fugitive emissions, flaring (for emergency purposes only).</p> <p>Decommissioning: emissions from fuel combustion, vehicle and supply vessel</p>	<p>Change in GHG emissions with potential impacts to local and global climate change (primarily during operational phase).</p> <p>Primary substances of concern are methane, nitrous oxide and CO₂.</p>	<p>The LNG plant will use electric motor driven technology for all liquefaction process and utility compressors, pumps and fans.</p> <p>See Atmospheric Environment (Climate) related commitments of EA Certificate E06-01 (EAC Schedule B).</p>

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
		traffic, shipping, flaring (for emergency purposes only).		

4.2 Terrestrial Environment

4.2.1 Valued Components

Candidate Terrestrial Environment VCs and associated Subcomponents are:

- Vegetation

Species-based subcomponents:

- Plant species at risk
- Other plant species of management concern including (*i.e.*, invasive plants)

Ecosystem-based subcomponents:

- Rare and sensitive ecological communities
- Wetlands
- Riparian ecosystems
- Old growth forests

Geology/Terrain and Soils were not considered VCs but were considered as pathway linkages to the Vegetation VC. Field surveys were completed in support of Terrain and Soils and will be discussed briefly below as indicators for the Vegetation VC.

The Amendment Application will identify the VCs selected for assessment according to the methodology specified in Section [3.1 Issues Scoping and Selection of Valued Components](#). The Amendment Application will also include the rationale for any differences in the list of VCs presented in the Amendment Application from those listed in the final Amendment Application Information Requirements.

Vegetation is proposed as a VC for the EA to evaluate potential changes to vegetation resources due to Project activities. The Vegetation VC includes two species-based subcomponents and four ecosystem-based subcomponents.

Species-based VC subcomponents have been selected based on their Aboriginal, regulatory, stakeholder, and conservation importance. The federal *Species at Risk Act* (SARA) and the associated bilateral Canada-British Columbia Agreement on Species at Risk (Government of Canada 2013) protects plant species in BC that are listed federally as Threatened or Endangered under Schedule 1. Plant species at risk are also provincially designated based on limited or unknown population distributions and have been identified as a conservation priority by the provincial government. Populations of species-based VC subcomponents may be reduced through Project direct and indirect effects, such as vegetation clearing, alteration of abiotic conditions sustaining plant populations, or the introduction of invasive and noxious plant species.

Ecosystem-based VC subcomponents have been selected based on their Aboriginal, regulatory, stakeholder, and conservation importance. Rare and sensitive ecological communities are provincially

designated based on limited (or unknown) population distributions and have been identified as a conservation priority by the provincial government. Wetlands, old growth forests, and riparian ecosystems are sensitive to disturbance, have developed over long time periods, and provide high value wildlife habitat. The spatial extent of these ecosystem-based VC subcomponents may be reduced through direct and indirect effects, including vegetation clearing, alteration of hydrological regimes, eutrophication, or habitat fragmentation.

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 11.

Table 11: Indicators and Measurable Parameters for Vegetation VC

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Species-based indicators <ul style="list-style-type: none"> • Plant species at risk distribution • Other plant species of management concern distribution (<i>i.e.</i>, invasive plant distribution) 	Species-based subcomponents <ul style="list-style-type: none"> • Plant species at risk • Other plant species of management concern including (<i>i.e.</i>, invasive plants) 	<ul style="list-style-type: none"> • Abundance and distribution of known locations of species-based subcomponents affected by the proposed KLNG Expansion Project 	<ul style="list-style-type: none"> • Practical and measurable indicator using available data.
Ecosystem-based indicators <ul style="list-style-type: none"> • Rare and sensitive ecological community distribution • Wetland distribution • Old growth forest distribution • Riparian ecosystem distribution 	Ecosystem-based subcomponents <ul style="list-style-type: none"> • Rare and sensitive ecological communities • Wetlands • Riparian ecosystems • Old growth forests 	<ul style="list-style-type: none"> • Area (ha) of ecosystem-based subcomponents affected by the proposed KLNG Expansion Project • Surface water flow and site drainage alterations • Changes in vegetation community composition measured as: <ul style="list-style-type: none"> ○ Change in critical levels for SO₂ and NO₂ exceeded ○ Critical loads for nitrogen (NO_x) and sulphur (SO_x) ○ Critical loads for acid deposition 	<ul style="list-style-type: none"> • Practical and measurable indicator using available data. • Responsive to the potential effects of the proposed KLNG Expansion Project.

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

4.2.2 Context and Boundaries

The Vegetation VC was selected because of its Aboriginal, regulatory, conservation and stakeholder importance, and because it may be adversely affected through the direct and indirect effects of the proposed KLNG Expansion Project.

Regulation and government context relevant to Vegetation VC include:

- The federal *Species at Risk Act* (SARA) and the associated bilateral Canada-British Columbia Agreement on Species at Risk (Government of Canada 2002, 2013);
- The BC *Forest and Range Practices Act* (FRPA) (Government of BC 2002);
- Oil and Gas Activities Act (OGAA) and Environment Protection and Management Regulation;
- BC *Weed Control Act* (Government of BC 1996);
- Weed Control Regulation (Government of BC 2011); and
- Federal Policy on Wetland Conservation (Government of Canada 1991).

The Government of British Columbia has adopted an approach to maintaining the province's rich biodiversity, referred to as the Conservation Framework (BC MOE 2009). This framework has three goals for conservation of species and ecosystems:

- Contribute to global efforts for species and ecosystem conservation;
- Prevent species and ecosystems from becoming at risk; and
- Maintain the diversity of native species and ecosystems.

To assist with these goals, species are ranked according to global and provincial risk status ranks determined by NatureServe (globally) and the BC Conservation Data Centre (BC CDC; provincially) (BC CDC 2018). The methods used to rank species globally and provincially have been established by NatureServe (Faber-Langendoen et al. 2012). At a provincial level, scores are assigned to each species or ecosystem based on various criteria, and categorized into one of several lists designated as red, blue, yellow, extinct, exotic, accidental, and unknown or no status (BC CDC 2018):

- Red-listed – includes ecological community and indigenous species and subspecies that is

extirpated, endangered, or threatened in British Columbia. Extirpated elements no longer exist in the wild in British Columbia but do occur elsewhere. Endangered elements are facing imminent extirpation or extinction. Threatened elements are likely to become endangered if limiting factors are not reversed.

- Blue-listed – includes ecological community and indigenous species and subspecies considered to be of special concern (formerly vulnerable) in British Columbia because of characteristics that make them particularly sensitive to human activities or natural events.
- Yellow-listed – indigenous species or subspecies (taxa) that is not at risk in British Columbia.
- Exotic – species that has been moved beyond its natural range as a result of human activity. Exotic species are also referred to as alien species, foreign species, introduced species, non-indigenous species and non-native species.
- Accidental – species occurring infrequently and unpredictably, outside its usual range.
- Unknown – species where there is substantial uncertainty about its status or uncertainty regarding whether it is native, introduced or accidental.

FRPA outlines resource-based activities on Crown land to manage the protection of plants, animals and ecosystems while setting requirements for planning, road construction, logging, and reforestation for forest range licenses (Government of BC 2002). Old forest retention (*e.g.*, old-growth management areas) is covered under FRPA through objectives set for wildlife and biodiversity.

Invasive plants are provincially regulated noxious weed species listed under the BC *Weed Control Act* (Government of BC 1996) and Weed Control Regulation (Government of BC 2011) and / or are species designated as invasive by the FLNRORD Invasive Alien Plant Program (IAPP) (BC MFLNRORD 2019).

Wetlands are of high socio-economic and ecological importance and are important reservoirs of biodiversity (Hails 1997). An interim guidance document prepared on wetland conservation *Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia* outlines the importance of wetlands and measures for mitigating impacts to these ecosystems (Wetland Stewardship Partnership 2009). In addition, the Federal Policy on Wetland Conservation was developed to conserve Canada's wetlands to sustain their ecological and socio-economic functions on federal lands and waters (Government of Canada 1991).

Riparian ecosystems comprise the ecotone between terrestrial and aquatic habitats (Richardson and Moore 2010) and are, in contrast to wetlands, flooded for a relatively short time during the growing season (MacKenzie and Moran 2004). Riparian ecosystems function in linking upland forests to watercourses, supporting species rich plant and animal communities, stabilizing streambanks and

floodplains, regulating stream temperatures, and providing a source of large woody debris and organic matter for aquatic food webs (Tschaplinski and Pike 2010). Riparian ecosystems are valued for these functions, and are vulnerable to activities such as forest harvesting, which can alter water temperature regimes, introduce fine sediments, and alter channel dynamics and bank stability (Tschaplinski and Pike 2010).

Old growth forests are structurally complex, often with large-sized trees, snags and coarse woody debris. The time since stand-replacing disturbance is greater than 250 years for old growth forests in the CWH zone (BC MOFR and BC MOE 2010). Old growth forests are important for maintaining biodiversity, maintaining wildlife habitat, as well as for aesthetic and intrinsic reasons (MacKinnon 1998; Spies 1997; Spies and Turner 1999).

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

4.2.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment Application.

In 2017 and 2019 the Holder initiated desktop and primary data collection studies to support the assessment of effects on Vegetation that were designed to address known data gaps. The objectives of the relevant studies are summarized in Table 12.

Table 12: Studies to Support the Assessment of the Vegetation VC

Study Name	Study Objectives
Desktop Review	Existing information was used to identify the distribution and status of terrestrial vegetation and ecosystems known to be present and those that potentially occur in the terrestrial LAA and RAA. Data reviewed included previous surveys completed for the Project and adjacent projects, web-based mapping service for spatial vegetation and ecosystem data (e.g., iMapBC, BC CDC Species and Ecosystem Explorer, SAR Public Registry, COSEWIC reports, E-Flora BC, Digital information from the Land and Resource Data Warehouse), vegetation and ecosystem reports and publications available (e.g., Vegetation Resource Inventory data from FLNRORD, with

Study Name	Study Objectives
	updates on recent cutblocks, previous Terrestrial Ecosystem Mapping [TEM], Predictive Ecosystem Mapping [PEM], or Sensitive Ecosystem Mapping [SEI] in the vicinity of the Project). Previous rare plant surveys and traditional use plant studies in the area were also referenced.
Vegetation Field Surveys to Support TEM	<p>TEM was completed in accordance with RISC (1998) at a scale of 1:5,000 for the terrestrial LAA. Ecosystems were described following Banner et al. (1993), and wetland ecosystems described following the Canadian Wetland Classification System (NWWG 1997), and MacKenzie and Moran (2004). An amalgamation of TEM and small-scale PEM available from the BC MOE PEM warehouse was used to map ecosystems for the terrestrial RAA. In addition, the following information was collected during vegetation field surveys:</p> <ul style="list-style-type: none"> • listed plant species and listed ecological communities • noxious weeds and invasive plant species • stand age and coarse woody debris data to help characterise wildlife habitat.
Bioterrain Field Surveys to Support TEM	Bioterrain field surveys were conducted to characterize the existing environment and fill data gaps for evaluating potential effects of the Project on surficial geology, terrain and soils. A soil survey was completed that conforms with the Soil Mapping System for Canada (Agriculture Canada 1981), with soil taxonomic classes determined in accordance with the Canadian System of Soil Classification (Soil Classification Working Group 1998) and Field Manual for Describing Terrestrial Ecosystems (BC MOFR and BC MOE 2010) to determine soil units and mapping for the Project.
Soil Acidification and Eutrophication Field Surveys	Objective to assess the potential for acidification and eutrophication of terrestrial ecosystems through analysis of critical loads on soils in the Project area using Slow Mass Balance (SMB) model utilizing weathering rates of minerals using PROFILE (Warfvinge and Sverdrup 1992). Soil survey and mapping related to acidification and eutrophication assessment will follow principals of Soil Mapping System for Canada (Agriculture Canada 1981) and the Soil Inventory Methods for British Columbia (RIC 1995).

4.2.4 Potential Effects

A summary of anticipated Vegetation VC interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 13.

The Amendment Application will identify potential adverse effects to the Vegetation VC resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

4.2.5 Mitigation Measures

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

4.2.6 Residual Effects and their Significance

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.2.7 *Cumulative Effects and their Significance*

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and
- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.2.8 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 13: Terrestrial Environment: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Vegetation	<p>Species-based:</p> <ul style="list-style-type: none"> • Plant species at risk • Other plant species of management concern including (<i>i.e.</i>, invasive plants) <p>Ecosystem-based:</p> <ul style="list-style-type: none"> • Rare and sensitive ecological communities • Wetlands • Riparian ecosystems • Old growth forests 	<p>Construction: vegetation removal and land clearing and excavation; stockpiling; temporary resurfacing; heavy vehicle traffic; road and infrastructure development; temporary workspace installation; fuel and chemical handling and storage; dewatering.</p> <p>Operations: road and infrastructure use and maintenance; fuel and chemical use; project emissions.</p>	<p>Clearing and vegetation removal during construction could potentially result in direct loss of plant and ecosystem extent or an indirect change to suitable plant habitat and ecosystem composition.</p> <p>Indirect effects to ecosystems could result from changes in drainage patterns, dust deposition, airborne deposition of chemical compounds, acidification / eutrophication and proliferation of noxious/invasive species, etc.</p>	<p>See Terrestrial Environment related commitments of EA Certificate E06-01 (Schedule B).</p>

4.3 Wildlife and Wildlife Habitat

4.3.1 Valued Components

Candidate Wildlife and Wildlife Habitat VC has the following four candidate subcomponents and associated focal species:

- Wildlife Species of Conservation Concern
 - Grizzly bear
 - Little brown myotis
 - Western toad
 - Coastal tailed frog
 - Western screech-owl
 - Northern goshawk *laingi* subspecies
- Marine Birds
 - Great blue heron *fannini* subspecies
 - Marbled murrelet
 - Cassin’s auklet
 - Western grebe
- Migratory Birds
 - Olive-sided flycatcher
- Other Species of Interest
 - Black bear
 - Moose
 - Marten

In-air noise will be considered a pathway linkage to the Wildlife and Wildlife Habitat VC.

The Amendment Application will identify the VCs selected for assessment according to the methodology specified in Section [3.1 Issues Scoping and Selection of Valued Components](#). The Amendment Application will also include the rationale for any differences in the list of VCs presented in the Amendment Application from those listed in the final Amendment Application Information Requirements.

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 14.

Table 14: Indicators and Measurable Parameters for Wildlife and Wildlife Habitat VC

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Wildlife habitat	Wildlife Species of Conservation Concern	Area (ha) and suitability of wildlife habitat (e.g., direct habitat loss,	<ul style="list-style-type: none"> • Direct or indirect loss of potential habitat may occur

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
quality (suitability) and quantity	Marine Birds Migratory Birds Other Species of Interest	changes in habitat suitability from changes in water quality for aquatic species and sensory disturbance from noise).	during the construction, operation, and decommissioning phases of the Project. Changes to quality and extent of available habitat can be measured using predictive models.
Wildlife mortality	Wildlife Species of Conservation Concern Marine Birds Migratory Birds Other Species of Interest	Sources of mortality and intensity of effect	<ul style="list-style-type: none"> Wildlife mortality has the potential to occur as result of construction/operation activities. Wildlife mortality is a relevant and responsive indicator that can be assessed qualitatively and quantitatively.
Wildlife movement	Wildlife Species of Conservation Concern Other Species of Interest	Habitat fragmentation and barriers to wildlife movement (qualitative)	<ul style="list-style-type: none"> Project activities and components during construction and operation may have the potential to affect wildlife movement. Wildlife movement is a relevant and responsive indicator that can be assessed qualitatively.

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

4.3.2 Context and Boundaries

Wildlife and Wildlife Habitat VC and subcomponents were selected because of their Aboriginal, regulatory, conservation and stakeholder importance, and because they may be adversely affected through the direct and indirect effects of the proposed KLNG Expansion Project.

Regulation and government context relevant to Wildlife and Wildlife Habitat VCs include:

- The federal *Species at Risk Act (SARA)* and the associated bilateral Canada-British Columbia Agreement on Species at Risk (Government of Canada 2002, 2013);
- The federal *Migratory Birds Convention Act (MBCA)* (Government of Canada 1994);
- The BC *Wildlife Act* (Government of BC 1996); and
- The BC *Forest and Range Practices Act (FRPA)* (Government of BC 2002).

In B.C., the provincial *Wildlife Act* (Government of BC 1996) is the only legislation that addresses endangered species specifically. Section 6 of the *Wildlife Act* empowers the provincial cabinet to designate a species as “Endangered” if, as a result of the action of humans, it is threatened with imminent extinction throughout a significant portion of its range or to designate a species as “Threatened” if it is likely to become endangered.

Provincially Red- and Blue-listed species by the Conservation Data Centre (CDC) potentially affected by forest and range practices may also be protected under FRPA if they meet criteria under the Act and are added to the category of Species at Risk, Regionally Important Wildlife Species, or Ungulate Species following order by the provincial Minister (BC MOE 2018). The establishment of categories of species enables a number of other provisions under the Act to be used to manage these wildlife species including habitat protection through the development of wildlife habitat areas (WHA), ungulate winter ranges (UWR), and associated general wildlife measures and objectives. However, these provisions only apply on Crown lands affected by forest and range management practices, or privately-owned land subject to tree farm or woodlot licenses (BC MOE 2018).

At the federal level, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is a group of experts that assess and designate animal, plant, and fungi species that are in danger of disappearing from Canada. The federal government periodically reviews the COSEWIC designations to determine if a listed species should be protected by law. The SARA establishes Schedule 1 as the official list of wildlife species at risk in Canada (Government of Canada 2019). Schedules 2 and 3 of SARA include species designated at risk by COSEWIC prior to October 1999. These species must be reassessed using revised criteria before they can be added to Schedule 1 of SARA.

The selection of Wildlife and Wildlife Habitat VC subcomponent candidate focal species focused on species of conservation concern, which are defined as “provincially Red- or Blue-listed species and/or species listed federally as Special Concern, Threatened or Endangered on Schedule 1 of SARA”. Wildlife species that are not of conservation concern, but are important to wildlife management agencies, the public, and Indigenous Groups because of their scientific, socio-economic, or cultural importance, were also considered. Those species are collectively referred to as “species of management concern”. Further, candidate focal species were selected to represent a variety of taxa (*i.e.*, species groups), environmental conditions (*e.g.*, habitats) and ecological roles (*e.g.*, predators and prey) applicable to evaluating Project effects. The conservation status of candidate focal species is presented in Table 15.

Table 15: Conservation Status of Wildlife and Wildlife Habitat VC Candidate Focal Species

Common Name	Scientific Name	COSEWIC ^(a)	SARA ^(a)	BC Status ^(b)
Coastal tailed frog	<i>Asaphus truei</i>	Special Concern	Special Concern, Schedule 1	Yellow (S4)

Common Name	Scientific Name	COSEWIC ^(a)	SARA ^(a)	BC Status ^(b)
Western toad	<i>Anaxyrus boreas</i>	Special Concern	Special Concern, Schedule 1	Yellow (S4)
American black bear	<i>Ursus americanus</i>	Not at Risk	–	Yellow (S5)
Grizzly bear	<i>Ursus arctos</i>	Special Concern	Special Concern, Schedule 1	Blue (S3?)
Little brown myotis	<i>Myotis lucifugus</i>	Endangered	Endangered, Schedule 1	Yellow (S4)
Moose	<i>Alces americanus</i>	–	–	Yellow (S5)
Pacific marten	<i>Martes caurina</i>	–	–	Yellow (S5)
Northern goshawk, <i>laingi</i> subsp.	<i>Accipiter gentilis laingi</i>	Threatened	Threatened, Schedule 1	Red (S2)
Olive sided flycatcher	<i>Contopus cooperi</i>	Special Concern	Threatened, Schedule 1	Blue (S3S4B)
Western Screech-owl, <i>kennicottii</i> subsp.	<i>Megascops kennicottii</i>	Threatened	Threatened, Schedule 1	Blue (S2S3)
Great blue heron, <i>fannini</i> subsp.	<i>Ardea herodias fannini</i>	Special Concern	Special Concern, Schedule 1	Blue (S2S3B, S4N)
Marbled murrelet	<i>Brachyramphus marmoratus</i>	Threatened	Threatened, Schedule 1	Blue (S3B,S3N)
Cassin's auklet	<i>Ptchoramphus aleuticus</i>	Special Concern	Special Concern, Schedule 1	Red (S3B,S3N)
Western grebe	<i>Aechmophorus occidentalis</i>	Special Concern	Special Concern, Schedule 1	Red (S1B,S2N)

^(a) Source: Government of Canada (2019). – = no status.

^(b) Source: BC CDC (2019).

Note: BC = British Columbia; COSEWIC = Committee on the Status of Endangered Wildlife in Canada; SARA = *Species at Risk Act*.

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

4.3.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment Application.

In 2017, the Holder initiated desktop and primary data collection studies to support the assessment of effects on Wildlife and Wildlife Habitat VC candidate focal species that were designed to address known data gaps. The objectives of the relevant studies are summarized in Table 16.

Table 16: Studies to Support the Assessment of Wildlife and Wildlife Habitat VCs

Study Name	Study Objectives
Desktop Review	Existing information was used to identify the distribution and status of terrestrial wildlife species known to be present and those that potentially occur in the LAA and RAA. Data reviewed included previous surveys completed for the Project and adjacent projects, web-based mapping service for spatial terrestrial wildlife data (e.g., iMapBC), wildlife reports and publications available through BC Cross-Linked (CLIR) web explorer, and other web-based wildlife data repositories (e.g., BC Breeding Bird Atlas).
Amphibian Surveys	To determine the presence (presence/not-detected status) of pond breeding amphibians in and around the LAA, and to locate breeding activity. Surveys were designed following methods described in RISC standards for amphibian presence/not-detected surveys using systematic visual encounter methods (RIC 1998a). The focus of this survey was on western toad (<i>Anaxyrus boreas</i>) because this species is a widely occurring amphibian that uses both aquatic and terrestrial habitats and is also a species of conservation concern.
Bat Summer Acoustic Survey	To determine bat presence (present/not-detected status), habitat associations, foraging activities, and movement activities in the LAA during the late summer period. The presence of bats was documented by recording echolocation calls (i.e., number of call passes) using acoustic detectors. Species of conservation concern, such as Keen’s myotis (<i>Myotis keenii</i>), little brown myotis (<i>M. lucifugus</i>), northern myotis (<i>M. septentrionalis</i>), and Townsend’s big-eared bat (<i>Corynorhinus townsendii</i>) were the focus of these surveys. Surveys were designed following methods described in RISC standards for acoustic detection of bats (RIC 1998b).
Breeding Bird Survey	To determine the presence, distribution, and relative abundance of native, non-invasive songbirds in the LAA, with a focus on provincially and/or federally listed bird species of conservation concern. Breeding bird survey methods were adapted from standard technical procedures for point counts described in Ralph (1993) and RISC guidelines for breeding songbirds (RIC 1999).
Marbled Murrelet Nesting Habitat Survey	To delineate and rank suitable marbled murrelet nesting habitat in and around the LAA. The survey followed the low-level aerial survey (LLAS) methods described by Burger et al. (2009) and Burger (2004).

Study Name	Study Objectives
Northern Goshawk Survey	To determine the presence (presence/not-detected status) of northern goshawk <i>laingi</i> subspecies in and around the LAA. Northern goshawk surveys were designed following methods described in RISC standards for presence/not-detected surveys using call-playback techniques (RIC 2001b) in combination with systematic visual surveys based on 2012 Best Management Practices (Stuart-Smith et al. 2012) and communication with northern goshawk specialists in BC (Doyle 2015a,b,c pers. comm.; Hetherington 2015, pers. comm.).
Raptor and Heron Nest Survey	To locate and characterize the nests of conspicuous breeding raptors and herons in and around the LAA, with a focus on species whose nests are protected year-round under the BCWA. An aerial survey was completed using methodology adapted from recommended guidelines described in RISC standards for raptor and heron nest presence/not-detected surveys (RIC 1998c, 2001b).
Western Screech-Owl Survey	To determine the presence (presence/not-detected status) of the western screech-owl <i>kennicottii</i> subspecies in and around the LAA. Western screech-owl surveys were designed following methods described in RISC standards for presence/not-detected surveys using call-playback techniques (RISC 2006).
Marine Bird Survey	To characterize the spatiotemporal occurrence of marine bird species in and around the LAA. Survey methodology was adapted from protocols used by the Canadian Wildlife Service (CWS 2006; Gjerdrum et al. 2012) and provincial standards (RIC 1997a, b,c; RIC 2001a) for conducting near shore and offshore vessel-based marine bird surveys.

4.3.4 Potential Effects

A summary of anticipated Wildlife and Wildlife Habitat VC interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 17.

The Amendment Application will identify potential adverse effects to the Wildlife and Wildlife Habitat VCs resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

4.3.5 Mitigation Measures

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

4.3.6 Residual Effects and their Significance

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.3.7 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and
- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.3.8 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 17: Wildlife and Wildlife Habitat: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Wildlife and Wildlife Habitat	Wildlife Species of Conservation Concern Marine Birds Migratory Birds Other Species of Interest	<p>Construction: clearing of habitat; excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; fuel and chemical handling and storage; noise and light from construction activities.</p> <p>Operations: vehicle and vessel traffic; road and infrastructure use and associated noise; fuel and chemical handling and storage.</p> <p>Decommissioning: vehicle traffic; road and infrastructure removal; fuel and chemical handling and storage; demolition activities.</p>	<p>Effects may occur from:</p> <ul style="list-style-type: none"> • habitat loss or alteration resulting in change in habitat suitability; • changes in mortality risk due to risks of collisions with infrastructure; • alteration of movement patterns including displacement; • disturbance due to lighting and noise. 	See Wildlife and Wildlife Habitat related commitments of EA Certificate E06-01 (Schedule B).

4.4 Water Resources

4.4.1 Valued Components

Candidate Water Resources VCs and associated Subcomponents are:

- Surface Water Resources
 - Surface Water Quality
 - Surface Water Quantity
- Groundwater Resources
 - Groundwater Quality
 - Groundwater Quantity

The Amendment Application will identify the VCs selected for assessment according to the methodology specified in Section [3.1 Issues Scoping and Selection of Valued Components](#). The Amendment Application will also include the rationale for any differences in the list of VCs presented in the Amendment Application from those listed in the final Amendment Application Information Requirements.

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 18.

Table 18: Indicators and Measurable Parameters for Water Resources VCs

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Changes to surface water quality	Surface Water Resource / Surface water quality Groundwater Resources / Groundwater quality	<ul style="list-style-type: none"> • TSS concentrations in water. • Contaminant concentrations in sediment and water. • Nutrient concentrations in water. • Bacteria in water. 	<ul style="list-style-type: none"> • Construction, operations and decommissioning all have the potential to influence these parameters in water. • Environmental quality benchmarks have been established for one or more of these parameters and can be used as an initial screening tool to evaluate the potential for effects.
Changes to existing groundwater quality	Groundwater Resources / Groundwater Quality	<ul style="list-style-type: none"> • Groundwater and surface water level monitoring • Groundwater and surface water sampling and analysis of physical and chemical parameters 	<ul style="list-style-type: none"> • Construction, operations and decommissioning all have the potential to influence groundwater quality. • Baseline groundwater quality has been established for one or more of these parameters and can be used as an initial

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
			screening tool to evaluate the potential for effects.
Effects of groundwater extraction on aquifers and streamflow/ freshwater aquatic habitat	Groundwater Resources / Groundwater Quantity	<ul style="list-style-type: none"> • Groundwater level monitoring • Aquifer hydraulic parameters • Groundwater extraction rates (based on pumping tests) • Surface water level monitoring in Bish Creek and Skoda Creek 	<ul style="list-style-type: none"> • Groundwater extraction may affect groundwater availability/sustainability, and nearby surface waters
Alteration of Site drainage	Surface Water Resources / Surface Water Quantity	<ul style="list-style-type: none"> • Surface water level and flow monitoring in streams 	<ul style="list-style-type: none"> • Construction, operations and decommissioning all have the potential to influence these parameters through alteration of site drainage, including runoff quantity, land cover, terrain feature changes, and water withdrawals or discharges.

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

4.4.2 Context and Boundaries

Water Resources VCs were selected because of their Aboriginal, regulatory, conservation and stakeholder importance, and because they may be adversely affected through the direct and indirect effects of the proposed KLNG Expansion Project:

- Surface (fresh) water quality and quantity are important habitat components for fish and other aquatic organisms in streams within the assessment area;
- Impacts to groundwater quality and/or groundwater flow direction from groundwater extraction and construction and operational activities may affect groundwater supply and potential groundwater receptors (*i.e.*, surface freshwater quality); and
- Groundwater extraction is required at a normal water use rate of 7.5 m³/hr, with peak rate of 156 m³/hr for filling firewater tanks. Groundwater extraction at the proposed rates may affect aquifer availability/sustainability. Additionally, the source groundwater aquifer may be in hydraulic connection with the surface freshwater in nearby streams, primarily Bish Creek and Skoda Creek; and groundwater extraction during construction and operational activities has the potential to affect streamflow and freshwater aquatic habitat.

Regulation and government context relevant to Water Resources VCs include:

- Federal *Fisheries Act* (Government of Canada 1985);
- British Columbia *Environmental Management Act* (Government of BC 2003);
- British Columbia *Water Sustainability Act* (Government of BC 2014);
- British Columbia Water Sustainability Regulation (Government of BC 2016a);
- British Columbia Groundwater Protection Regulation (Government of BC 2016b);
- British Columbia Contaminated Sites Regulation (Government of BC 1996);
- Guidelines for Canadian Drinking Water Quality (Health Canada 2019);
- Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites, Version 4 (Government of Canada 2016);
- Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG): Water Quality Guidelines for the Protection of Aquatic Life freshwater (CCME 1999);
- British Columbia Approved Water Quality Guidelines for the protection of freshwater aquatic life (MOE 2019);
- British Columbia Working Water Quality Guidelines for the protection of freshwater aquatic life (MOE 2017); and
- The BC Ministry of Environment document entitled Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators, Version 2 (MOE 2016) was referenced to determine frequency and type of monitoring for the groundwater component.

Effluent discharges and other inputs to surface water bodies may be considered deleterious substances under the federal *Fisheries Act* (Government of Canada 1985) or may cause pollution vis-à-vis the BC *Environmental Management Act* (Government of BC 2003). The *Fisheries Act* and *Water Sustainability Act* (Government of BC 2014) have the function of protecting water flows and ultimately fish habitat.

Pursuant to the *Water Sustainability Act* (Government of BC 2014) and associated Water Sustainability Regulation (Government of BC 2016a), impacts that surface water and groundwater extraction or discharge, construction, and operational activities may have on groundwater aquifers and on nearby watercourses must be assessed and potentially mitigated. Pollution to groundwater aquifers/supplies is regulated under the *Environmental Management Act* (Government of BC 2003).

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

4.4.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment Application.

In 2018, the Holder initiated desktop and primary data collection studies to support the assessment of effects on surface water quality and quantity that were designed to address known data gaps.

The Holder initiated a desktop hydrogeological study in early 2017 to review previous hydrogeological studies and identify data gaps. The Holder subsequently conducted hydrogeological field studies in 2017, 2018 and 2019 at the Plant Site to collect baseline hydrogeological information, develop a hydrogeological conceptual model and support the assessment of potential effects on groundwater quality and quantity, and on associated receptors.

The objectives of the relevant studies are summarized in Table 19.

Table 19: Studies to Support the Assessment of Water Resources VCs

Study Name	Study Objectives
Evaluation of eutrophication and acidification	Water samples were collected from creeks in the vicinity of the Plant site and analyzed following the guidance of BC MOE (2015). These data will be combined with available data for lakes in the area as a basis for an assessment of the potential for acidification/ eutrophication following provincial guidance (BC MOE 2014, 2015)
Baseline Groundwater Conditions	<ul style="list-style-type: none"> • Quarterly groundwater level measurements and groundwater quality monitoring and sampling at nineteen existing monitoring wells and nine newly constructed monitoring wells between May 2017 and November 2019 to assess seasonal changes in groundwater levels and groundwater quality in the shallow and deep groundwater aquifers at the Plant Site. The newly constructed monitoring wells were installed in January/February 2019 as part of the baseline groundwater conditions assessment.

Study Name	Study Objectives
	<ul style="list-style-type: none"> • Installation of dataloggers at select monitoring wells across the Plant Site to evaluate long-term trends in groundwater elevations, and to obtain baseline groundwater elevations for reference in subsequent hydraulic testing of test water supply wells. • Installation of a datalogger in Bish Creek in May 2017 to evaluate long-term trends in surface water elevations in Bish Creek and to compare elevations in Bish Creek with groundwater elevations. • Installation of shallow piezometers adjacent to Bish Creek and Skoda Creek to evaluate trends in shallow groundwater elevations near the creeks and to obtain baseline groundwater elevations for reference in subsequent hydraulic testing of test water supply wells. • Construction of three test water supply wells at the Plant Site, within the targeted basal aquifer. • Hydraulic pumping tests at each of the test water supply wells, including measurements of water levels in the surrounding monitoring infrastructure and evaluation of basal aquifer hydraulic parameters. • Evaluation of water quality and water level data; and assessment of groundwater availability/sustainability including potential hydraulic connection between aquifers and nearby streams. • Development of a hydrogeological conceptual model.
Surface Water Quantity	Hydrometric monitoring of Bish Creek using data loggers has been conducted to measure the annual discharge rate in Bish Creek, and a meteorological station with a rain gauge measures the rainfall at the Plant Site.

4.4.4 Potential Effects

A summary of anticipated Water Resources VCs interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 20.

The Amendment Application will identify potential adverse effects to the Water Resources VCs resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

4.4.5 Mitigation Measures

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

4.4.6 Residual Effects and their Significance

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder’s significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder’s Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.4.7 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and
- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.4.8 Follow-up Strategy

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 20: Water Resources: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Surface Water Resources	Surface Water Quality Surface Water Quantity	<p>Construction: excavation; stockpiling; temporary resurfacing; installation of culverts; construction of access roads and onshore infrastructure; heavy vehicle traffic; fuel and chemical handling and storage; construction of a storm water collection system and underground utilities.</p> <p>Operations: vehicle traffic; road and infrastructure use and updates; fuel and chemical handling and storage; operation of a sewage treatment plant and storm water management system.</p>	<p>Alteration of drainage patterns and increase of impervious areas, which can lead to erosion, waterlogging, flooding and/or the sedimentation of local watercourses and estuaries, potentially resulting in reduced water quality in streams and ocean and cause impacts to wildlife and human health and/or recreational activities.</p> <p>Reduced water quality in streams and ocean due to accidental fuel or chemicals spills, resulting in impacts to wildlife and human health and/or recreational activities.</p> <p>Potential acidification of surrounding freshwater bodies due to SO₂ and NO_x emissions, resulting in reduced water quality in streams and lakes and impacts to wildlife and human health and / or recreational activities.</p>	<p>Stormwater management plan required to manage water on site.</p> <p>See Freshwater and Fisheries Environment (Water and Wastewater Management) related commitments of EA Certificate E06-01 (Schedule B).</p> <p>The LNG plant will use electric motor driven technology for all liquefaction process and utility compressors, pumps and fans. Use of electric drives largely eliminates combustion related emissions such as NO₂ and SO₂.</p>
Groundwater Resources	Groundwater Quality Groundwater Quantity	<p>Construction: groundwater extraction for processing and domestic use; excavation; stockpiling; temporary resurfacing; installation of culverts; construction of access roads and onshore infrastructure; heavy vehicle traffic; fuel and chemical handling and storage; construction of a storm water collection system and underground utilities.</p>	<p>Alteration of groundwater recharge and discharge locally due to an increase in impervious areas and construction of a storm water collection system</p> <p>Changes to groundwater levels and flows, resulting in impacts to local groundwater dependent ecosystems, such as Bish Creek</p> <p>Impacts to groundwater quality and receiving streams, lakes, or reservoirs</p>	<p>Develop groundwater management plan outlining groundwater protection measures, BMPs and monitoring programs.</p>

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
		Operations: groundwater extraction for processing and domestic use; fuel and chemical handling and storage.	due to soil acidification or accidental chemical, fuel or sewage releases	

4.5 Freshwater Fish and Fish Habitat

4.5.1 Valued Components

Candidate Freshwater Fish and Fish Habitat VCs and associated Subcomponents are:

- Freshwater Fish and Fish Habitat

The Amendment Application will identify the VCs selected for assessment according to the methodology specified in Section [3.1 Issues Scoping and Selection of Valued Components](#). The Amendment Application will also include the rationale for any differences in the list of VCs presented in the Amendment Application from those listed in the final Amendment Application Information Requirements.

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 21.

Table 21: Indicators and Measurable Parameters for Freshwater Fish and Fish Habitat VCs

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Fish habitat quality and quantity	Freshwater Fish and Fish Habitat/Anadromous fish Freshwater Fish and Fish Habitat/Resident fish	Area (m ²) and quality of in-stream and riparian habitat (Habitat Units; HU).	A direct or indirect loss of potential habitat may occur during the construction, operation, and decommissioning phases of the Project. Changes to the quality, extent, and distribution of available habitat are measurable using baseline fish habitat information.
Fish distribution (presence/absence) and abundance	Freshwater Fish and Fish Habitat/Anadromous fish Freshwater Fish and Fish Habitat/Resident fish	Fish species presence/absence and relative abundance.	Changes to fish distribution and abundance has the potential to occur during the construction, operational, and decommissioning phases of the Project. Changes to fish species presence/absence are measurable using fish inventory data collection and information. Changes to fish species relative abundance are measurable using fish community data collection and information.

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

4.5.2 Context and Boundaries

Regulation and government context relevant to the Freshwater Fish and Fish Habitat VC include:

- *Fisheries Act* (Government of Canada 1985);
- Applicant's Guide Supporting the "Authorizations Concerning Fish and Fish Habitat Protection Regulations" (DFO 2019);
- Fish and fish habitat protection policy statement, August 2019 (DFO 2019);
- Measures to Protect Fish and Fish Habitat (DFO 2019);
- Aquatic Invasive Species Regulations (Government of Canada 2015);
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- Canadian Environmental Quality Guidelines (CCME 2019);
- *BC Water Sustainability Act* (Government of BC 2014);
- British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (MOE 2019);
- British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (MOE 2017);
- *Species at Risk Act* (SARA; Government of Canada 2002); and
- Resource Information Standards Committee (RISC) standards (RISC 2014).

In Canada, federal and provincial legislation protects fish and fish habitat. These include the federal *Fisheries Act* and SARA, as well as the provincial *Water Sustainability Act* and *Wildlife Act* (Government of BC 1996). The purpose of the federal *Fisheries Act* is to provide a framework for the proper management and control of fisheries and the conservation and protection of fish and fish habitat, including by preventing pollution. Specifically, the fish and fish habitat protection provisions of the *Fisheries Act* prohibits any works, undertakings, or activities that result in the death of fish by means other than fishing or the harmful alteration, disruption or destruction of fish habitat. Section 36(3) prohibits the deposit of a deleterious substance of any type in water frequented by fish or in any place where the deleterious substance may enter any such water.

The *BC Water Sustainability Act* protects stream health and aquatic environments and regulates any changes in and about a stream due Project-related effects and considers environmental flow needs in new water allocation decisions.

The federal SARA was created to prevent species from becoming extirpated or extinct, to aid in the recovery of Endangered or Threatened species, and to prevent further species from becoming at risk through proper management. This objective is achieved by promoting and securing necessary actions for recovery through legal protection. COSEWIC uses a scientific process whereby species are assessed and ranked according to conservation concern (*i.e.*, Extinct, Extirpated, Endangered, Threatened, Special Concern, Not at Risk, or Data Deficient). The COSEWIC assessment is taken into consideration during a SARA listing process; however, only species and their critical habitats listed under SARA Schedule 1 are legally protected.

The British Columbia (BC) Conservation Data Centre (CDC), in cooperation with scientists and experts throughout the province, identifies vulnerable animals, plants, and ecological communities, and places them on Red and Blue lists. The Red list includes animals, plants, and ecological communities that are Extirpated, Endangered, or Threatened in BC, while the Blue list includes those that are of special concern. BC does not have stand-alone Endangered species legislation; however, the BC *Wildlife Act* (Government of BC 1996) protects all animals from direct harm, except as allowed by regulation (*e.g.*, trapping, hunting). Legal designation as Endangered or Threatened under the Act increases the penalties for harming a species and enables the protection of habitat in a critical Wildlife Management Area (WMA).

Coastal cutthroat trout *clarkii* subspecies, which is provincially Blue-listed (CDC 1995), are known to occur within the LSA. In addition to cutthroat trout, the CDC (2010) indicates one other listed fish species occurs in the municipality of Kitimat (and therefore may occur within or nearby to the site): green sturgeon, which is provincially Red-listed and designated as Special Concern by COSEWIC (Pearson and Healey 2012).

Eulachon (Pacific Coast and Nass/Skeena River populations), which is provincially Blue-listed (CDC 2006) and designated as Endangered by COSEWIC, could also potentially be present within the RSA.

Haisla Nation has identified traditional areas for harvesting salmon near the Project site.

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

4.5.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and

- Reference to any technical reports related to the VC that will be provided with Amendment Application.

A review of existing information was conducted to support the characterization of existing conditions for Freshwater Fish and Fish Habitat, this included the following sources:

- Literature review including data made available to Golder by KLNG and by LNG Canada through a data sharing agreement;
- Fisheries Information Summary System (FISS)
- Ecological Reports Catalogue (EcoCat) online database (BCMOE 2013a)
- Habitat Wizard interactive mapping database (BCMOE 2013b)
- iMapBC, interactive mapping database (BCMOE 2013c)
- DFO Aquatic Species at Risk Map (DFO 2019)
- British Columbia Species and Ecosystems Explorer internet database; and
- BC Freshwater Atlas.

In 2017, the Holder initiated desktop and primary data collection studies to support the assessment of effects on Freshwater Fish and Fish Habitat that were designed to address known data gaps. Building on available published information, field studies were conducted to address known data gaps. The objectives of the relevant studies are summarized in Table 22.

Table 22: Studies to Support the Assessment of Freshwater Fish and Fish Habitat VCs

Study Name	Study Objectives
Desktop Studies – Fisheries Resources and Fish Habitat	A comprehensive literature review of fisheries data was conducted to compile information on fish distributions and relative abundance as well as fish habitat quality and quantity within the Project site, LAA, and RAA.
Freshwater Fish and Fish Habitat Baseline Study – Plant Site	The Freshwater Fish and Fish Habitat Baseline Study at the Plant Site was conducted to support the EAC amendment. The amended Project footprint was expanded outside of the Project footprint for which the original EAC was issued; therefore, the 2017 Freshwater Fish and Fish Habitat Program focused on the EAC Amendment area. Data collected during the program is used to describe baseline conditions and to prepare an assessment of potential effects on Freshwater Fish and Fish Habitat for the Amendment Application.

Study Name	Study Objectives
Freshwater Fish and Fish Habitat – Oxbow Area Study to support development of offsetting plan.	The Freshwater Fish and Fish Habitat Baseline Study at the Oxbow Area was conducted to support the EAC amendment. Data collected during the program will be used to develop a conceptual design for potential offsetting in the Oxbow Area.

4.5.4 Potential Effects

A summary of anticipated Freshwater Fish and Fish Habitat VCs interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 23.

The Amendment Application will identify potential adverse effects to the Freshwater Fish and Fish Habitat VCs resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

4.5.5 Mitigation Measures

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

4.5.6 Residual Effects and their Significance

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder’s significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder’s Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.5.7 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the

Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);

- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and
- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.5.8 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 23: Freshwater Fish and Fish Habitat: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Freshwater Fish and Fish Habitat	None Proposed	<p>Construction: excavation, stockpiling, temporary resurfacing, installation of culverts and bridges, heavy vehicle traffic, road and infrastructure development, fuel and chemical handling and storage.</p> <p>Operations: vehicle traffic, road and infrastructure use and updates, fuel and chemical handling and storage.</p>	<p>Potential impacts to fish-bearing streams from installation of road crossing culverts and bridges</p> <p>Increased runoff and dust generation during the construction and decommissioning phases, could potentially enter fish-bearing streams via runoff and lead to environmental effects on water quality, fish and fish habitat</p>	<p>Install clear span bridges and follow Best Management Practices for designing and constructing stream crossings.</p> <p>See Freshwater and Fisheries Environment related commitments of EA Certificate E06-01 (Schedule B).</p>

4.6 Marine Resources

4.6.1 Valued Components

Candidate Marine Resources VCs and associated Subcomponents are:

- Marine Mammals
 - Steller sea lion
 - Killer whale
 - Harbour porpoise
 - Humpback whale

- Marine Resources
 - Marine Fish and Fish Habitat, including listed species at risk and commercial, recreational or Aboriginal fisheries
 - Marine Water Quality (pathway component)
 - Benthic Fauna
 - Marine Sediment (pathway component)

The Amendment Application will identify the VCs selected for assessment according to the methodology specified in Section [3.1 Issues Scoping and Selection of Valued Components](#). The Amendment Application will also include the rationale for any differences in the list of VCs presented in the Amendment Application from those listed in the final Amendment Application Information Requirements.

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 24.

Table 24: Indicators and Measurable Parameters for Marine Resources VCs

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Marine Mammals	Steller Sea Lion Killer Whale Harbour Porpoise Humpback Whale	Marine Mammal species changes in presence/absence and abundance	Changes to marine mammal distribution and abundance has the potential to occur during the construction, operational, and decommissioning phases of the Project. Changes to marine mammal species presence/absence are measurable using marine mammal survey data and information.

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
			Changes to marine mammal relative abundance are measurable using marine mammal survey data and information.
Marine Fish	Salmonids (e.g., Coho, Chinook, Pink, Chum, Sockeye, Steelhead, Cutthroat Trout, Dolly Varden, Forage fish (e.g., Pacific herring, Pacific sand lance, eulachon, surf smelt) Rockfish (Sebastes spp.) Groundfish (e.g., Pacific halibut, ling cod)	Fin fish species changes in presence/ absence and abundance	Activities associated with the construction, operational, and decommissioning phases of the Project have the potential to adversely affect marine fish through changes in fish mortality, changes in fish behaviour, changes in fish health or changes to marine fish habitat used for spawning, rearing, feeding or migration. Changes to fish species presence/ absence and seasonal abundance are measurable using fish survey data and information.
Marine Fish Habitat	Habitat structure (e.g., eelgrass, salt marsh, spawning habitat) Habitat quality (e.g. water quality, sediment quality and plankton)	Habitat structure and quality changes	Activities associated with the construction, operational, and decommissioning phases of the Project have the potential to adversely affect marine fish habitat. Changes to fish habitat quality and abundance are measurable using fish habitat baseline data and delineation, water quality, sediment quality and plankton baseline data.
Marine Benthic Fauna	Benthic fauna	Benthic fauna presence/ absence and abundance	Changes to benthic fauna has the potential to occur during the construction, operational, and decommissioning phases of the Project. Changes to benthic fauna presence/absence and relative abundance are measurable using benthic fauna baseline data and information.

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

4.6.2 Context and Boundaries

Regulation and government context relevant to Marine Resources VCs include:

- Fisheries Act (Government of Canada 1985)
- Applicant’s Guide Supporting the “Authorizations Concerning Fish and Fish Habitat Protection Regulations” (DFO 2019)
- Fish and fish habitat protection policy statement, August 2019 (DFO 2019)
- Measures to Protect Fish and Fish Habitat (DFO 2019)

- Marine Mammal Regulations (Government of Canada 1993)
- Aquatic Invasive Species Regulations (Government of Canada 2015)
- *Species at Risk Act* (SARA; Government of Canada 2002)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
- Canadian Environmental Quality Guidelines (CCME 2019)
- *Canadian Environmental Protection Act* (1999)
- Disposal at Sea Regulations (2001)

The proposed shipping route will pass through marine mammal protected areas as defined through provisions under SARA, including ‘Critical Habitat’ for humpback whales, ‘Potential Critical Habitat Areas’ for Northern resident killer whales and DFO-recognized ‘Important Areas’ for humpback and fin whales (all three species are listed as Threatened under SARA). Project shipping routes will therefore overlap with sensitive areas for these and other marine mammal species from both a ship noise exposure and ship strike perspective.

The marine environment where the Project is located supports important marine resources such as marine fish and fish habitat protected under the federal *Fisheries Act*, marine mammals protected under the Marine Mammal Regulations, as well as marine species identified by COSEWIC, the SARA, and on BC provincial red and blue lists.

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

4.6.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment

Application.

A review of existing information will consider the following studies previously conducted to characterize marine resources within the LSA and RSA:

- Kitimat LNG Project Bish Cove 2014 Field Sampling Report, dated March 2015 (Archipelago 2015a);
- KLNG Project Clio Bay Placement Project Habitat Assessment Baseline Report 2014 (Archipelago 2015b);
- Kitimat LNG Project BMAP Juvenile Salmon Monitoring Program, dated March 2015 (Archipelago 2015c);
- Kitimat LNG Project Baseline Marine Monitoring Program Field Sampling Final Report, dated 7 March 2014 (Archipelago 2014a);
- Kitimat LNG Project Bish Cove Baseline Marine Monitoring Program Field Sampling Final Report, dated 7 March 2014 (Archipelago 2014b);
- Kitimat LNG Project Monitoring Juvenile Pink and Chum Salmon Use of Bish Cove Protocol, dated 29 March 2014 (Archipelago 2014c);
- Kitimat LNG Baseline Marine Monitoring Report Field Sampling Event 3 Report, dated 25 July 2013 (Archipelago 2013a);
- Kitimat LNG Baseline Marine Monitoring Report Field Sampling Event 2 Report, dated 14 June 2013 (Archipelago 2013b);
- Kitimat LNG Baseline Marine Monitoring Report Field Sampling Event 1 Report, dated 17 May 2013 (Archipelago 2013c);
- KM LNG Baseline Monitoring Program Mapping the Seasonal Distribution of Indicator Species and Potential Suitability for Ecosystem Health Monitoring (Archipelago 2013d);
- Marine Ecosystem Health Assessment Bish Cove Annual Update for 2014 (Core6 and Archipelago 2015a);
- Marine Ecosystem Health Assessment Bish Cove First Annual Report for 2014. Dated March 2015 (Core6 and Archipelago 2015b);
- Chevron Canada Ltd. 2016. KLNG EAC Amendment Support – Marine Fish Desktop Analysis, dated 31 January 2017 (Chevron 2017); and

- Government databases (e.g., Fisheries and Oceans Canada herring spawn surveys).

In 2017, the Holder initiated desktop and primary data collection studies to support the assessment of effects on Marine Resources that were designed to address known data gaps. The objectives of the relevant studies are summarized in Table 25.

Table 25: Studies to Support the Assessment of Marine Resources VCs

Study Name	Study Objectives
Desktop Review	Existing information was used to identify the distribution and status of marine mammals, marine fish and marine fish habitat known to be present and those that potentially occur in the marine resources LAA and RAA. Data reviewed included previous surveys completed for the Project and adjacent projects, web-based mapping services (e.g., iMapBC, BC CDC Species and Ecosystem Explorer, SAR Public Registry, COSEWIC reports, E-Flora BC), and available ecosystem reports and publications.
Passive Acoustic Monitoring Program	The Project will include marine construction operations to install an LNG tanker berth in the cove. Construction activities will involve pile driving, onshore blasting and possibly dredging. Once the terminal is built, visiting tankers will be escorted to the berth by tugs. The construction activities and vessel activities will generate underwater noise that could affect nearby marine fauna. As such, it is important to understand the present noise levels and the spatio-temporal presence of several species of marine fauna, and notably harbour porpoise, in close proximity to the terminal. The Passive Acoustic Monitoring Program aims to inform the environmental assessment with respect to potential Project impacts on marine mammals.
Vessel Acoustic Signatures and Transmission Loss Study	A desktop / field study to obtain and verify container ship and tug sound source levels and signatures at different speeds, and to measure transmission loss at three key sites along the shipping route to better characterise source levels, amplitude and frequency for a range of representative vessels and improve sound propagation modeling.
Marine Mammal Survey Program	Document species occurrence, estimate species density and abundance, and examine patterns of distribution and seasonal residency in areas along the Project shipping corridor that correspond with sensitive marine mammal habitat areas. The surveys are aimed to capture key seasonal marine mammal spatial information which will contribute to the overall marine mammal baseline study in support of the Project's EA process.
Marine Fish Surveys	Determine composition, distribution and relative abundance of near shore and offshore marine fin fish, Dungeness crab and plankton.
Water Quality Sampling	Vertical water column profile sampling and water sample collection are proposed to further characterize the biological productivity of the marine environment. The focus of this sampling will be physical measurements and nutrients.
Marine Benthic Fauna Surveys	Characterize eelgrass beds in Bish Cove including its areal extent, density (percent cover) and health.

4.6.4 Potential Effects

A summary of anticipated Marine Resources VCs interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 26.

The Amendment Application will identify potential adverse effects to the Marine Resources VCs resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

4.6.5 *Mitigation Measures*

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

4.6.6 *Residual Effects and their Significance*

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.6.7 *Cumulative Effects and their Significance*

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and
- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

4.6.8 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 26: Marine Resources: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
<p>Marine Resources, including Marine Mammals</p>	<p>Steller sea lion Killer whale Harbour porpoise Humpback whale</p> <p>Marine Fish and Fish Habitat Marine Water Quality (pathway component) Benthic Fauna Marine Sediment Quality (pathway component)</p>	<p>Construction: vessel traffic, underwater pile driving; dredging of marine sediment; installation of marine infrastructure related to the LBW; land-based site clearing; and storm water drainage system and sanitary sewage effluent discharge.</p> <p>Operations: vessel traffic, wake and prop wash, shading, and associated underwater noise and light; operation of LNG facility and supporting infrastructure and discharge of Storm water to marine environment; operation of marine terminal; and LNG shipping.</p> <p>Decommissioning: removal of marine infrastructure; dismantling onshore facilities and supporting infrastructure and management of storm water discharge to marine environment.</p>	<p>Behavioural disturbance (displacement, avoidance, or communication masking) due to underwater noise or artificial light from project activities (e.g., pile driving, blasting, dredging, shipping).</p> <p>Potential injury/mortality or behavioral disturbance (e.g., displacement or avoidance) due to interaction with Project during shipping activities.</p> <p>Potential effects associated with accidents and malfunctions, including unplanned spills to the marine environment.</p> <p>Changes to health, survivorship, or behavior due to indirect effects from the Project (e.g., changes in habitat quality, reduced prey availability) because of effluent discharges from Project vessels and onshore activities/infrastructure.</p> <p>Storm water discharge into Bish Cove may alter water quality resulting in change in fish habitat use, physiology or alter mortality risk.</p> <p>Loss of near shore habitat (i.e., eelgrass) will impact marine fish, including juvenile salmonids.</p> <p>Effects may occur from habitat loss or alteration resulting in change in</p>	<p>See Marine Environment and Marine Mammals related commitments of EA Certificate E06-01 (Schedule B). <i>Fisheries Act</i> Authorization and habitat offsetting is expected to be required for the removal of eelgrass habitat and the construction of the LBW.</p> <p>Monitoring required for permitted discharge of storm water.</p>

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
			habitat suitability; changes in mortality risk due to risks of collisions with infrastructure; alteration of movement patterns including displacement; disturbance due to lighting and noise.	

5.0 ECONOMIC EFFECTS ASSESSMENT

5.1 Economic Effects

5.1.1 Valued Components

Candidate Economic VCs and associated Subcomponents are:

- Economy
 - Labour Market
 - Economic Development
 - Local Government Finance

The Amendment Application will include an assessment of Economic VCs identified in the Amendment Application Information Requirements. The assessment will be conducted in accordance with the methodology specified in Section [3.0 Assessment Methodology](#) and reported using the organizational structure demonstrated in the Section [4.0 Environmental Effects Assessment](#).

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 27.

Table 27: Indicators and Measurable Parameters for Economy VC

Indicators	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Employment Labour market balance Employment income	Labour Market	<ul style="list-style-type: none"> • Employed and unemployed workers (number) • Unemployment rate and labour force participation (%) • Employment income (\$) 	<ul style="list-style-type: none"> • Quantitative parameters that indicates change labour market conditions based on proposed KLNG Expansion Project labour requirements and local labour supply
Business opportunities Economic development plans	Economic Development	<ul style="list-style-type: none"> • Revenues of suppliers of industrial and commercial materials, goods, and services (\$) • Revenues of suppliers to households (\$) • Consistency with BC and local government economic development plans 	<ul style="list-style-type: none"> • Quantitative parameters that reflects potential changes to a dimension of economic development in response to the proposed KLNG Expansion Project • Indicates compatibility of the Project with economic development direction as expressed by responsible authorities based on (qualitative) comparison of

Indicators	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
			the Project with established economic development plans
Local government revenues Local government expenditures	Local Government Finance	<ul style="list-style-type: none"> Municipal and regional government revenues, property tax revenues, and total revenues (\$) Municipal and regional government expenditures, service program expenditures, and total expenditures (\$). 	<ul style="list-style-type: none"> Project-associated property tax, municipal and regional district tax, and permit fee payments may affect local government revenues Direct provision of services to the Project and associated services and infrastructure requirements may affect local government expenditures These are indicators used by government, agencies and service providers for planning, management, and reporting data sources generated by government, agencies, and service providers

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

5.1.2 Context and Boundaries

Economy was selected as a VC based on its importance to Indigenous groups, the public, and other stakeholders due to its regulatory importance. Project associated labour, materials, goods, and service demand could affect the local labour market while Project related business opportunities could support local economic development. Certain municipal and regional governments could see an increase in taxation revenue or increase in expenditures or both due to project related property and income taxation and through direct use of local services and infrastructure.

CEAA 2012 Sections 5(1)(c)(i) and 5(2)(b)(i) are relevant to Economy as changes potentially affecting the local labour market, regional economic development, and local government finance are linked to the health and socio-economic conditions of Aboriginal peoples and to public stakeholders. This includes potential project-related changes to the economy—including job creation—which has the potential to impact the socio-economic conditions of Aboriginal people and public stakeholders.

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

5.1.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment Application.

In 2019, the Holder initiated desktop and primary data collection studies to support the assessment of effects on Economy that were designed to address known data gaps. The objectives of the relevant studies are summarized in Table 28.

Table 28: Studies to Support the Assessment of Economy VCs

Study Name	Study Objectives
Interview program	Primary source information will be collected through interviews with representatives of provincial and municipal departments responsible for economic development and local and regional economic development organizations such as chambers of commerce.
Literature and baseline data review	Baseline economic data will be collected from a range of information sources and analysed. The main secondary sources include Statistics Canada Census (2006-2016) and Statistics Canada Labour Force Survey (LFS). The Canadian Census published by Statistics Canada offers the most complete and reliable sources of economic data over time and can be disaggregated to a certain extent by general and Aboriginal populations. Other secondary sources include various economic development reports and consolidated financial statements and operating budget projections prepared by LSA communities.

5.1.4 Potential Effects

A summary of anticipated Economic VC interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 29.

The Amendment Application will identify potential adverse effects to the Economic VCs resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

The Amendment Application will describe any effects of a change in the environment on the economic conditions of Indigenous peoples and the effects of any change to the environment directly linked or necessarily incidental to federal decisions on overall economic conditions.

Where there is the potential for a change to the environment to result in an economic effect with respect to Indigenous peoples, the Holder will make efforts to collect data relating to the particular economic effect with respect to Indigenous peoples that is resulting specifically from an environmental effect.

If it is determined that the proposed KLNG Expansion Project will not result in an environmental effect defined in subsection 5(1) or 5(2) of CEAA 2012 (*e.g.*, there will be no change to the environment that affects the socio-economic conditions of Indigenous peoples), a rationale to substantiate this conclusion will be provided. In the presence of a defensible rationale, no further assessment of a specified section 5 environmental effect is required.

5.1.5 *Mitigation Measures*

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

5.1.6 *Residual Effects and their Significance*

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

5.1.7 *Cumulative Effects and their Significance*

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and
- Where an adverse residual cumulative effect is identified, the Amendment Application will also

describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

5.1.8 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 29: Economic Effects: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Economy	Labour Market Economic Development Local Government Finance	<p>Construction: during construction peak labour is estimated to be between 1,800 and 2,500 depending on final development plan.</p> <p>Operations: operations phase is expected to provide direct employment for approximately 300 – 450 people.</p> <p>Decommissioning: activities will require contractor services.</p>	<p>Increased job opportunities, financial growth and training opportunities could positively influence socio-economic well-being in the local communities.</p> <p>Project expenditures will accrue to individuals, businesses and communities in the local area and region, contributing to the development of the local and regional economies.</p> <p>Risk of goods and services shortages and price inflation in the local area during the construction phase due to the Kitimat area’s relatively small economy and the expected goods and services requirements of the Project.</p> <p>Increased demand for temporary accommodation and permanent housing from persons and their dependents who temporarily and/or permanently relocate to the local area for work.</p> <p>Higher demands on utility, health, emergency, transportation services, community services, and infrastructure from the temporary and/or permanent population increase, with potential implications for the capacity, resourcing and costs of these services.</p>	See Communities and Economy related commitments of EA Certificate E06-01 (Schedule B).

6.0 SOCIAL EFFECTS ASSESSMENT

6.1 Social Effects

6.1.1 Valued Components

Candidate Social VCs and associated Subcomponents are:

- Socio-community
 - Housing
 - Services and Infrastructure
 - Road Transportation
 - Community Wellbeing
- Current Use of Lands and Resources for Traditional Purposes
 - Food, Social, and Ceremonial (FSC) Marine and Land and Resource Use
 - Intangible Cultural Heritage
- Marine and Land Resource Use
 - Navigation
 - Commercial and Recreational Fishing
 - Other Commercial and Non-Commercial Use
- Visual Quality

Rationale for the selection of Social VCs to evaluate potential changes is provided in Section 6.1.2.

The Amendment Application will include an assessment of Social VCs identified in the Amendment Application Information Requirements. The assessment will be conducted in accordance with the methodology specified in Section [3.0 Assessment Methodology](#) and reported using the organizational structure demonstrated in the section [4.0 Environmental Effects Assessment](#).

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 30.

Table 30: Indicators and Measurable Parameters for Social VCs

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Change in demand for housing	Socio-community/Housing	<ul style="list-style-type: none"> • Workforce requirements • Occupancy and vacancy rates • Housing and occupancy costs • Housing stock and temporary accommodation inventory 	These indicators are recognised measurable variables of demand for and change in supply of housing and accommodation.
Health service demand and supply Police service demand and supply Ambulance service demand and supply Water service demand and supply Solid waste service demand and supply	Socio-community/Services and Infrastructure	<ul style="list-style-type: none"> • Number of workers • Health and Social Services: health facilities and services; medical practitioner numbers • Education Services: public schools; private schools; post-secondary institutions • Community Services: sewer, waste and water services and capacities. • Emergency Services: number and location of police/fire/ambulance departments/stations; number of police/fire/ambulance personnel; call numbers 	Indicators used by local government and emergency service providers to understand emergency services demand and supply to support service planning and management
Road transportation demand and capacity	Socio-community/Road Transportation	<ul style="list-style-type: none"> • Local traffic counts at key routes and intersections • Consistency with local transportation development plans 	The Project could increase local traffic due to commuting workforce and delivery of goods and materials to site
Social determinants of health	Socio-community/Community Wellbeing	Measurable parameters for selected social determinants of health	<p>The Project may interact with key social determinants of health such as:</p> <ul style="list-style-type: none"> • Employment and Income; • Education and Training; • Affordable Housing; • Smoking, Drug and Alcohol Use; • Community Connectedness; • Accidents and Mortality; • Health Services; • Crime; and • Leisure and Recreation.
Ability to access preferred locations for harvesting land and marine resources for cultural practices,	Current Use of Lands and Resources for Traditional Purposes	Changes in the ability to physically access current use locations	The Project may change access routes or interfere with cultural practices to acquire resources that are tied to Aboriginal rights.

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
including cultural, sacred and spiritual locations			
Availability of preferred resources.	Current Use of Lands and Resources for Traditional Purposes/ Food, Social, and Ceremonial Marine and Land Resource Use	Changes in distribution or movement, relative abundance, or habitat area or composition of resources	The Project may alter species movements or remove habitat at specific locations that are used by Indigenous groups for traditional purposes
Quality of preferred resources, including changes in the real or perceived quality of traditional use resources	Current Use of Lands and Resources for Traditional Purposes/ Food, Social, and Ceremonial Marine and Land Resource Use	Changes in the real or perceived quality of current use resources as informed by consultation and other VC assessments linked to those resources	The Project may have emissions that of concern to Indigenous groups with respect to species or resources that are used for traditional purposes
Quality of experience when accessing areas of current use for harvesting and cultural practices, including sensory disturbance due to Project-related changes to noise, air quality and visual quality	Current Use of Lands and Resources for Traditional Purposes/ Intangible Cultural Heritage	Changes to other cultural practices tied to current use locations and resources, including intangible heritage resources (e.g., gathering places) and the expression of cultural values	The Project may result in changes in the landscape or have emissions that affect cultural practices on the landscape
Change in navigational use and navigability	Marine and Land Resource Use/Navigation	<ul style="list-style-type: none"> • Navigational use <ul style="list-style-type: none"> ○ navigational location and use • Navigability • navigation aids, in-water structures, hazards, safety 	<ul style="list-style-type: none"> • The Project occurs in an area used for shipping and other marine activities via designation shipping lanes in Douglas Channel and Kitimat Arm. • Project construction, operation, and decommissioning activities including associated marine vessel movements could interfere with navigation.
Change in commercial and recreational fishing use and access Change in resource availability of fish Change in marine environmental setting	Marine and Land Resource Use/Commercial and Recreational Fishing	<ul style="list-style-type: none"> • Commercial Fishing, including Aboriginal Commercial Fishing <ul style="list-style-type: none"> ○ Number and type of commercial fishing licences/vessels ○ Harvest area and access ○ Harvest levels ○ Availability/abundance of commercial fishery resources 	<ul style="list-style-type: none"> • Project construction, operation, and decommissioning activities could displace and affect area use and access, as well as fish presence and availability for commercial fisheries, and guided sport and recreational fishing. • Project activities could affect the environmental setting and

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
		<ul style="list-style-type: none"> • Guided Sport Fishing <ul style="list-style-type: none"> ○ Guided sport fishing locations and access routes ○ Business activity^(a) ○ Availability/abundance of fishery resources • Recreational Fishing <ul style="list-style-type: none"> ○ Recreational harvest area and access routes ○ Recreational fishing effort ^(b) ○ Availability/abundance of recreational fishery resources • Environmental condition of noise levels, air quality, visual quality 	<p>quality of experience of guided sport fishing and) and recreational fishing.</p>
<p>Compliance with land use ownership, plans, designations, and policies</p> <p>Commercial marine transportation activity</p> <p>Change in commercial marine tourism, and recreational boating area use and access</p> <p>Change in resource availability (<i>i.e.</i>, marine mammals)</p> <p>Change in marine and land-based environmental setting</p>	<p>Marine and Land Resource Use/Other Commercial and Non-Commercial Use</p>	<ul style="list-style-type: none"> • Conformance with regional and local government land and marine use designations, plans, objectives and policies • Commercial Marine Transportation <ul style="list-style-type: none"> ○ Commercial transportation vessel types, number, and routes • Marine Tourism <ul style="list-style-type: none"> ○ Marine tourism locations and access routes ○ Business activity^(a) ○ Availability/abundance of marine resources (<i>e.g.</i>, whales) • Recreational Boating <ul style="list-style-type: none"> ○ Recreational boating locations and access routes ○ Estimation of visitation/level of use • Land-based commercial activity type, location, access, use levels 	<ul style="list-style-type: none"> • Project construction, operation, and decommissioning activities could displace and affect commercial and non-commercial marine and land-based area use and access, as well as marine mammal presence and availability for marine tourism. • Project activities could affect the environmental setting and quality of experience of marine tourism (<i>e.g.</i>, whale watching) and non-commercial recreational marine use (<i>e.g.</i>, recreational boating)

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
		<ul style="list-style-type: none"> Land-based recreation activity type, location, access, use levels Environmental condition of noise levels, air quality, visual quality 	
Level of change in visual quality	Visual Quality	<ul style="list-style-type: none"> Visibility of Project components and their visual prominence from key viewpoints Visual contrast of Project components with the existing visual character and the resulting visual impact to viewer from key viewpoints 	<ul style="list-style-type: none"> The Project’s Onshore and Offshore facilities and Project-associated marine vessels traffic could potentially affect viewing conditions and visual quality for residents and visitors (e.g., recreational and tourism users) at nearby locations

(a) business information provided based on availability; (b) recreational information provided based on availability.

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

6.1.2 Context and Boundaries

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

6.1.2.1 SOCIO-COMMUNITY

Socio-community was selected as a VC based on its importance to Indigenous groups, local governments, the public, and other stakeholders. The Socio-community VC will assess the Project effects on subcomponents for housing, community infrastructure and services, and road transportation by considering Project-related changes in population due to workforce requirements, and project direct use of services. The sub-component for community wellbeing will address potential changes to social determinants of health. This analysis will consider if and how the Project interacts with a range of social factors that can contribute to and influence individual and community health and wellbeing. These VCs are linked as changes in the availability of community resources — including police, fire and ambulance services — which potentially affects the health and socio-economic conditions of people using these resources.

Regulation and government context relevant to Socio-community includes:

- Section 5(1)(c) (i) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012);

Government of Canada, 2012) requires an assessment of an effect of changes to the environment that could result in effects on Aboriginal health and socio-economic conditions.

- CEAA 2012 Sections 5(1)(c)(i) and 5(2)(b)(i) are relevant to Socio-Community as changes to demand for health and emergency services are linked to the health and socio-economic conditions of Aboriginal peoples and to public stakeholders.

6.1.2.2 CURRENT USE OF LANDS AND RESOURCES FOR TRADITIONAL PURPOSES

The Amendment Application will include an assessment of the Current Use of Lands and Resources for Traditional Purposes VC. The current use of lands and resource for traditional purposes is a factor identified under subsection 5(1)(c)(iii) of CEAA 2012. Project components and activities have the potential to adversely affect the current and future use of locations and resources that support traditional diets, economies, social and spiritual life, governance, and cultural transmission (*e.g.*, transfer of traditional language, laws stories and beliefs associate with places and sites on the landscape, sites of historical significance, harvesting of resources, and formation and maintenance of cultural identity). Potential Project-related effects to current use of resources may also extend to the exercise of Aboriginal Interests that may be associated with that use. Aboriginal Interests, which is defined as asserted or determined Aboriginal Rights, including Aboriginal title and treaty rights, will be assessed separately in Part C of the Amendment Application. The effects assessment will consider traditional use studies, ethnographic information, and traditional knowledge, where provided, during the ongoing consultation between the Holder and Aboriginal Groups or otherwise available through public sources.

Regulation and government context relevant to Current Use of Lands and Resources for Traditional Purposes VC will focus on the following Indigenous Groups listed in Procedural Letter:

- Gitga'at First Nation
- Gitxaala Nation
- Haisla Nation
- Kitselas First Nation
- Kitsumkalum First Nation
- Lax Kw'alaams Band
- Métis Nation BC
- Metlakatla First Nation

6.1.2.3 MARINE AND LAND RESOURCE USE

For the purpose of this assessment, Marine and Land Resource use is defined as the commercial and non-commercial use of marine waters and land-based resources and amenities that may be affected by the proposed KLNG Expansion Project. Douglas Channel and the Kitimat Arm area is an important waterway supporting industrial development and related marine transportation, commercial fisheries, and marine

recreational and Indigenous use. General land and resource use in proximity to the proposed KLNG Expansion Project includes commercial activities such as forestry and trapping, and non-commercial activities such as hunting and recreational use. Land and marine resource uses are regulated through the federal and provincial legislation, land use plans, or other regulations described below.

The rationale for the selection of Marine and Land Resource Use as a VC is based on the potential for the changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project to disrupt commercial and non-commercial land use area and access, and for proposed KLNG Expansion Project - related construction activity and vessel movements to interfere with navigational use and disrupt commercial, recreational, and Aboriginal fishing area use and access. There is also the potential for impacts to the quality of experience for commercial tourism (*e.g.*, guided sport fishing) and non-commercial recreational use (*e.g.*, recreational boating) related to a change in the environmental setting.

Regulation and government context relevant to Marine and Land Resource Use VC include but are not limited to the following:

- *Canadian Navigable Waters Act* (formerly the *Navigation Protection Act*) related to protection and access to navigable waters;
- *Canada Marine Act* and the *Canada Shipping Act* related to marine safety and marine environmental protection;
- *Marine Liability Act* and the *Marine Transportation Security Act* related to security of marine transportation;
- B.C. *Wildlife Act* and Federal *Fisheries Act* related to wildlife and marine species protection;
- B.C. *Land Act* related to land and resource use on Crown land;
- *First Nations Commercial and Industrial Development Act* related to regulations for commercial and industrial development projects on reserve land;
- Kalum Land and Resource Management Plan, Kalum Sustainable Resource Management Plan Regional District of Kitimat-Stikine, District of Kitimat, and Haisla Nation strategic land and marine related plans and objectives; and
- CEAA 2012 subsection 5(1) and 5(2) related to the socio-economic conditions of Indigenous peoples and public stakeholders

6.1.2.4 VISUAL QUALITY

The “visual aesthetics” of the Approved KLNG Project were considered to a limited degree as part of the Land and Resource Use VC (*i.e.*, aesthetics and wilderness values). For the purposes of this assessment, the

term “visual quality” refers to the visual aesthetic aspects of coastal landscape and marine seascapes which are related to resource planning, public enjoyment of scenic views, cultural use, and concerns over the visual impacts caused by offshore development and marine activity. Guidelines and objectives related to the management of visual quality of the Project area exist in strategic planning documents and provincial resource management programs. The natural coastal and marine environment is identified as providing a setting for local residents, tourists and recreational users, and Indigenous cultural use in the Douglas Channel and Kitimat Arm area. As such, visual quality is a component of the human environment that is considered to have regulatory, social, and Indigenous importance.

The rationale for the selection of Visual Quality as a VC is based on the potential for the existing natural visual quality of Douglas Channel and Kitimat Arm to be effected by the visibility and visual character of the construction and operation of the proposed KLNG Expansion Project facility design, and related marine and land-based activities (e.g., marine shipping traffic).

Regulation and government context relevant to the Visual Quality VC include:

- North Coast Land Resource Management Plan and North Coast Marine Plan policy direction for visual management in relevant planning areas;
- BC Oil and Gas Commission *Oil and Gas Activities Act* direction for visual management of oil and gas related developments;
- Ministry of Forests, Lands and Natural Resource Operations visual quality objectives for the land-based Project area; and
- CEAA 2012 subsection 5(1) and 5(2) related to the socio-economic conditions of Indigenous peoples and public stakeholders.

6.1.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment Application.

Methods for evaluating existing conditions of Social VCs are provided in the following sections.

6.1.3.1 SOCIO-COMMUNITY

The summary of existing conditions will be based on secondary and primary data collection. Collected baseline data will provide information to describe existing conditions of socio-community sub-components which will be used to identify and contextualize potential Project effect. Secondary information sources could include but are not limited to the following:

- Statistics Canada Census, community health profiles, and data tables
- BC Ministry of Justice Police Statistics
- Municipal and Regional District plans, reports, and websites
- Service provider reports, databases, and websites (*i.e.*, Northern Health Authority, BC Ambulance Service, Police, Fire, College of Physicians and Surgeons of British Columbia)
- Sources related to Indigenous groups (*i.e.*, community websites, reports, and government offices)

In 2019, the Holder initiated desktop and primary data collection studies to support the assessment of effects on the Socio-community VC that were designed to address known data gaps. Primary research will be undertaken through targeted interviews with representatives from local municipalities, emergency service providers, housing and real estate, educational institutions to obtain information on current conditions and perspectives on potential Project effects. The objectives of the relevant studies are summarized in Table 31.

6.1.3.2 CURRENT USE OF LANDS AND RESOURCES FOR TRADITIONAL PURPOSES

Indigenous groups will be consulted to identify

- Any specific asserted Aboriginal Interests that may be potentially affected by the Project or other sources of information; and
- Measures to avoid or mitigate the potential adverse effects of the Project and/or to otherwise address or accommodate concerns expressed by Indigenous groups.

The summary of existing conditions will be based on information from Indigenous groups obtained through consultation on the proposed KLNG Expansion Project, if provided, and supplemented by information from publicly available sources. The Current Use of Lands and Resources for Traditional Purposes assessment will include future intended use where such information is provided.

Current Use of Lands and Resources for Traditional Purposes will focus on the assessment of food, social and ceremonial (FSC) use of terrestrial and marine resources and the exercise of Aboriginal Interests that may be associated with that use. The approach will include a review of the assessments of other VCs to

which some current use activities are directly linked (*e.g.*, Fish and Fish Habitat, Marine Mammals, Noise, Vegetation, Wildlife and Wildlife Habitat, Visual Quality, Heritage Resources).

The assessment will include factors identified under subsection 5(1)(c) of CEAA 2012 that are closely related to the current use of lands and resources for traditional purposes. This will include potential Project-related effects on intangible cultural heritage of Indigenous people, including Indigenous cultural landscapes and cultural attributes (*e.g.*, language, stories, beliefs) tied to those landscapes, where information to support this assessment is available.

The description of existing conditions for each Indigenous group's use of land and resources for traditional purposes will include, but may not be limited to, the following information, as provided to the Holder, or otherwise available through publicly available sources:

- Preferred locations, timing (including frequency), methods, and quality of current use activities (*e.g.*, use of harvesting areas, transportation corridors, special use sites, sacred places);
- Reasonably foreseeable use, particularly where desired use levels exceed current use levels;
- Studies (including Project-specific TU and TEK, if provided) and reports that support and inform current use;
- Harvesting studies related to harvesting of marine and terrestrial resources for food, social and ceremonial purposes;
- Traditional purposes that are served by the current use locations and resources (*e.g.*, traditional diets, economies, social and spiritual life, governance, and cultural transmission);
- Baseline information for the Current Use of Lands and Resources for Traditional Purposes VC will be included as part of this technical section of the Amendment Application; and
- Review of policies and plans developed by Indigenous groups where publicly available or provided by Indigenous groups.

Information to support the characterization of existing conditions for all Indigenous groups will be identified through the following methods:

- Review of public sources including submissions for other projects in the area such as EAC Applications for LNG projects;
- Review of Project-specific studies or studies conducted by Indigenous groups that may be relevant to the Project area as provided to the Holder;
- Discussions with Indigenous groups fisheries departments, commissions, and other

departments as applicable for marine and terrestrial harvesting data and reports if available; and

- Consultation with Indigenous groups regarding their current use, including their review of any summaries of this use prior to submission of the Amendment Application.

The Amendment Application will include a summary of the regulatory or government context for the Current Use of Lands and Resources for Traditional Purposes. These may include, but are not limited to, the following:

- Summaries of relevant court decisions;
- Summaries of Indigenous communal fishing licences and their regulations as available from DFO or as provided by Indigenous groups; and
- Government agreements with Indigenous groups.

6.1.3.3 MARINE AND LAND RESOURCE USE

The summary of existing conditions will be based on secondary and primary data collection information to describe current marine and land resource use planning objectives and guidance, existing marine and land resource use conditions and activities, and potential trends in marine and land resource use. Collected baseline data will provide information to describe existing conditions of marine and land resource use sub-components which will be used to identify and contextualize potential Project effect. Secondary information sources could include but are not limited to the following:

- 2005 EAC Application for the Kitimat LNG Project and other recent LNG EAC Applications;
- Provincial, regional, and local government legislation, regulations, and bylaws relevant to marine and land resource use;
- Provincial, regional, and local government land and marine use designations and strategic plans;
- Ownership and tenures data from DataBC;
- Kitimat LNG TERMPOL Review Process Report and regional navigational risk assessment reporting;
- Commercial and recreational fishing and seafood effort and harvesting data and regulations from DFO;
- Forestry and timber harvesting data from FLNRORD;

- Recreational wildlife harvesting data and regulations from FLNRORD;
- Marine recreational information and patterns of use (*e.g.*, kayak routes, anchorages, boat launches) from BC Marine Conservation Analysis (BCMCA), community and user group websites;
- Land-based recreational amenities and patterns of use (*e.g.*, hiking trails, ATV routes, hunting areas) from FLNRORD, community and user group websites; and
- Sources related to Indigenous groups commercial marine and land use (*i.e.*, community websites, and available studies and reports).

In 2019, the Holder initiated desktop and primary data collection studies to support the assessment of effects on Marine and Land Resource VC that were designed to address known data gaps. Primary research will be undertaken through targeted interviews to gather information on marine and land resource use areas, activity levels, and periods of use. The objectives of the relevant studies are summarized in Table 31.

6.1.3.4 VISUAL QUALITY

The summary of existing viewing conditions will be based on a review of background information related to the environmental setting and management of visual resources, the result of a photographic survey from identified key viewpoints, and analysis of the existing visual quality and viewing conditions within the Visual Quality VC LAA. This will include the following tasks:

- A desktop review of existing information including established visual inventories and relevant local and regional strategic land use and resource planning documents detailing management objectives related to visual resources.;
- Identification of viewpoints predicted to have a line-of-sight to the amended Project site. These will be identified based on the results of visibility analysis and using visual landscape and recreation features inventories, available information from consultation with stakeholders and Indigenous Groups, and established viewpoint selection criteria. Input from stakeholders and Indigenous Groups will also support an understanding of the value of visual quality to potential viewers;
- A photographic survey conducted to gather an inventory of the existing viewing conditions from key viewpoints. Results will be compiled in a visual inventory and used to establish characterizations of the existing visual quality and character; and
- Characterization the existing seascape and landscape character within the Visual Quality VC LAA based on visual inventory data, available environmental information (*i.e.*, topography, landcover, land use pattern) and established methods for inventorying and assessing land and

marine visual quality. The summary of existing conditions will be used as the basis of the assessment of effects from interactions between the amended Project and the Visual Quality VC.

In 2019, the Holder initiated desktop and primary data collection studies to support the assessment of effects on the Visual Quality VC that were designed to address known data gaps. The objectives of the relevant studies are summarized in Table 31.

Table 31: Studies to Support the Assessment of Social VCs

Study Name	Study Objectives
Field Interviews	<p>In-person interviews with representatives from local municipalities, emergency service providers, housing and real estate, educational institutions to obtain information on current conditions and perspectives on potential project effects.</p> <p>In-person interviews with representatives from commercial fisheries management, provincial wildlife conservation, marine sport fishing and recreation operators, land-based forestry operators, and recreational groups to obtain information on historical, present and future commercial and non-commercial marine and land resource uses in the area.</p>
Photographic Field Survey	A photographic field surveys consisting of site photography at key viewing locations to gather photographs and observations of daytime viewing conditions.

6.1.4 Potential Effects

A summary of anticipated Social VC interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 32.

The Amendment Application will identify potential adverse effects to the Social VCs resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

The Amendment Application will describe any effects of a change in the environment on the socio-economic conditions of Indigenous peoples and the effects of any change to the environment directly linked or necessarily incidental to federal decisions on overall social conditions.

Where there is the potential for a change to the environment to result in a socio-economic effect with respect to Indigenous peoples, the Holder will make efforts to collect data relating to the particular socio-economic effect with respect to Indigenous peoples that is resulting specifically from an environmental effect.

The Amendment Application will describe any effects of a change in the environment on the Indigenous groups' current use of lands and resources for traditional purposes.

If it is determined that the proposed KLNG Expansion Project will not result in an environmental effect

defined in subsection 5(1) or 5(2) of CEAA 2012 (*e.g.*, there will be no change to the environment that affects the socio-economic health of Indigenous peoples), a rationale to substantiate this conclusion will be provided. In the presence of a defensible rationale, no further assessment of a specified section 5 environmental effect is required.

6.1.5 *Mitigation Measures*

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

6.1.6 *Residual Effects and their Significance*

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

6.1.7 *Cumulative Effects and their Significance*

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and
- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

6.1.8 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 32: Social Effects: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Socio-community	Housing Services and Infrastructure Road Transportation Public Health and Safety Community Wellbeing	<p>Construction: during construction, peak labour is estimated to be between 1,800 and 2,500 depending on final development plan.</p> <p>Operations: operations phase is expected to provide direct employment for approximately 300 – 450 people.</p>	<p>Demand for housing may increase due to project related workforce requirements and associated in-migration which could result in upward pressure on housing prices and rent.</p> <p>Incremental demand placed on local services and infrastructure, particularly during the Project construction phase, may affect availability and accessibility of local services (<i>i.e.</i>, police, fire, ambulance) and social and physical infrastructure.</p> <p>Project use of local roads for delivery of goods and services and transportation of the workforce could increase traffic.</p> <p>The Project may interact with key social determinants of health such as:</p> <ul style="list-style-type: none"> • Employment and Income; • Education and Training; • Affordable Housing; • Smoking, Drug and Alcohol Use; • Community Connectedness; • Accidents and Mortality; • Health Services; • Crime; and • Leisure and Recreation. 	<p>See Communities and Economy related commitments of EA Certificate E06-01 (Schedule B).</p>

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
			<p>Project related changes in noise, light, and dust could result in increased nuisance to local residents.</p>	
<p>Current Use of Lands and Resources for Traditional Purposes</p>	<p>Food, Social, and Ceremonial (FSC) Marine and Land and Resource Use</p>	<p>Construction: clearing of habitat; excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; noise and light from construction activities.</p> <p>Operations: vehicle and vessel traffic; road and infrastructure use and associated noise, facility lighting.</p> <p>Decommissioning: vehicle and vessel traffic; road and infrastructure use and associate noise.</p>	<p>Potential changes in the ability to access preferred locations for traditional purposes because of Project activities across all Project phases (e.g., navigational closures, safety exclusion zones, increased vessel traffic congestion).</p> <p>Potential changes in presence or absence, abundance, or spatial distribution of preferred marine, freshwater, terrestrial, or other resources that are currently used for traditional purposes, such as marine fish (including invertebrates), marine plants, marine mammals, terrestrial vegetation and wildlife, migratory birds, and freshwater fish leading to potential loss of fishing, hunting, trapping, or gathering opportunities across all Project phases.</p> <p>Potential changes in the quality of preferred resources that are currently used for traditional purposes, such as marine fish (including invertebrates), marine plants, marine mammals, terrestrial vegetation and wildlife, migratory birds, and freshwater fish, leading to avoidance of traditional foods or otherwise disrupting patterns of use and levels of consumption across all Project phases</p>	<p>See First Nations related commitments of EA Certificate E06-01 (Schedule B).</p>

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
			<p>Potential changes in the quality of experience associated with the current use of lands and resources for traditional purposes across all Project phases may include but may not be limited to:</p> <p>Potential displacement from or avoidance of preferred locations because of sensory disturbance (<i>e.g.</i>, increased noise, light), perceived health or safety risks (<i>e.g.</i>, increased air emissions, vessel traffic), or changed sense of place.</p> <p>Potential interference with or loss of ability to achieve cultural purposes associated with use of specific locations or resources, such as intergenerational knowledge transfer of practices, customs, or traditions.</p>	
<p>Marine and Land Resource Use</p>	<p>Navigation Commercial and Recreational Fishing Other Commercial and Non-commercial Use</p>	<p>Construction: dredging adjacent to LBW, vessels; clearing of habitat; excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; noise and light from construction activities.</p> <p>Operations: vehicle and vessel traffic; road and infrastructure use and associated noise; increased vessel traffic within Douglas Channel and Kitimat Arm.</p> <p>Decommissioning: removal of marine infrastructure and support facilities and reclamation of disturbed areas.</p>	<p>Increased marine vessel movements could interfere with navigational use</p> <p>Potential for disruption to commercial, recreational, and Aboriginal fishing area use and access related to increased vessel traffic.</p> <p>Potential for disruption to commercial (<i>e.g.</i>, forestry, guide outfitting, trapping) and non-commercial (<i>e.g.</i>, hunting, trails) land use area and access related to vegetation clearing and vehicle traffic.</p> <p>Potential for direct and indirect impacts to fish and marine mammals related to dredging, disposal at sea and increased vessel traffic.</p>	<p>See Navigable Waters related commitments of EA Certificate E06-01 (Schedule B), which include commitments to marine access, communication, safety and security.</p> <p>See Land and Resource Use related commitments of EA Certificate E06-01 (Schedule B) which include commitments to access, road maintenance, communication, zoning and permitting.</p> <p>KLNG Project TERMPOL recommendations and findings.</p> <p>Project vessel navigation and safety zones consistent with applicable marine navigation laws and</p>

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
		<p>Reduction in overall frequency of vessel traffic.</p> <p>Construction: vessel traffic from shipping of materials; dredging adjacent to LBW; disposal at sea; road and infrastructure development; heavy vehicle traffic; noise, light, dust, and visual disturbance from construction activities.</p> <p>Operations: 'No Go' safety zones adjacent to the Project site and shipping route; increased vessel traffic within Douglas Channel and Kitimat Arm.</p> <p>Decommissioning: removal of marine infrastructure and support facilities and reclamation of disturbed areas; temporary increase in vessel traffic with overall reduction in frequency of vessel traffic.</p>	<p>Potential for direct and indirect impacts to wildlife related to related to increased vessel traffic.</p> <p>Potential for change to environmental setting and quality of experience of commercial tourism (e.g., guided sport fishing) and non-commercial recreational use (e.g., recreational, boating).</p>	<p>regulations, and industry best practices.</p> <p>Mitigations through proposed Management Plans (e.g., Construction Management Plans, Air Quality, Noise, and Vegetation Management Plans)</p>
Visual Quality	n/a	<p>Construction: clearing and vegetation removal; erection of near shore and onshore facilities;</p> <p>Operations: existence of near shore or onshore LNG processing facility and berthing of LNG vessels; flaring (for emergency purposes only); vessel movements visible along shipping route.</p> <p>Decommissioning: decommissioning activities near shore and onshore facilities; temporary increase in vessel traffic with overall reduction in frequency of vessel traffic.</p>	<p>Visual disturbance resulting from vegetation removal during construction and the introduction of visible anthropogenic features that are inconsistent with current landscape character.</p> <p>Indirect effects on cultural, recreation and tourism values closely related to activities that are related to visual quality and the enjoyment of scenic values.</p>	<p>Project design and mitigations and best practices to address potential visual effects.</p> <p>Mitigations through proposed Management Plans (e.g., Vegetation Management Plan)</p>

7.0 HERITAGE EFFECTS ASSESSMENT

7.1 Heritage Effects

7.1.1 Valued Components

Candidate Heritage VCs and associated Subcomponents are:

- Heritage Resources
 - Archaeological Resources
 - Historical Resources
 - Palaeontological Resources

The Amendment Application will include an assessment of Heritage VCs identified in the Amendment Application Information Requirements. The assessment will be conducted in accordance with the methodology specified in Section [3.0 Assessment Methodology](#) and reported using the organizational structure demonstrated in section [4.0 Environmental Effects Assessment](#).

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 33.

Table 33: Indicators and Measurable Parameters for Heritage VCs

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Archaeological sites or objects	Heritage Resources/Archaeological Resources	Changes to archaeological sites, features or objects	<ul style="list-style-type: none"> • Indicators are direct physical representations of the VC • Indicators can be evaluated using existing data, new field data and predictive models • Changes to the indicators can be measured and accurately reflect changes to the Heritage Resources VC and subcomponents • Indicators are directly and tangibly responsive to project effects, in predictable ways
Historical sites or objects	Heritage Resources/Historical Resources	Changes to historical sites, structures or objects	
Culturally modified trees	Heritage Resources/either Archaeological or Historical Resources (depending on age)	Changes to culturally modified trees	

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
Structures of historical or archaeological or architectural significance	Heritage Resources/Historical Resources	Changes to structures that have heritage significance	
Palaeontological sites or fossils	Heritage Resources/Palaeontological Resources	Changes to sites or strata containing fossils of heritage significance	

The Amendment Application will include the rationale for any differences in the indicators and measurable parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

7.1.2 Context and Boundaries

Heritage resources will be defined as any structure, site or thing that is of historical, archaeological, palaeontological or architectural significance. This definition is consistent with Section 5(2)c of CEAA 2012 and satisfies the provincial *Heritage Conservation Act* (HCA). Heritage resources may occur on land or under water and may be intact or previously disturbed.

For clarity with respect to CEAA 2012 Section 5(1) and 5(2), the Heritage Resources VC is limited to physical heritage indicators and specifically excludes non-physical (intangible) Indigenous cultural heritage indicators, which will be addressed elsewhere in the Amendment Application. Heritage resources indicators include the following:

- Archaeological sites - defined as heritage objects and sites that pre-date AD 1846 or otherwise would be protected from unauthorized alteration under Section 13 of the HCA. Such protection includes burials and rock art sites that have historical or archaeological value, regardless of age, as well as ship or plane wrecks that have heritage value and are more than two years old.
- Historical sites – defined as objects and sites that have heritage value but are not automatically protected under Section 13 of the HCA. Most historical sites post-date AD 1846.
- Culturally modified trees (CMTs). Depending on the age of the cultural modification, a CMT may be considered an archaeological site or a historical site.
- Structures of historical or architectural significance.
- Sites or objects of palaeontological significance (e.g., fossils).

Regulation and government context relevant to Heritage VCs include:

- CEAA 2012, particularly Section 5(1)(c)(iv) and 5(2)(c)(iv);
- *B.C. Heritage Conservation Act*;
- *Land Act* (for fossil management);
- *Mineral Tenure Act* (for fossil management); and
- Fossil Impact Assessment Guidelines.

Section 5 of CEAA 2012 specifically states that effects on heritage resources must be considered in an assessment. Archaeological sites and some historical sites are protected under Section 12(1) of the *BC Heritage Conservation Act* (HCA), as items having historical or archaeological value. Archaeological assessments on provincial crown lands or private lands are undertaken in accordance with the British Columbia Archaeological Impact Assessment Guidelines (Archaeology Branch 1998) and relevant Archaeology Branch policies and bulletins. In the absence of federal guidelines, the provincial standards are typically applied as a best practice.

Fossils may also qualify for protection under Section 12(1) of the HCA. In addition, the BC Fossil Impact Assessment (FIA), Guidelines for Industry¹ state that if a proposed development is to be located on Crown land a concise analysis of the potential impact on fossils should be included in the land disposition application. Based on the potential for disturbance of significant fossils, additional palaeontological study may be warranted to inform a decision by a Land Adjudicator regarding the need for mitigation or protection of fossils during project development, if the application is approved.

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

7.1.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;

¹ Fossil Impact Assessment (FIA), Guidelines for Industry, in British Columbia Fossil Management/ Industrial and User Information, https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/fossil-management/fia_guidelines_-_abridged_for_industry_final.pdf (Document dated August 23, 2018; accessed July 9, 2019).

- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment Application.

In 2017, the Holder initiated archaeological desktop and primary data collection studies to support the assessment of effects on Heritage Resources that were designed to address known data gaps. A palaeontological desktop overview and modeling study was conducted in 2019 to evaluate palaeontological potential in the Project area. The objectives of the relevant studies are summarized in Table 34.

Table 34: Studies to Support the Assessment of Heritage VCs

Study Name	Study Objectives
Archaeological desktop review and gap analysis	A desktop study to evaluate the scope and results of past archaeological studies relevant to the Project, and to identify gaps that would require further field inventory to support the Application Information.
Heritage Resources Inventory	A field study to search for and document archaeological and historical sites within proposed new disturbance areas. The primary data collected in the field will contribute to the Project effects assessment.
Palaeontological Overview and Model	A desktop study to review existing palaeontological information relevant to the Project. The overview included modeling of palaeontological resource potential for the Heritage Local and Regional Study Area.

7.1.4 Potential Effects

A summary of anticipated Heritage VC interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 35.

The Amendment Application will identify potential adverse effects to the Heritage VCs resulting from the proposed changes to the Approved KLNG Project attributable to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#).

The Amendment Application will describe:

- Any effects of a change in the environment on physical and cultural heritage and/or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance to Indigenous peoples; and
- Any effects of any change to the environment directly linked or necessarily incidental to federal decisions on physical and cultural heritage and/or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

If it is determined that the proposed KLNG Expansion Project will not result in an environmental effect defined in subsection 5(1) or 5(2) of CEAA 2012 (*e.g.*, there will be no change to the environment that affects physical and cultural heritage of Indigenous peoples), a rationale to substantiate this conclusion will be provided. In the presence of a defensible rationale, no further assessment of a specified section 5 environmental effect is required.

7.1.5 *Mitigation Measures*

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

7.1.6 *Residual Effects and their Significance*

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

7.1.7 *Cumulative Effects and their Significance*

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and
- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

7.1.8 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 35: Heritage Effects: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Heritage Resources	Archaeological Resources Historical Resources Palaeontological Resources	Construction: clearing; excavation; stockpiling; road and infrastructure development. Operations: shipping.	Physical disturbance or increased accessibility to archaeological or historical sites could result during clearing, site preparation and construction, and from wake effects during shipping.	Heritage resources can be avoided or managed. See Heritage and Archaeological Resources related commitments of EA Certificate E06-01 (Schedule B).

8.0 HEALTH EFFECTS ASSESSMENT

8.1 Health Effects

8.1.1 Valued Components

Candidate Health VCs are:

- Human Health

The Amendment Application will include an assessment of Health VCs identified in the Amendment Application Information Requirements. The assessment will be conducted in accordance with the methodology specified in Section [3.0 Assessment Methodology](#) and reported using the organizational structure demonstrated in section [4.0 Environmental Effects Assessment](#). The Human Health VC addresses the chemical exposure and is assessed using a human health risk assessment approach, which provides an evaluation of risks at receptor locations where people are known to be present including communities, Aboriginal harvesting areas and recreational areas that are in proximity of the proposed KLNG Expansion Project.

Indicators and Measurable Parameters provide a means of determining an incremental Project-related change to a VC. The Indicators and Measurable Parameters and the rationale for their selection are presented in Table 36.

Table 36: Indicators and Measurable Parameters for Health VCs

Indicator	Candidate VC/Subcomponent	Measurable Parameters	Rationale for Selection
<ul style="list-style-type: none"> • Comparison of air, water, soil and country foods (e.g., fish) measurements/predictions to the applicable human health guidelines/standards • Calculation of human health risk estimates for operable exposure pathways and constituents of potential concern and receptors of potential concern; and • Comparison of risk estimates to acceptable risk levels determined by Health Canada, BC Ministry of Environment and Climate Change Strategy and BC Ministry of Health. 	Human Health	Not applicable	<ul style="list-style-type: none"> • The indicators used to assess the potential effects are based on Health Canada and BC Ministry of Environment and Climate Change Strategy guidance

The Amendment Application will include the rationale for any differences in the indicators and measurable

parameters presented in the Amendment Application from those listed in the Amendment Application Information Requirements.

8.1.2 Context and Boundaries

Human Health was selected as a VC based on its importance to Aboriginal Groups, the public, or other stakeholders as well as for its regulatory importance. Regulation and government context relevant to Human Health includes provincial and federal legislation. Specifically, the methods for conducting human health risk assessment are based on guidance provided by Health Canada, British Columbia Ministry of Environment and Climate Change Strategy (BC ENV), United States Environmental Protection Agency (US EPA) and other applicable risk assessment and health assessment guidance documents and manuals. See Section 8.1.4 for methods for evaluating potential effects to Human Health.

Regulation and government context relevant to the Human Health VC include:

- CEAA (2012) Sections 5(1)(c)(i) and 5(2)(b)(i) are relevant to Human Health as changes to air and water quality are linked to the health and socio-economic conditions of Aboriginal peoples and to public stakeholders. This includes potential Project-related changes in air and water quality that may increase exposure to constituents of potential concern, which have the potential to affect the health of local peoples.

The Amendment Application will identify the spatial, temporal, administrative and technical study area boundaries, as applicable for the VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#) of the Amendment Application Information Requirements. Proposed spatial boundaries are presented in Table 6.

8.1.3 Existing Conditions

The Amendment Application will summarize existing conditions in a manner consistent with Section [3.3 Existing Conditions](#) and will include the following:

- A description of the approach to collecting baseline information, including any planned field programs, desktop studies or modelling and reference to any applicable standards or methods for baseline information collection;
- A summary of the regulatory or government context for the management of the VC; and
- Reference to any technical reports related to the VC that will be provided with Amendment Application.

In 2017, 2018 and 2019, the Holder initiated desktop and primary data collection studies to support the assessment of effects on Human Health that were designed to address known data gaps. Baseline field surveys were conducted to determine the baseline or existing conditions of metals, polycyclic aromatic hydrocarbons (PAHs) and/or dioxins and furans in terrestrial (soil and vegetation), marine aquatic (crab,

mussel and fish) and freshwater aquatic (fish) resources within the study area as defined by the LAA and RAA. The objectives of the relevant studies are summarized in Table 37.

Table 37: Studies to Support the Assessment of Health VCs

Study Name	Study Objectives
Baseline Field Surveys	Vegetation, fish (marine and freshwater) and shellfish consumed by people were targeted for collection. The resulting data will be used to characterize baseline soil, vegetation, fish and shellfish quality for Human Health. Paired soil and vegetation samples were collected in 2017 and 2019. These results will be used to estimate exposure concentrations and bioaccumulation factors in the human health risk assessment.

8.1.4 Potential Effects

A summary of anticipated Human Health VC interactions with project components or activities, potential incremental effects and mitigation to address potential adverse effects is presented in Table 38. The Human Health VC considers the results of the effects assessments for the Atmospheric Environment (*i.e.*, air quality) and Water Resources (*i.e.*, water quality) VCs rather than direct interactions between human health and Project components and activities. For information regarding Project interactions for those VCs, refer to Section 4.1(Atmospheric Environment) and Section 4.4(Water Resources).

The Amendment Application will identify potential adverse effects to the Human Health VC resulting from to the proposed KLNG Expansion Project in a manner consistent with section [3.4 Potential Effects](#). Potential adverse effects may occur during the construction, operation and decommissioning phases of the Project. The assessment will consider the effect of potential emissions from routine activities in the Project phases by considering the “worst-case” Project phase (*e.g.*, generally Operations) and extrapolating this phase throughout the life of the project rather than assessing each phase individually. This “worst-case” approach is consistent with the approach used by the Atmospheric Environment VC.

The Amendment Application will describe the effects occurring in Canada that may be caused to the environment by the proposed KLNG Expansion Project with respect to the health conditions of local communities, including Indigenous peoples.

If it is determined that the proposed KLNG Expansion Project will not result in an environmental effect defined in subsection 5(1) or 5(2) of CEAA 2012 (*e.g.*, there will be no changes to the environment that affects the health of Indigenous peoples), a rationale to substantiate this conclusion will be provided. In the presence of a defensible rationale, no further assessment of a specified section 5 environmental effect is required.

The potential effects on Human Health will be evaluated using the risk assessment framework commonly employed in Canada. The risk assessment framework provides a structured approach for evaluating potential adverse effects to receptors (*e.g.*, people) from environmental stressors (*e.g.*, chemicals). The framework for risk assessment typically involves four stages: problem formulation, exposure assessment,

toxicity assessment and risk characterization, as described below.

- Problem Formulation — This is the initial screening and decision-making step intended to focus the assessment on the chemicals, receptors and exposure pathways of greatest concern. The purpose of the problem formulation is to distinguish between pathways for which further quantitative analysis is warranted and those that do not warrant further analysis either because the potential for risk is negligible, or because a simple solution for mitigating the potential exposure exists. The problem formulation includes the following major elements:
 - Identification of constituents of potential concern (COPCs) – Measured concentrations of soil, water, sediment, and fish tissue are compared to applicable environmental quality guidelines to identify COPCs.
 - Identification of receptors of concern – Human receptors for the risk assessment are identified. For people, consideration is given to sensitive and exposed populations (*e.g.*, aboriginal subsistence user). Receptors are chosen that are most likely to spend time in the local or regional assessment areas.
 - Identification of operable exposure pathways – This step involves the identification of the exposure pathways by which the COPC could come in contact with the receptors of concern. The possible exposure pathways are reviewed to provide a sound technical basis for the subsequent scope of risk assessment activities, as well as to document rationale used to exclude specific exposure pathways from further consideration.
 - Conceptual exposure models – A conceptual exposure model provides a visual depiction of the linkages between chemical sources and receptors. A conceptual site model is developed that illustrates the potential linkages between the COPC, the exposure pathways, and the receptors of concern that will be evaluated in the human health risk assessment.

If the problem formulation identifies a link between receptors, COPCs, and operable exposure pathways, a quantitative human health risk assessment is conducted, which includes the following components:

- Exposure Assessment – The Exposure Assessment involves estimating the amount or exposure dose of the contaminant received by people for each pathway identified in the problem formulation. The dose of a chemical depends on the concentration in various media (*e.g.*, water, soil, sediment and food), the amount of time that receptor might be in contact with these media and the physiological characteristics of the receptor (*e.g.*, ingestion rates, inhalation rates, body weights and dietary preferences). Relevant consumption rates (*e.g.*, for local aboriginal groups) will be used in the assessment. Exposure will be assessed using measured environmental data.
- Toxicity Assessment – The Toxicity Assessment involves the selection of toxicity reference

values (*i.e.*, the acceptable dose that people can be exposed to without risk of adverse health effects over a lifetime. For human health, both the type of health effect (*e.g.*, cancer) and the pathway by which a receptor is exposed to the contaminant (*e.g.*, ingestion) are considered when selecting appropriate toxicity reference values.

- Risk Characterization – In the Risk Characterization, the results of the exposure assessment are compared with the findings of the toxicity assessment to determine whether there is potential for COPCs to pose adverse human health effects. For human health, the predicted risks will be compared to negligible risk levels as determined by Health Canada. The risk characterization is completed for the chemicals, receptors and exposure scenarios of concern identified in the problem formulation.

The human health risk assessment will be composed of three components with the specific scope of each component determined as an outcome of the problem formulation. The three components are as follows:

- 1) A multimedia assessment to evaluate chronic risks associated with exposure to substances that might be present in environmental media such as air, soil, sediment, water, and country foods. The assessment provides an evaluation of health risks as a result of potential constituent changes in multiple media that people may come into contact with (*e.g.*, air, soil, sediment, water, and country foods). If a multimedia assessment is needed based on the outcome of the problem formulation, a detailed assessment of exposure to COPCs in country foods will be conducted, which will include the prediction of COPC concentrations in country food items (*e.g.*, fish, berries). The country foods assessment will incorporate existing country foods quality data, as well as information about local Indigenous people's country foods consumption patterns. A multimedia exposure assessment would also consider exposure to other media (*e.g.*, sediments, soil, air, and water) and exposure to both non-carcinogenic and carcinogenic COPCs.
- 2) An air quality risk assessment, which evaluates the acute (short-term) and chronic (long-term) effects associated with certain airborne or gaseous substances that are only present in air. Exposure periods are typically 1-hour, 24-hours, and annual. For substances identified as COPCs in air (other than particulate matter), the air quality assessment considers exposure to both non-carcinogenic and carcinogenic COPCs.
- 3) A particulate matter assessment, if particulate matter is identified as a COPC based on the results of the problem formulation. The particulate matter assessment is an assessment of the potential health effects from increased particulate matter concentrations as a result of the proposed KLNG Expansion Project.

8.1.5 Mitigation Measures

The Amendment Application will identify measures to avoid, manage or otherwise mitigate potential adverse effects to the VC in a manner consistent with Section [3.5 Mitigation Measures](#). Relevant management plans will be referenced. Linkages to other sections in the Amendment Application must be identified.

8.1.6 Residual Effects and their Significance

Where an adverse residual effect is identified, the Amendment Application will characterize the residual effect based on the context, magnitude, extent, duration, reversibility, and frequency as described in Section [3.6 Characterization of Residual Effects](#).

However, the effects analysis methods for Human Health are different in some notable ways from those used by other VCs. Specifically, the assessment of potential effects to Human Health results in the generation of risk factors that inherently consider the geographic extent, duration, frequency and other characteristics of the predicted changes to the environment that may result from Project activities. Therefore, the likelihood of significant adverse effects for Human Health is evaluated based on the following:

- The potential magnitude of the response, as indicated by the hazard quotient (HQ) or the probability of the risk as indicated by the incremental lifetime cancer risk (ILCR); and
- The degree of conservatism and uncertainty in the analysis.

Note that the risk estimates (*i.e.*, HQs or ILCRs) by themselves do not fully reflect the potential for harm because the magnitude of any HQ or ILCR calculation is a function of the exposure and effects assessments, each of which depends on the realism or conservatism applied during the modelling procedure. Together, potential magnitude and conservatism are used to determine the overall risk, which in turn is used to evaluate environmental significance. The magnitude of risk and conservatism associated with the risk estimates are assessed on a chemical-specific basis.

Where an adverse residual effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

8.1.7 Cumulative Effects and their Significance

If a residual effect is identified, unless stated otherwise by EAO, the Amendment Application will:

- Determine whether any cumulative interactions between residual effects of the proposed KLNG Expansion Project and the potential residual effects of other developments, based on the preliminary list of past, present and reasonably foreseeable developments provided in the Amendment Application Information Requirements, are likely to occur, consistent with section [3.10.1 Identifying Past, Present or Reasonably Foreseeable Projects and/or Activities](#);
- Conduct a cumulative effects assessment consistent with Section [3.10.2 Conducting a Cumulative Effects Assessment](#);
- Identify any additional mitigation measures, consistent with Section [3.5 Mitigation Measures](#); and

- Where an adverse residual cumulative effect is identified, the Amendment Application will also describe the likelihood, Holder's significance determination and predictive confidence, in accordance with Sections [3.7 Likelihood](#), [3.8 Holder's Determination of Significance](#) and [3.9 Confidence and Risk](#).

8.1.8 *Follow-up Strategy*

Where a residual effect and/or cumulative effect have been identified, the Amendment Application will include a description of a follow-up strategy that is consistent with Section [3.11 Follow-up Strategy](#).

Table 38: Health Effects: Summary of Anticipated Project-VC interactions, Potential Incremental Effects and Mitigation

Candidate VCs	Subcomponents	Project Activities (of the KLNG Project, inclusive of proposed KLNG Expansion Project)	Potential Incremental Effects	Mitigation
Human Health	n/a	<p>Construction: clearing; excavation; heavy vehicle traffic; road and infrastructure development; fuel and chemical handling and storage; noise and light from construction activities; flaring</p> <p>Operations: vehicle and vessel traffic; road and infrastructure use and associated noise; fuel and chemical handling and storage; flaring.</p> <p>Decommissioning: emissions from material handling, backfilling, contouring, fuel combustion, vehicle and supply vessel traffic, shipping, flaring (for emergency purposes only).</p>	<p>Air quality may be impacted from Project activities which can have a direct (via inhalation) or indirect (deposition onto soil, water, or plants and subsequent exposure via ingestion and dermal contact) effect on Human Health; physical activities including clearing, grading, compaction and blasting may increase dust levels in air.</p> <p>Potential effects to country foods (e.g., plants, berries) with resulting impacts on human health.</p>	<p>The LNG plant will use electric motor driven technology for all liquefaction process and utility compressors, pumps and fans. Use of electric drives largely eliminates combustion related emissions such as NO₂, SO₂, CO and particulate matter.</p> <p>See Atmospheric Environment (Air Quality) related commitments of EA Certificate E06-01 (Schedule B)</p> <p>See Freshwater and Fisheries Environment (Water and Wastewater Management) related commitments of EA Certificate E06-01 (Schedule B).</p>

9.0 ACCIDENTS AND MALFUNCTIONS

This section of the Amendment Application will assess the effect of potential accidents or malfunctions related to the proposed changes to the Approved KLNG Project attributable to all phases of the proposed KLNG Expansion Project. The consideration of potential accidents and malfunctions will include specific reference to environmental effects as identified in Section 5 of CEAA 2012.

For the purpose of the assessment, an “accident” is defined as an unexpected occurrence or unintended action that can result in an adverse environmental, social, economic, heritage or human health effect, and a “malfunction” is defined as the failure of a piece of equipment, a device or a system to function normally that can result in an adverse environmental, social, economic, heritage or human health effect.

The Amendment Application will include the following:

- Identification of potential accidents and malfunctions that could result from the proposed changes to the Approved KLNG Project in any phase of the proposed KLNG Expansion Project, including:
 - Loss of containment of LNG in the plant process area or storage tanks;
 - Explosion and/or fire;
 - Marine vessel grounding or collision, including a loss of cargo where applicable;
 - Emergency LNG facility shutdown (including emergency flaring); and
 - Spills of hazardous materials (not including LNG).
- 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;
- Identification of proposed measures to reduce the likelihood of the event;
- Assessment of consequence of the event, in a manner consistent with the direct effects assessment;
- Identification of measures to mitigate the consequences to valued components; and

- Conclusions on the potential risk (likelihood multiplied by consequence) of the accident or malfunction.

10.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

This section of the Amendment Application will consider the effects of the environment on the proposed changes to the Approved KLNG Project, including specific reference to environmental effects as identified in Section 5 of CEAA 2012.

The Amendment Application will include:

- The environmental factors deemed to have possible consequences on the proposed changes to the Approved KLNG Project, including, but not necessarily limited to, consideration of natural hazards such as:
 - Extreme weather and weather-related events, including wind and waves, heavy rain, flooding, and extreme temperatures;
 - Seismic events and tsunamis;
 - Forest fires; and
 - Predicted climate change events on sea-level rise, precipitation and temperature.
- A description of any changes or effects on the proposed KLNG Expansion Project that may be caused by the above-mentioned environmental factors;
- The likelihood and consequence of the changes or effects to relevant VCs;
- 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 KLNG Expansion Project; and
- A conclusion about the potential risk of an effect of the environment on the proposed KLNG Expansion Project and to relevant VCs.

11.0 SUMMARY OF STATUTORY REQUIREMENTS UNDER CEAA 2012

The Amendment Application will include:

- The specific VCs and key indicators that will be assessed for each of the factors listed in Section 5(1) and 5 (2) of CEAA 2012;
- The spatial, temporal, administrative and technical study area boundaries, as applicable for the relevant VC, including maps, in a manner consistent with Section [3.2 Assessment Boundaries](#);
- The approach to collecting baseline information, including any planned field programs, desktop studies or modeling and reference to any applicable standards or methods for baseline information collection;
- A Summary of the regulatory or government context for the management of the VC;
- Reference to any technical reports related to the VC that will be provided with Amendment Application; and
- A summary of anticipated VC interactions with project components or activities.

The Amendment Application will also include the following additional information:

- A description of the linkages of the Section 5(1)(c) VCs with other VCs (both environmental effects and other relevant effects assessed in Part B) including any cumulative effects;
- A description or summary of any additional measures, beyond the mitigation measures described in the effects assessment to avoid, mitigate, or otherwise manage potential effects on subsection 5(1)(c) factors;
- A statement articulating the Holder's determination of the significance determination of the effects of environmental change on all Section 5(1) and 5(2) factors; and
- A report on the views of Indigenous Groups with respect to subsection 5(1)(c) effects as provided to the Holder.

Amendment Application Information Requirements

Part C – Indigenous Consultation

PART C – INDIGENOUS CONSULTATION

12.0 INDIGENOUS CONSULTATION

12.1 Aboriginal Interests

The Indigenous Groups discussed in this section will include:

- Gitga'at First Nation
- Gitxaala Nation
- Haisla Nation
- Kitselas First Nation
- Kitsumkalum First Nation
- Lax Kw'alaams Band
- Métis Nation BC
- Metlakatla First Nation

For each Indigenous Group, the Amendment Application will include:

- A summary of past and planned consultation activities;
- A summary of proposed changes to the Indigenous Consultation Plan resulting from the Indigenous Groups' feedback, or experience from consultation to date, including any such changes which have been implemented;
- A summary of the key issues and concerns raised by Indigenous Groups relevant to the environmental assessment, the Holder's responses to those issues and concerns, and the status of resolution;
- A map that identifies Indian Reserves and Indigenous communities, for the Indigenous Groups and the project location;
- Traditional Ecological Knowledge and Traditional Land Use information, as available, with a description of how Traditional Ecological Knowledge (TEK) and Traditional Land Use Studies (TLUS) information was gathered and incorporated into the assessment of impacts of the proposed KLNG Expansion Project on Aboriginal Interests;
- A description of the Aboriginal Interests of each group identified through secondary research techniques or provided directly through consultation activities. The description will include background information on ethnography, language, governance, economy and reserves;

- A description of potential adverse effects of the proposed KLNG Expansion Project on Aboriginal Interests;
- A description or summary of mitigation measures to avoid or reduce potential adverse effects on Aboriginal Interests consistent with Section [3.5 Mitigation Measures](#);
- A characterization of the residual adverse effects on Aboriginal Interests after mitigation using the methodology described in Sections [3.6 Characterization of Residual Effects](#), [3.7 Likelihood](#), and [3.9 Confidence and Risk](#) and incorporating the findings of the VC chapters in the Amendment Application that are relevant to Aboriginal interests;
- A summary of any outstanding Aboriginal Interests issues identified by Indigenous groups; and
- A summary of publicly available arrangements or agreements reached between the Holder and Indigenous Groups.

12.2 Other Matters of Concern to Indigenous Groups

The Amendment Application will include:

- A list of other matters of concern raised by Indigenous Groups with respect to potential environmental, economic, social, heritage and health effects of the proposed KLNG Expansion 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 Amendment Application) of the mitigation measures to address potential effects on other matters of concern to Indigenous Groups;
- A characterization of the residual adverse effects after mitigation, in a manner consistent with assessment methodology in the Amendment Application Information Requirements; and
- A description of how these matters of concern have been addressed from the perspective of the Indigenous Groups and the Holder.

12.3 Issue Summary Table

The Amendment Application will include:

- A Summary Table (see example Table 39) that identifies Aboriginal Interests or other matters of concern to Indigenous Groups that may be impacted by the proposed KLNG Expansion Project, and the measures to avoid, mitigate or otherwise manage the effects; and

- An Appendix, the Indigenous Consultation Report, which contains comments received from Indigenous Groups regarding this section of the Amendment Application.

Table 39: Summary Table of the Results of Indigenous Consultation related to Aboriginal Interests/Other Matters of Concern to Indigenous Groups

Indigenous Group	Consultation Stage / Information Source	Issue – Aboriginal Interest	Issue – Other Matters of Concern	Analysis of Potential Effect	Proposed Measures to Avoid, Mitigate or Otherwise Manage Effects	Status of Issue (e.g., resolved, ongoing resolution, referred to agency, etc.)

Amendment Application Information Requirements

Part D – Public Consultation



PART D – PUBLIC CONSULTATION

13.0 PUBLIC CONSULTATION

The Amendment Application 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 KLNG Expansion Project;
 - Maps of local government boundaries, private land, tenures/authorizations, or residences with respect to the proposed KLNG Expansion 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 any 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.



Environmental
Assessment Office

Amendment Application Information Requirements

Part E – Management Plans and Follow-Up Programs



PART E - MANAGEMENT PLANS AND FOLLOW-UP PROGRAMS

14.0 MANAGEMENT PLANS

The Amendment Application will include:

- A list of Management Plans for all phases of the proposed KLNG Expansion Project, including but not limited to:
 - Access Management, including road and infrastructure maintenance;
 - Air Quality Management;
 - Environment, Health and Safety Management System (EHSMS);
 - Erosion Prevention and Sediment Control;
 - Fire Contingency, Prevention and Suppression;
 - Fish and Fish Habitat Management;
 - Heritage Resource Chance Find Management;
 - Marine Resource Protection, including Marine Mammals;
 - Marine Transport Management;
 - Material Storage, Handling and Waste Management, including equipment refueling constraints;
 - Metal Leaching-Acid Rock Drainage (ML-ARD) Management;
 - Noise Management;
 - Pile Construction Management;
 - Site Restoration;
 - Spill Prevention and Emergency Response;
 - Traffic Management;
 - Vegetation Management, including timber clearing/salvage and invasive plant species;
 - Water Management; and
 - Wildlife Protection.
- A comprehensive description of the contents of each Management Plan, including the identification of any mitigation measures described in previous sections that will be included within the plans.

15.0 MONITORING AND FOLLOW-UP PROGRAMS

The Amendment Application will include:

- A description of the monitoring and follow-up programs the Holder will implement, including their activities, objectives and reporting; and
- Reporting structure as identified within the environmental management plans, monitoring plans and EA Certificate Conditions.

Amendment Application Information Requirements

Part F – Conclusions

PART F - CONCLUSIONS

16.0 CONCLUSIONS

The Amendment Application will:

- Provide the Holder’s conclusions regarding the potential for significant adverse effects on VCs from the Project;
- Request Amendment #3 to EA Certificate E06-02 for the proposed KLNG Expansion Project; and
- Acknowledge the need, if applicable, to successfully complete a federal EA and subsequent permitting/authorization processes prior to proceeding with Project construction, operation and decommissioning of the proposed KLNG Expansion Project.

16.1 Summary of Residual Effects

The Amendment Application will summarize all potential residual effects, including cumulative residual effects, in a table format that depicts the potential effect, project phases, project activity or physical work linked to the effect, proposed mitigation and significance of effect on VCs.

16.2 Summary of Mitigation Measures

The Amendment Application will include a table that identifies the proposed measures to mitigate potential impacts to VCs as shown in Table 40. This information provides the foundation for the development of a Table of Conditions for the proposed KLNG Expansion Project, which would be appended to an EA Certificate, should Amendment #3 be approved.

Table 40: Summary of Proposed Mitigation Measures

No.	VC and Effect	Proposed Mitigation Measure	Timing	Legal Requirement?	Responsible Agency
Environmental					
1.1					
1.2					
Social					
2.0					

17.0 REFERENCE MATERIAL

The Holder will provide a list of reference material used in developing the Amendment Application.

A preliminary list of reference material used in the Amendment Application Information Requirements is below. A more complete list of reference material will be included in the final Amendment Application Information Requirements.

17.1 Atmospheric Environment

FPTCCCEA. 2003. Incorporating climate change considerations in environmental assessment: general guidance for practitioners. The Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment.

MFLNRO. 2001. Visual impact assessment guidebook, 2nd Ed. Ministry of Forests, Lands and Natural Resource Operations, Victoria, B.C.

MOE. 2015. British Columbia Air Quality Dispersion Modelling Guideline. BC Ministry of Environment.

17.2 Terrestrial Environment

Agriculture Canada, 1981, A soil mapping system for Canada. Land Resource Research Institute Contribution # 42. Research Branch, Agriculture Canada.

BC CDC (British Columbia Conservation Data Centre). 2018. Species and Ecosystems Explorer. [accessed December 2018]. <http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/species-and-ecosystems-explorer>.

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18.0 APPENDICES

This section will include the appendices referenced in the Amendment Application.

Information prepared by professionals and provided under their professional seal will be identified in the Amendment Application and the related sealed studies will be included in an Appendix.

18.1 Substitution Summary Appendix

The Amendment Application will include an Appendix that summarizes how all requirements in subsections 5(1), 5(2), and 19(1) of CEAA 2012 have been met or addressed in the Amendment Application. The summary will be in table format as shown in Table 41 below and will:

- Describe how each environmental effect listed in section 5 and each factor to be considered listed in subsection 19(1) were considered in the Amendment Application;
- Identify any potential environmental effects as described in section 5, including cumulative effects;
- List mitigation measures that are proposed to reduce any potential environmental effects described in section 5;

- State the significance of residual effects, or with respect to subsection 5(1)(c) considerations, provide a conclusion on the adequacy of mitigation measures related to any section 5 environmental effects;
- List any follow-up programs to be undertaken by the Holder; and
- Reference to the section in the Amendment Application where additional information can be found on consideration of sections 5 and 19 of CEEA 2012.

Table 41: Sample Substitution Summary Table

CEAA 2012 Effect or Factor	Summary of Assessment	Proposed Mitigation Measure
<p><i>e.g.</i>, Fish, as defined in section 2 of the <i>Fisheries Act</i> and fish habitat as defined in subsection 34(1) of that Act</p>	<p>Identify any fish or fish habitat potentially impacted by the project and if that fish/fish habitat was selected as a VC:</p> <ul style="list-style-type: none"> • Any impacts, including cumulative impacts, by the project on that fish/fish habitat; • Technically and economically feasible mitigation measures; and • Any residual effects and their significance; and proposed follow-up programs. <p>If no effects are identified to a section 5 consideration, describe this finding and provide a rationale.</p>	<p>Section(s) __ and a brief description of the mitigation measure.</p>



Environmental
Assessment Office

Amendment Application Information Requirements

Appendix A – Maps

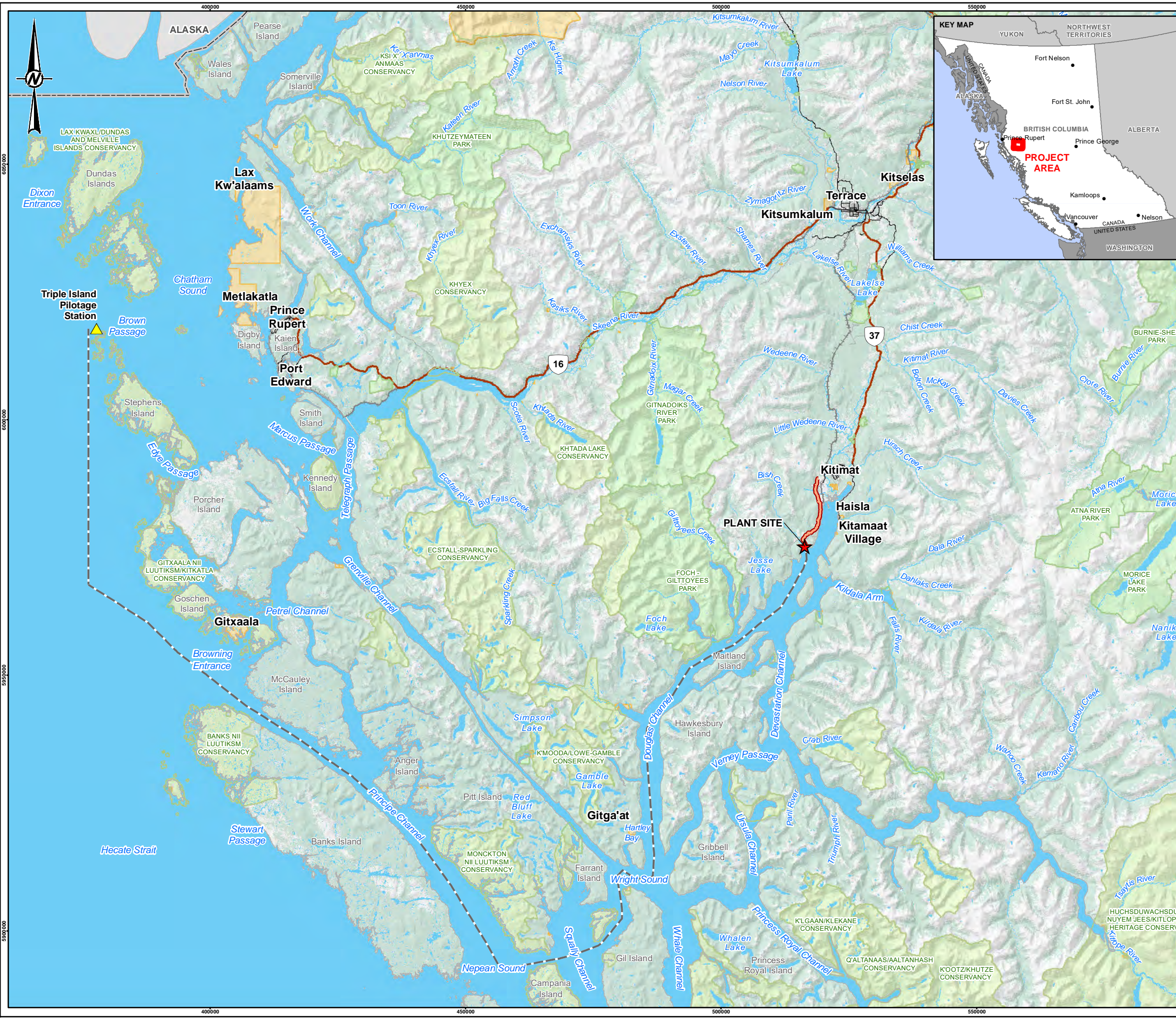


APPENDIX A - MAPS

Figure A1	KLNG Project Location
Figure A2	Detailed KLNG Plant Site Plan: 12 MTPA Compact E-Drive Design
Figure A3	Detailed KLNG Plant Site Plan: Proposed 18 MTPA Expansion Project
Figure A4	Approved KLNG Project and Proposed KLNG Expansion Project Plant Site General Arrangement
Figure A5.1	Local and Regional Assessment Areas: Air Quality (Facility)
Figure A5.2	Local and Regional Assessment Areas: Air Quality (Shipping)
Figure A6	Local and Regional Assessment Areas: Vegetation
Figure A7.1	Local and Regional Assessment Areas: Wildlife and Wildlife Habitat
Figure A7.2	Local and Regional Assessment Areas: Marine Birds
Figure A8	Local and Regional Assessment Areas: Water Resources
Figure A9	Local and Regional Assessment Areas: Freshwater Fish and Fish Habitat
Figure A10.1	Local and Regional Assessment Areas: Marine Mammals
Figure A10.2	Local and Regional Assessment Areas: Marine Resources
Figure A11	Local and Regional Assessment Areas: Economy
Figure A12.1	Local and Regional Assessment Areas: Socio-Community
Figure A12.2	Local and Regional Assessment Areas: Marine and Land Resource Use – Navigation
Figure A12.3	Local and Regional Assessment Areas: Marine and Land Resource Use – Marine
Figure A12.4	Local and Regional Assessment Areas: Marine and Land Resource Use - Land
Figure A12.5	Local and Regional Assessment Areas: Visual Quality

Figure A13 Local and Regional Assessment Areas: Heritage Resources

Figure A14 Local and Regional Assessment Areas: Human Health



LEGEND

PROJECT DATA

- ★ KITIMAT LNG (PLANT SITE)
- - - PROPOSED SHIPPING ROUTE
- PROPOSED PIPELINE CORRIDOR

BASE DATA

- ▲ PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- ++++ RAILWAY
- INTERNATIONAL BOUNDARY
- WATERCOURSE
- WATERBODY
- FIRST NATION RESERVE
- CONSERVANCY AREA
- PARKS AND PROTECTED AREAS
- VEGETATION



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
3. CONTOURS, ROADS, INTERNATIONAL BOUNDARY, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

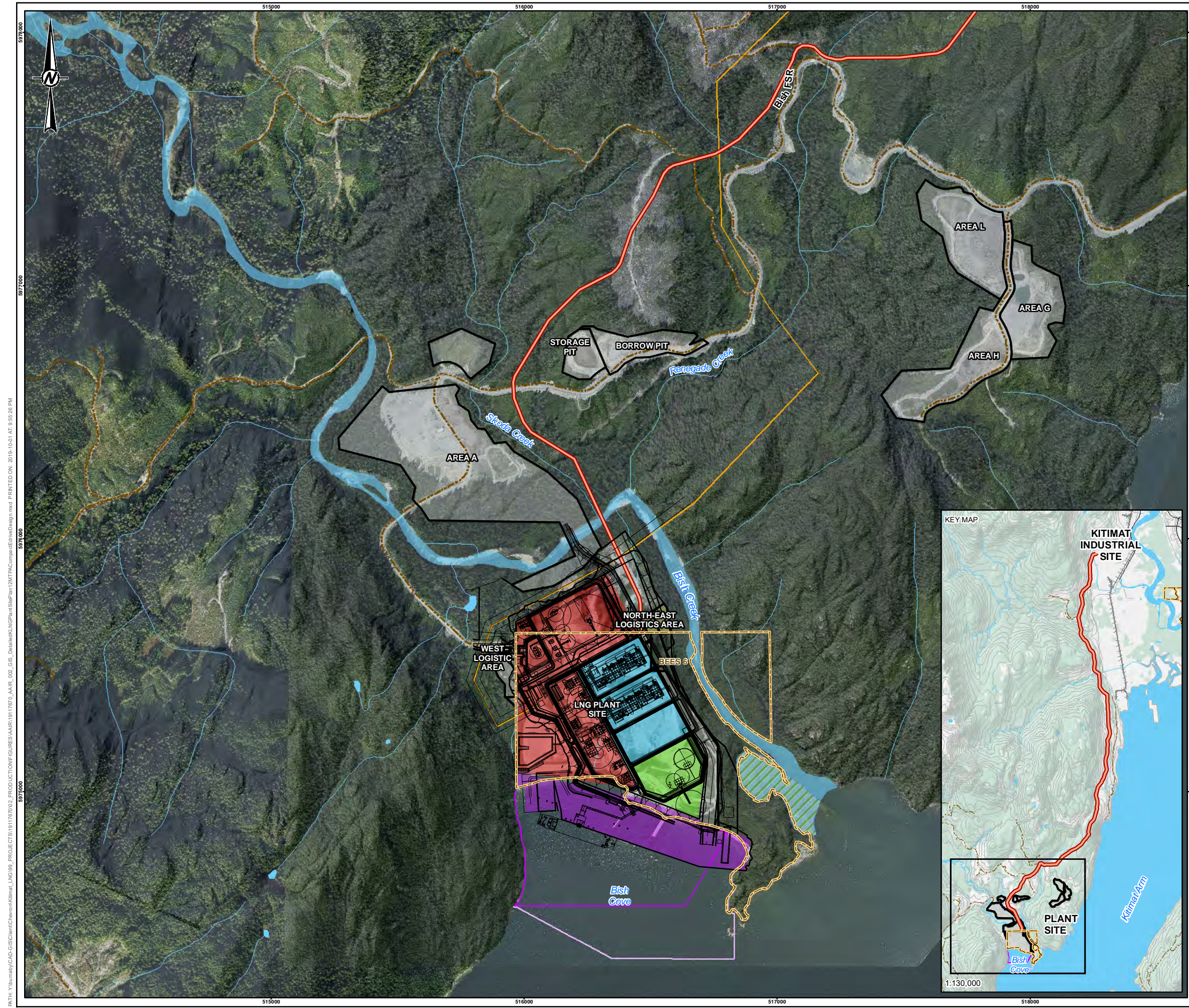
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KITIMAT LNG EXPANSION PROJECT

TITLE
KLNG PROJECT LOCATION

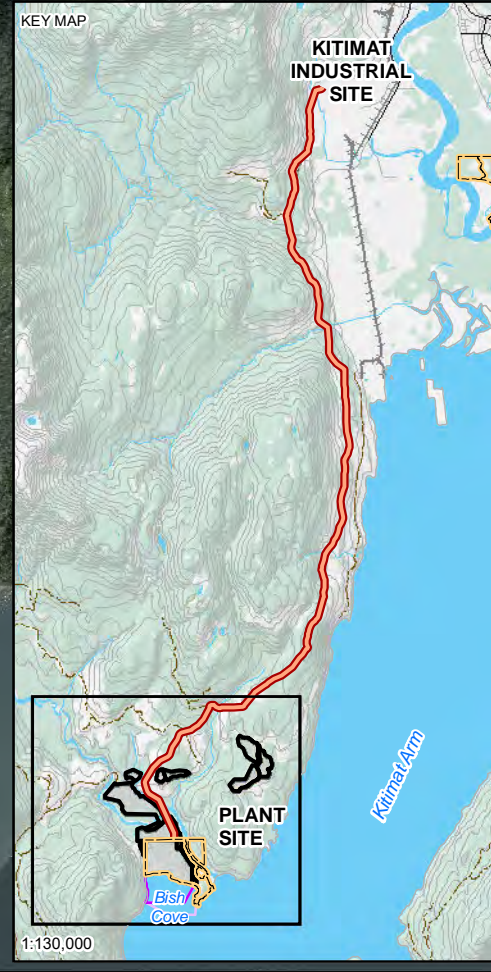
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- LEGEND**
- PROJECT DATA**
- FACILITY LAYOUT
 - PROPOSED PIPELINE CORRIDOR
 - EXISTING PROJECT FOOTPRINT
 - PROPOSED NEW DEVELOPMENT AREA
 - EXISTING FORESHORE LEASE AREA
 - PROPOSED FORESHORE LEASE AREA
- PLANT SITE AREAS**
- INSIDE BATTERY LIMITS (ISBL)
 - OUTSIDE BATTERY LIMITS (OSBL)
 - LNG STORAGE AREA
 - LAND BACKED WHARF (LBW)
- BASE DATA**
- LOCAL ROAD
 - TRANSMISSION LINE
 - FOREST SERVICE ROAD
 - WATERCOURSE
 - CONTOUR (20m)
 - WATERBODY
 - WETLAND
 - FIRST NATION RESERVE
 - VEGETATION



DRAFT

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- REFERENCES**
1. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
 2. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE - BRITISH COLUMBIA.
 3. FIRST NATION RESERVES OBTAINED FROM IHS ENERGY.
 4. ROADS OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 5. IMAGERY PROVIDED BY CHEVRON. NAD 1983 CSRS UTM ZONE 9N

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PROJECT
KITIMAT LNG EXPANSION PROJECT

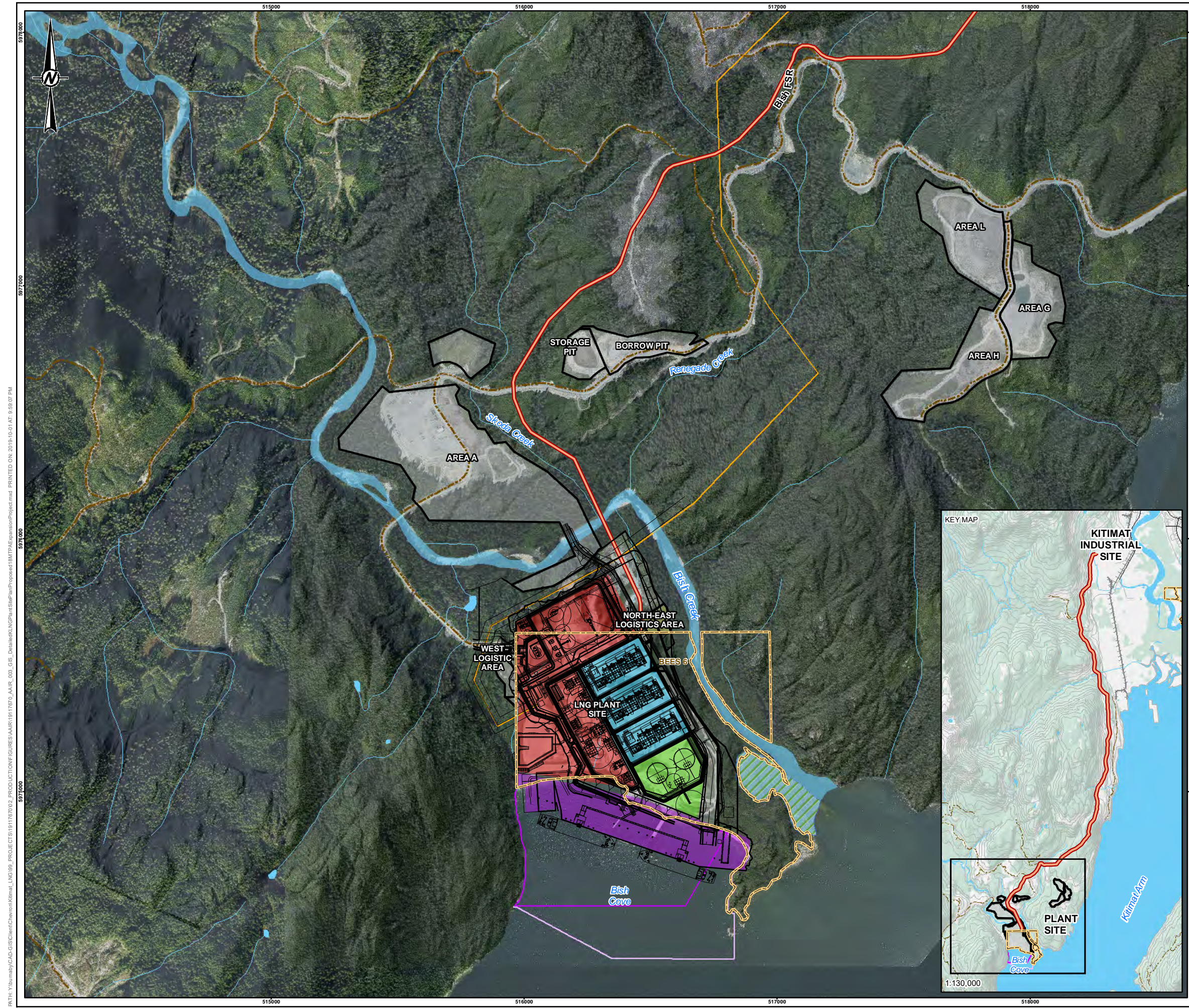
TITLE
DETAILED KLNG PLANT SITE PLAN: 12 MTPA COMPACT E-DRIVE DESIGN

Kitimat LNG	YYYY-MM-DD	2019-10-01
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	REVIEWED	
	APPROVED	

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 - PROPOSED PIPELINE CORRIDOR
 - EXISTING PROJECT FOOTPRINT
 - PROPOSED NEW DEVELOPMENT AREA
 - EXISTING FORESHORE LEASE AREA
 - PROPOSED FORESHORE LEASE AREA
- PLANT SITE AREAS**
- INSIDE BATTERY LIMITS (ISBL)
 - OUTSIDE BATTERY LIMITS (OSBL)
 - LNG STORAGE AREA
 - LAND BACKED WHARF (LBW)
- BASE DATA**
- LOCAL ROAD
 - TRANSMISSION LINE
 - FOREST SERVICE ROAD
 - WATERCOURSE
 - CONTOUR (20m)
 - WATERBODY
 - WETLAND
 - FIRST NATION RESERVE
 - VEGETATION

DRAFT

0 250 500
1:15,000 METRES

- REFERENCES**
1. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
 2. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE - BRITISH COLUMBIA.
 3. FIRST NATION RESERVES OBTAINED FROM IHS ENERGY.
 4. ROADS OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 5. IMAGERY PROVIDED BY CHEVRON. NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

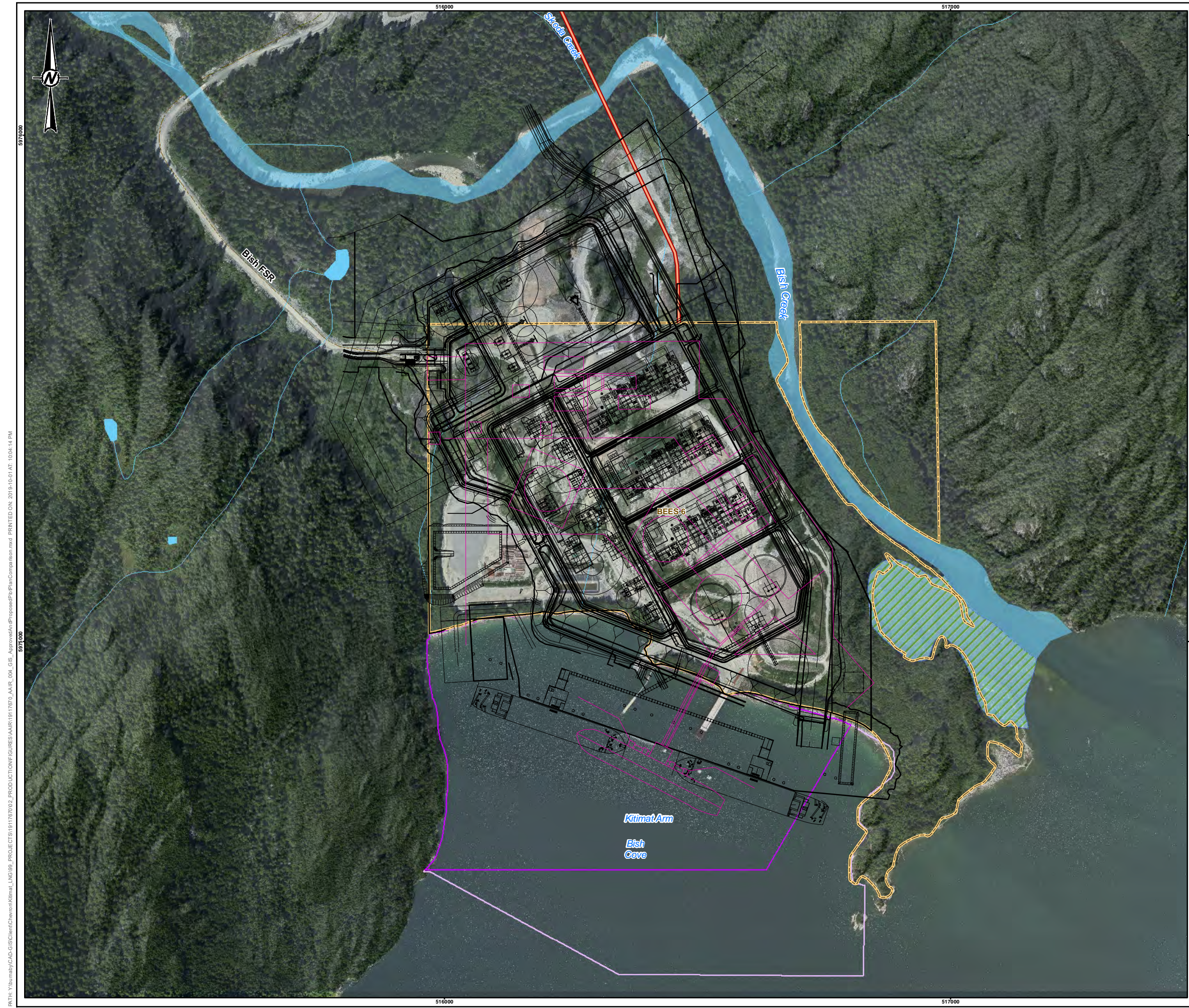
TITLE
DETAILED KLNG PLANT SITE PLAN: PROPOSED 18 MTPA EXPANSION PROJECT

Kitimat LNG	YYYY-MM-DD	2019-10-01
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO. 19117670	CONTROL 1000	REV. A	FIGURE A3
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PATH: Y:\bim\by\CAD-GIS\client\Chevron\Kitimat_LNG\09_PROJECT\19117670\2.PRODUCTION\FIGURES\KAR\19117670_LAIR_000_CIS_Details\K1_NGP\SitePlan\Proposed\BIMTPAExpansionProject.mxd PRINTED ON: 2019-10-01 AT: 09:00 PM

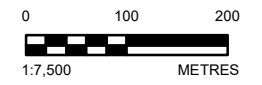
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- FACILITY LAYOUT
 - PLOT PLAN (2008)
 - PROPOSED PIPELINE CORRIDOR
 - EXISTING FORESHORE LEASE AREA
 - PROPOSED FORESHORE LEASE AREA
- BASE DATA**
- FOREST SERVICE ROAD (FSR)
 - WATERCOURSE
 - WATERBODY
 - WETLAND
 - FIRST NATION RESERVE



DRAFT



- REFERENCES**
1. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
 2. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE - BRITISH COLUMBIA.
 3. FIRST NATION RESERVES OBTAINED FROM IHS ENERGY.
 4. ROADS OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 5. IMAGERY PROVIDED BY CHEVRON. NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

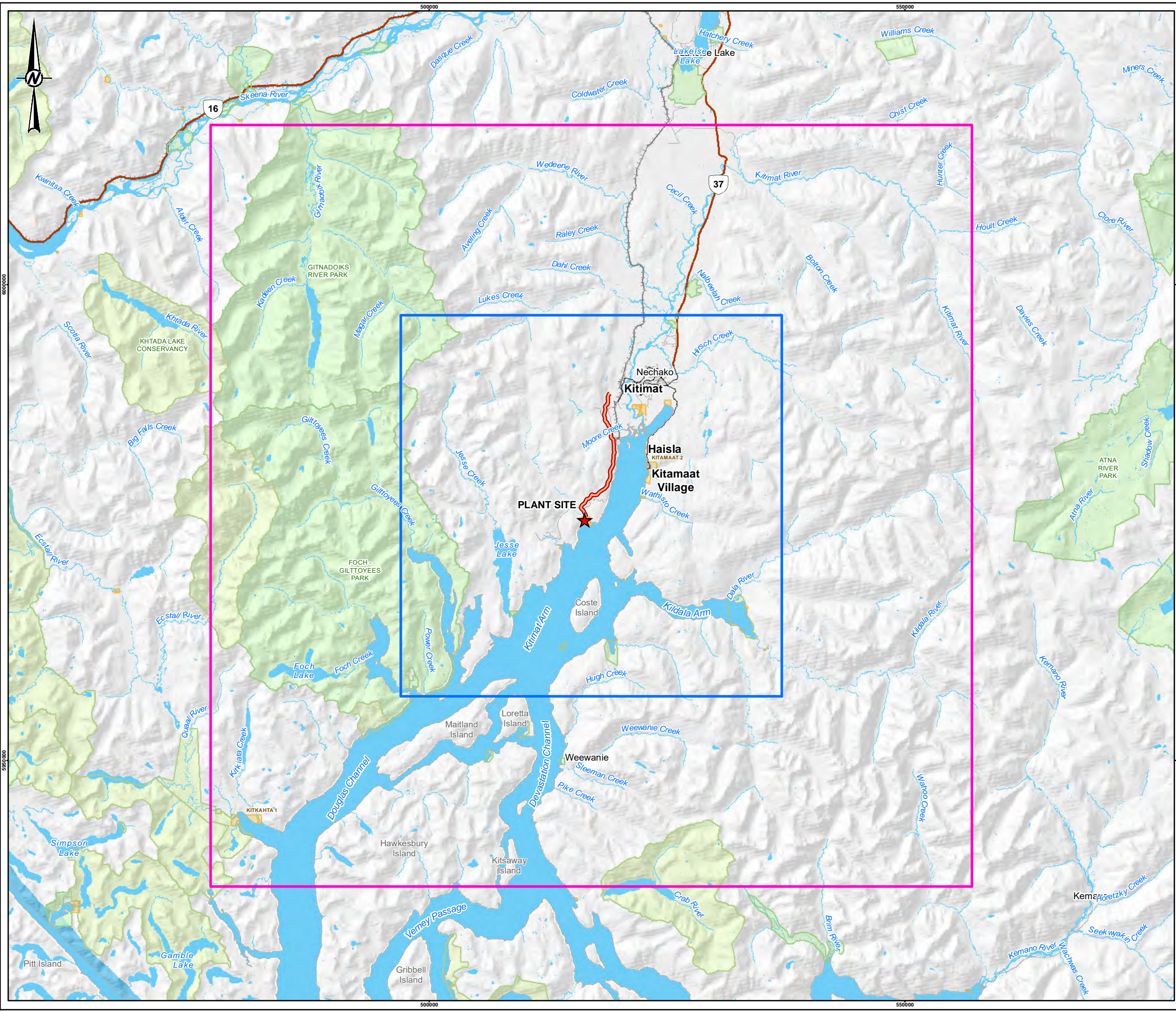
TITLE
APPROVED KLNG PROJECT AND PROPOSED KLNG EXPANSION PROJECT PLANT SITE GENERAL ARRANGEMENT

	YYYY-MM-DD	2019-10-01
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A4

PATH: Y:\burbaby\CAD-GIS\client\Chevron\Kitimat_LNG\099_PROJECT\191176702_PRODUCTION\FIGURES\KIMAT_191176702_A4R_004_CIS_AbrvowedAn@response\Fs\Plan\Compassion.mxd. PRINTED ON: 2019-10-01 AT: 10:04:14 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- PROJECT DATA**
- ★ KITIMAT LNG (PLANT SITE)
 - PROPOSED PIPELINE CORRIDOR
 - ▭ LOCAL ASSESSMENT AREA
 - ▭ REGIONAL ASSESSMENT AREA
- BASE DATA**
- HIGHWAY
 - MAJOR ROAD
 - LOCAL ROAD
 - ++++ RAILWAY
 - WATERCOURSE
 - WATERBODY
 - FIRST NATION RESERVE
 - CONSERVANCY AREA
 - PARKS AND PROTECTED AREAS



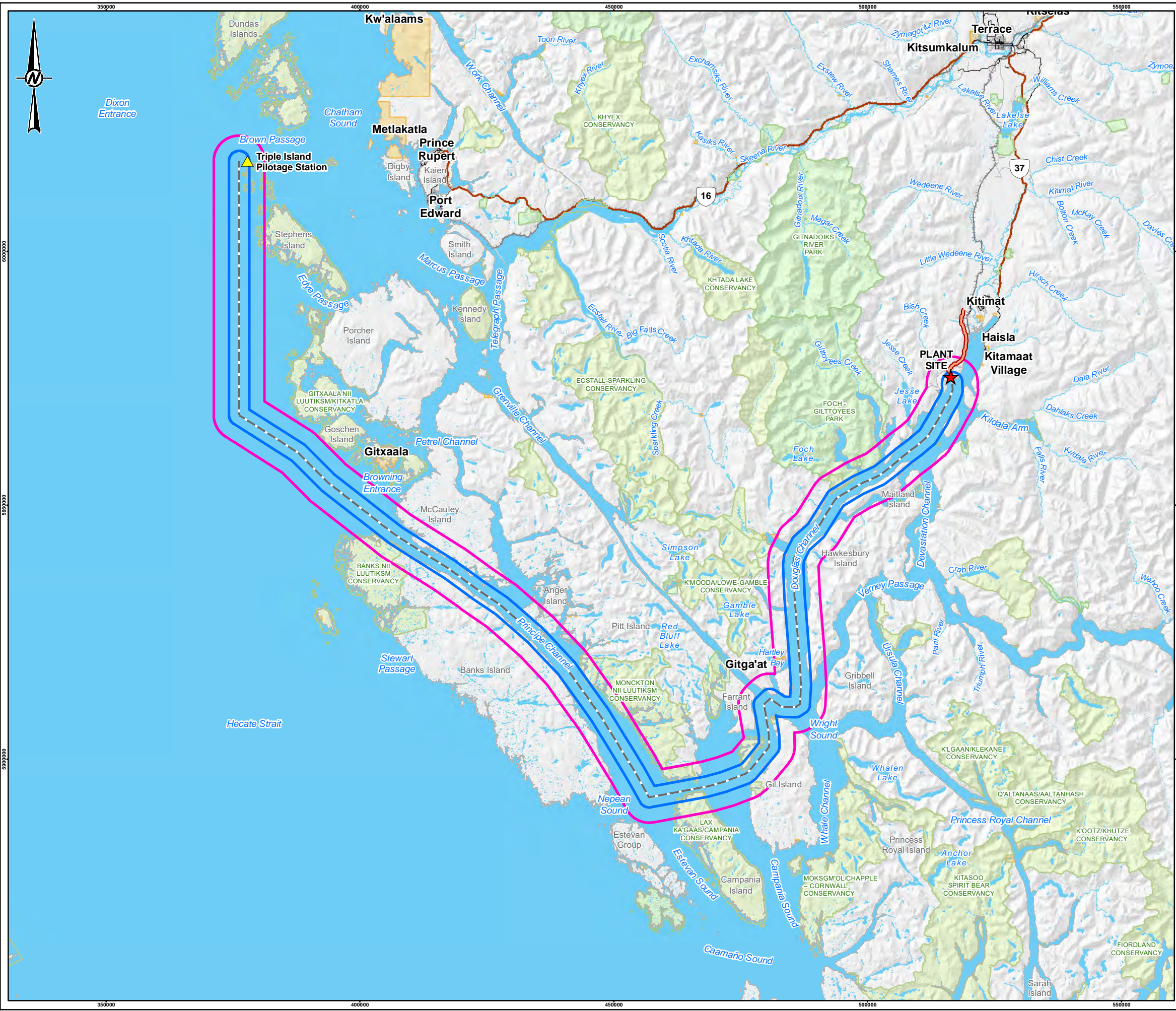
REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
3. CONTOURS, ROADS, INTERNATIONAL BOUNDARY, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT	
CHEVRON CANADA LIMITED	
PROJECT	
KITIMAT LNG EXPANSION PROJECT	
TITLE	
LOCAL AND REGIONAL ASSESSMENT AREAS: AIR QUALITY (FACILITY)	
	YYYY-MM-DD 2019-10-03
	DESIGNED AC
	PREPARED CDB
	REVIEWED
	APPROVED
PROJECT NO.	CONTROL
19117670	1000
REV.	FIGURE
A	A5.1

PATH: Y:\airmb\CAD-GIS\client\chevron\kitimat_lng\09_PROD\FIGURES\AIR_19117670_AIR_006_1_GIS_1904_Air_Quality_Facility.mxd PRINTED ON: 2019-10-03 AT: 1:01:22 PM
 IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

PROJECT DATA

- ★ KITIMAT LNG (PLANT SITE)
- - - PROPOSED SHIPPING ROUTE
- PROPOSED PIPELINE CORRIDOR
- ▭ LOCAL ASSESSMENT AREA
- ▭ REGIONAL ASSESSMENT AREA

BASE DATA

- ▲ PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- +++ RAILWAY
- WATERCOURSE
- WATERBODY
- ▭ FIRST NATION RESERVE
- ▭ CONSERVANCY AREA
- ▭ PARKS AND PROTECTED AREAS



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
3. CONTOURS, ROADS, INTERNATIONAL BOUNDARY, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

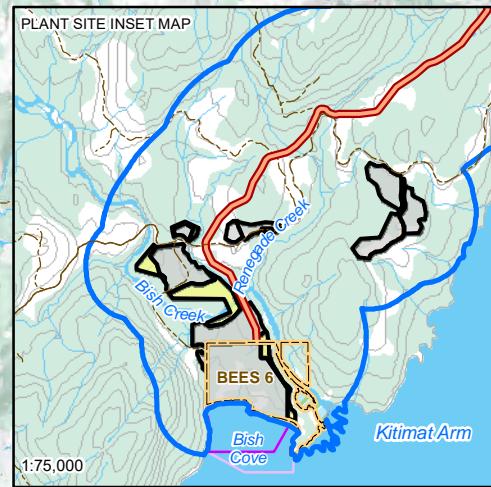
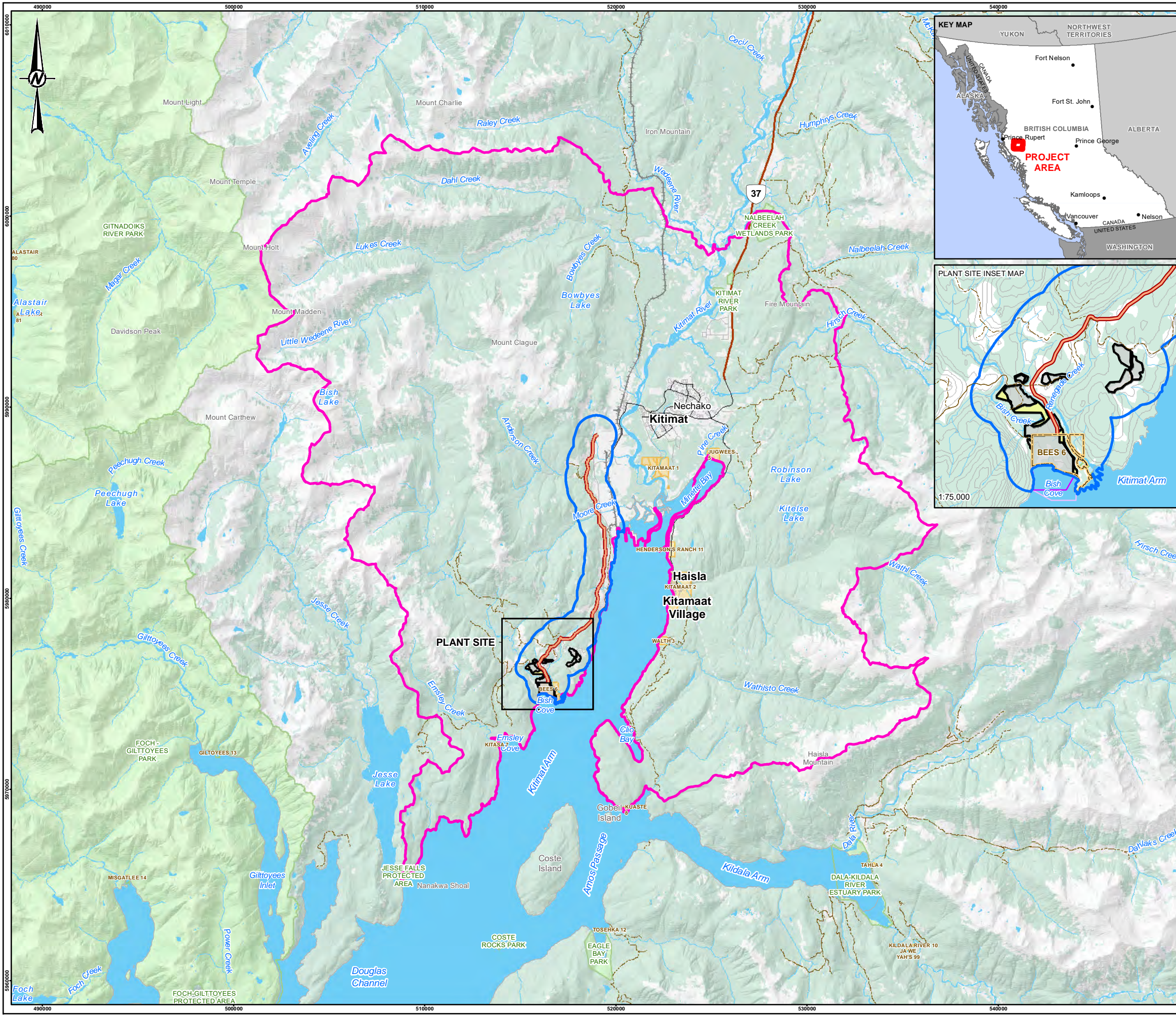
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: AIR QUALITY (SHIPPING)

Kitimat LNG	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

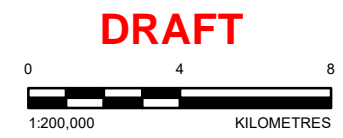
PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A5.2

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- PROJECT DATA**
- EXISTING PROJECT FOOTPRINT
 - PROPOSED NEW DEVELOPMENT AREA
 - EXISTING FORESHORE LEASE AREA
 - PROPOSED FORESHORE LEASE AREA
 - LOCAL ASSESSMENT AREA
 - REGIONAL ASSESSMENT AREA
- BASE DATA**
- HIGHWAY
 - MAJOR ROAD
 - LOCAL ROAD
 - FOREST SERVICE ROAD
 - RAILWAY
 - WATERCOURSE
 - WATERBODY
 - WETLAND
 - FIRST NATION RESERVE
 - PARKS AND PROTECTED AREAS
 - VEGETATION

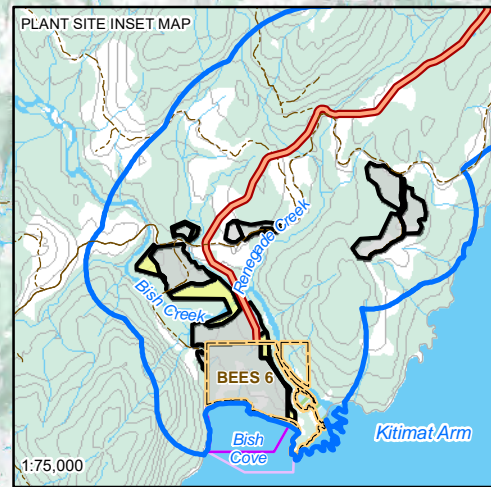
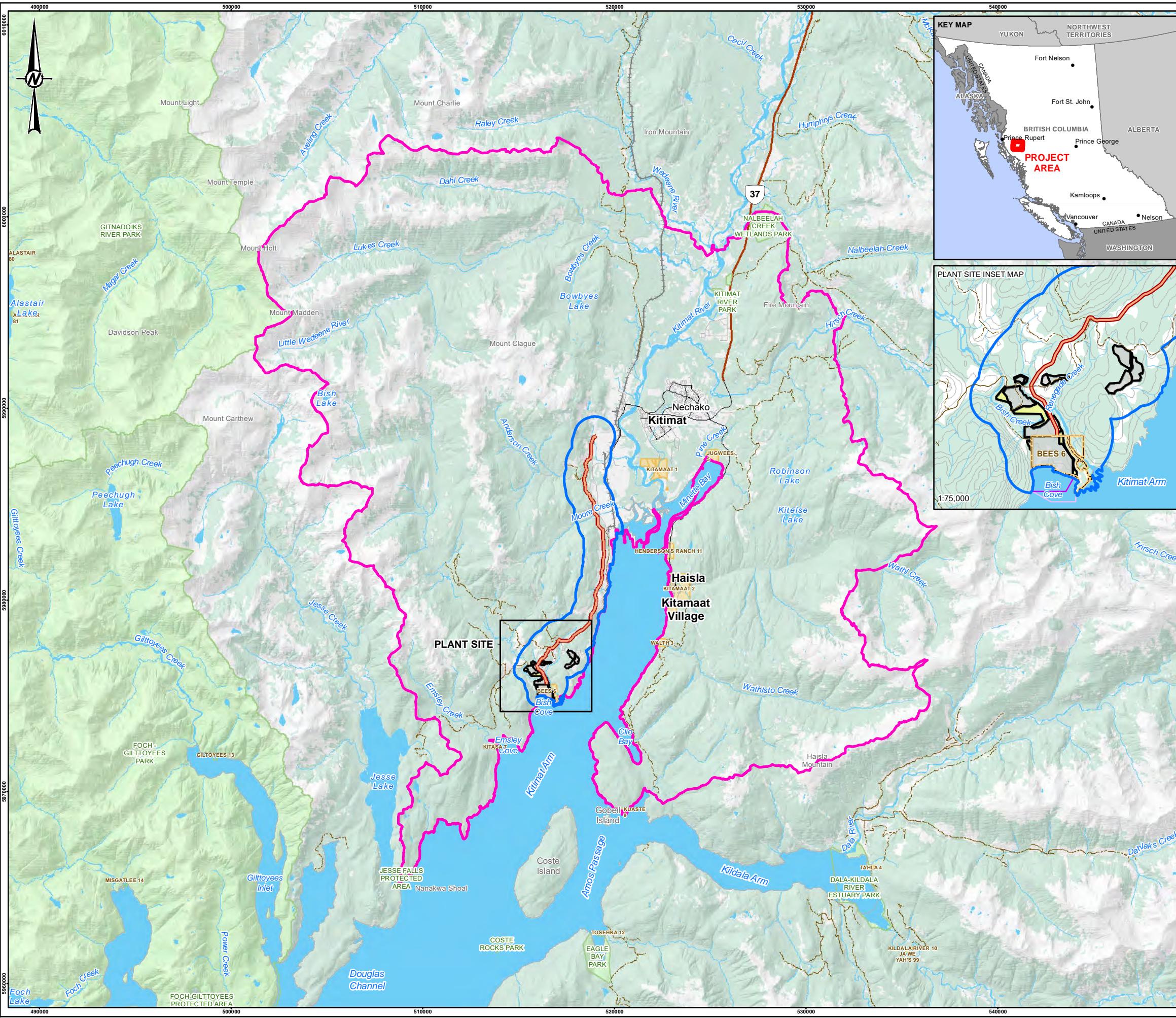


- REFERENCE(S)**
1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
 2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
 3. CONTOURS, ROADS, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
- COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT			
CHEVRON CANADA LIMITED			
PROJECT			
KITIMAT LNG EXPANSION PROJECT			
TITLE			
LOCAL AND REGIONAL ASSESSMENT AREAS: VEGETATION			
Kitimat LNG	YYYY-MM-DD 2019-10-03		
	DESIGNED AC		
	PREPARED CDB		
	REVIEWED		
	APPROVED		
PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A6

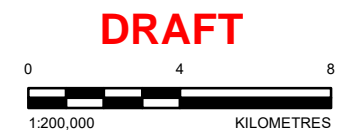
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- PROJECT DATA**
- EXISTING PROJECT FOOTPRINT
 - PROPOSED NEW DEVELOPMENT AREA
 - EXISTING FORESHORE LEASE AREA
 - PROPOSED FORESHORE LEASE AREA
 - LOCAL ASSESSMENT AREA
 - REGIONAL ASSESSMENT AREA

- BASE DATA**
- HIGHWAY
 - MAJOR ROAD
 - LOCAL ROAD
 - FOREST SERVICE ROAD
 - RAILWAY
 - WATERCOURSE
 - WATERBODY
 - WETLAND
 - FIRST NATION RESERVE
 - PARKS AND PROTECTED AREAS
 - VEGETATION



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
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COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

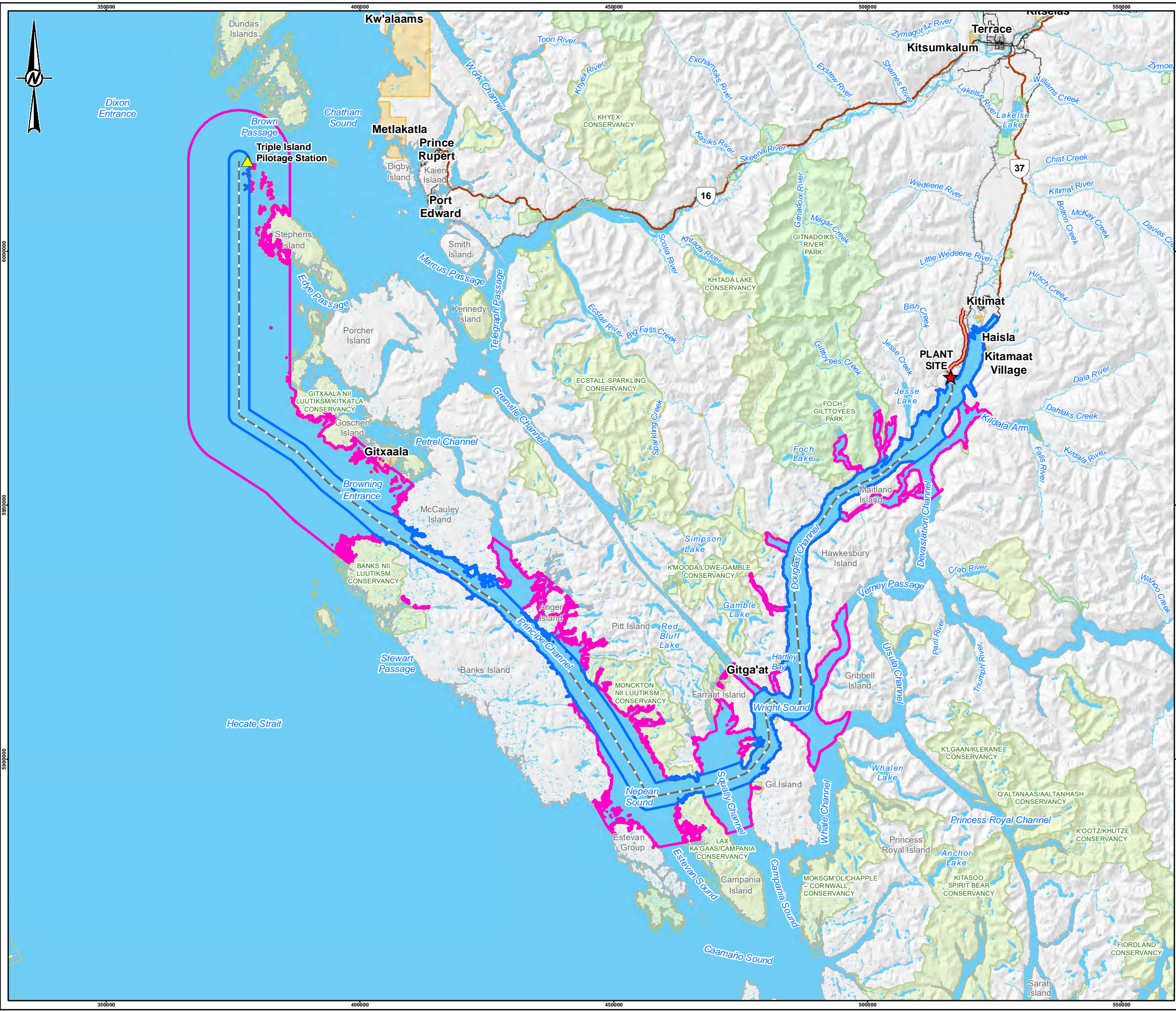
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: WILDLIFE AND WILDLIFE HABITAT

Kitimat LNG	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO. 19117670 CONTROL 1000 REV. A FIGURE A7.1

PATH: Y:\mshy\CAD-GIS\client\Chevron\Kitimat_LNG\09_PROJECT\GIS\FIGURES\MAPS\19117670_AMR_007_1_GIS_L004_Wildlife_Habitat.mxd PRINTED ON: 2019-10-03 AT: 1:38:03 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



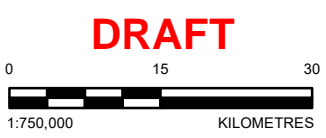
LEGEND

PROJECT DATA

- ★ KITIMAT LNG (PLANT SITE)
- - - PROPOSED SHIPPING ROUTE
- PROPOSED PIPELINE CORRIDOR
- ▭ LOCAL ASSESSMENT AREA
- ▭ REGIONAL ASSESSMENT AREA

BASE DATA

- ▲ PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- +++ RAILWAY
- WATERCOURSE
- WATERBODY
- ▭ FIRST NATION RESERVE
- ▭ CONSERVANCY AREA
- ▭ PARKS AND PROTECTED AREAS



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
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COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

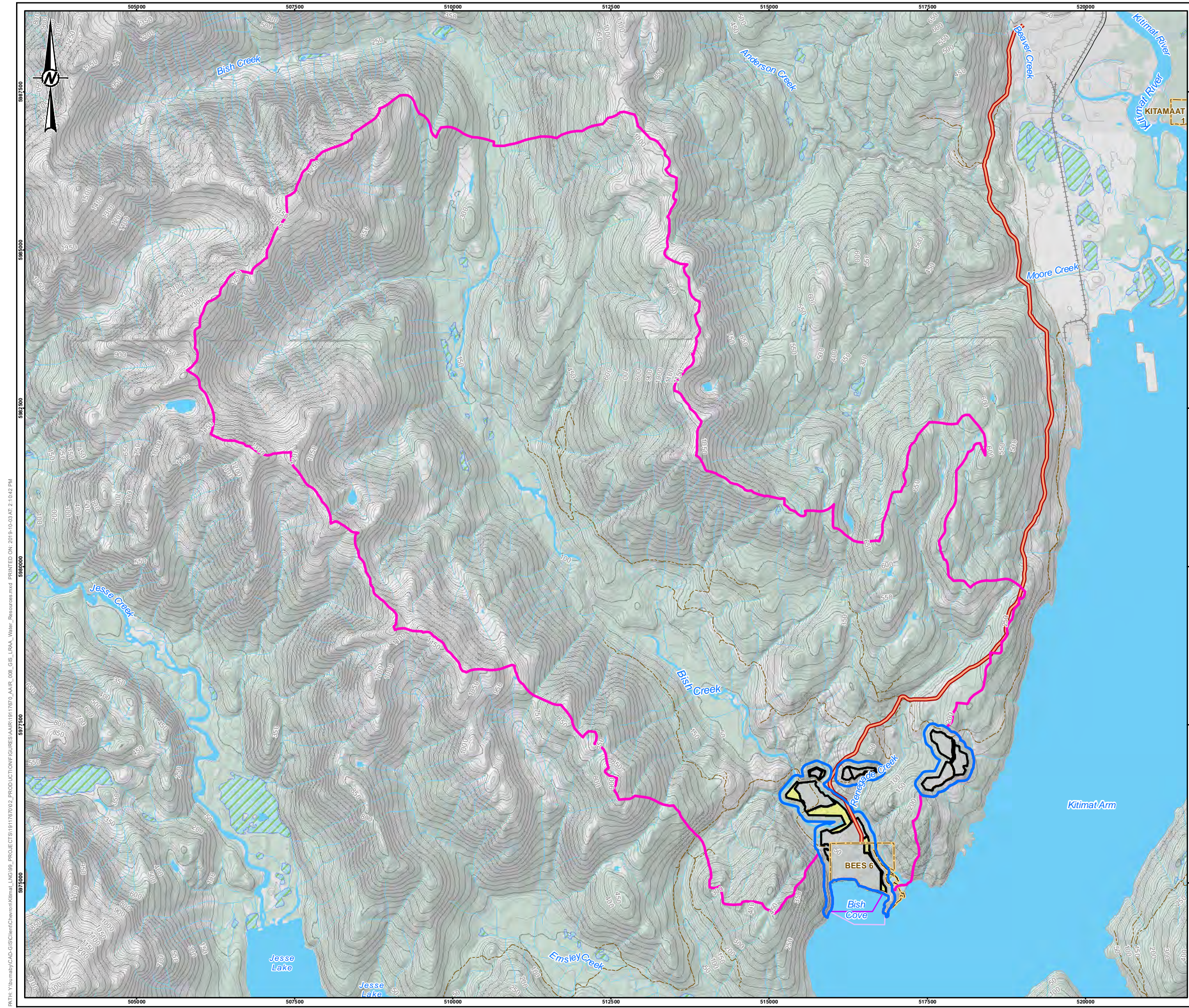
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: MARINE BIRDS

Kitimat LNG	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A7.2

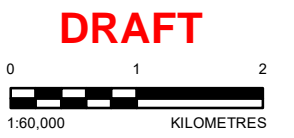
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

- PROPOSED PIPELINE CORRIDOR
- PROJECT DATA**
 - EXISTING PROJECT FOOTPRINT
 - PROPOSED NEW DEVELOPMENT
 - EXISTING FORESHORE LEASE
 - PROPOSED FORESHORE LEASE
 - LOCAL ASSESSMENT
 - REGIONAL ASSESSMENT
- BASE DATA**
 - MAJOR ROAD
 - LOCAL ROAD
 - FOREST SERVICE ROAD
 - RAILWAY
 - WATERCOURSE
 - CONTOUR 10m
 - CONTOUR 50m
 - WATERBODY
 - WETLAND
 - FIRST NATION RESERVE
 - VEGETATION



- REFERENCES**
- EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
 - FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
 - FIRST NATION RESERVES OBTAINED FROM IHS ENERGY.
 - CONTOURS, ROADS, AND VEGETATION OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

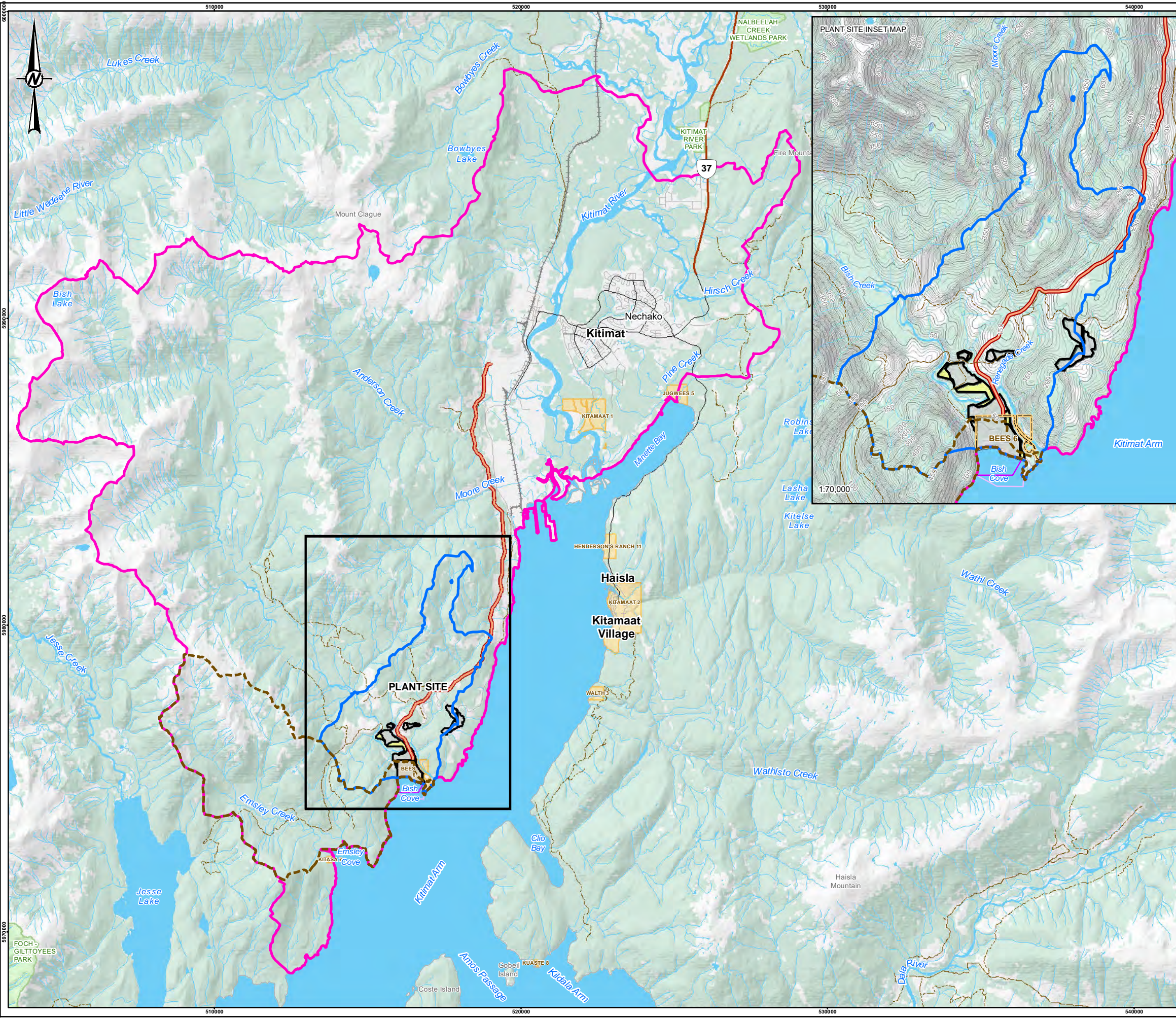
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: WATER RESOURCES

Kitimat LNG	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO. 19117670	CONTROL 1000	REV. A	FIGURE A8
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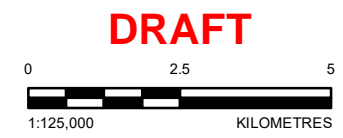
LEGEND

PROJECT DATA

- PROPOSED PIPELINE CORRIDOR
- EXISTING PROJECT FOOTPRINT
- PROPOSED NEW DEVELOPMENT AREA
- EXISTING FORESHORE LEASE AREA
- PROPOSED FORESHORE LEASE AREA
- LOCAL ASSESSMENT AREA
- REGIONAL ASSESSMENT AREA
- REFERENCE AREA

BASE DATA

- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- FOREST SERVICE ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- WETLAND
- FIRST NATION RESERVE
- PARKS AND PROTECTED AREAS
- VEGETATION



REFERENCE(S)

- FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
- INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
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CLIENT
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PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: FRESHWATER FISH AND FISH HABITAT

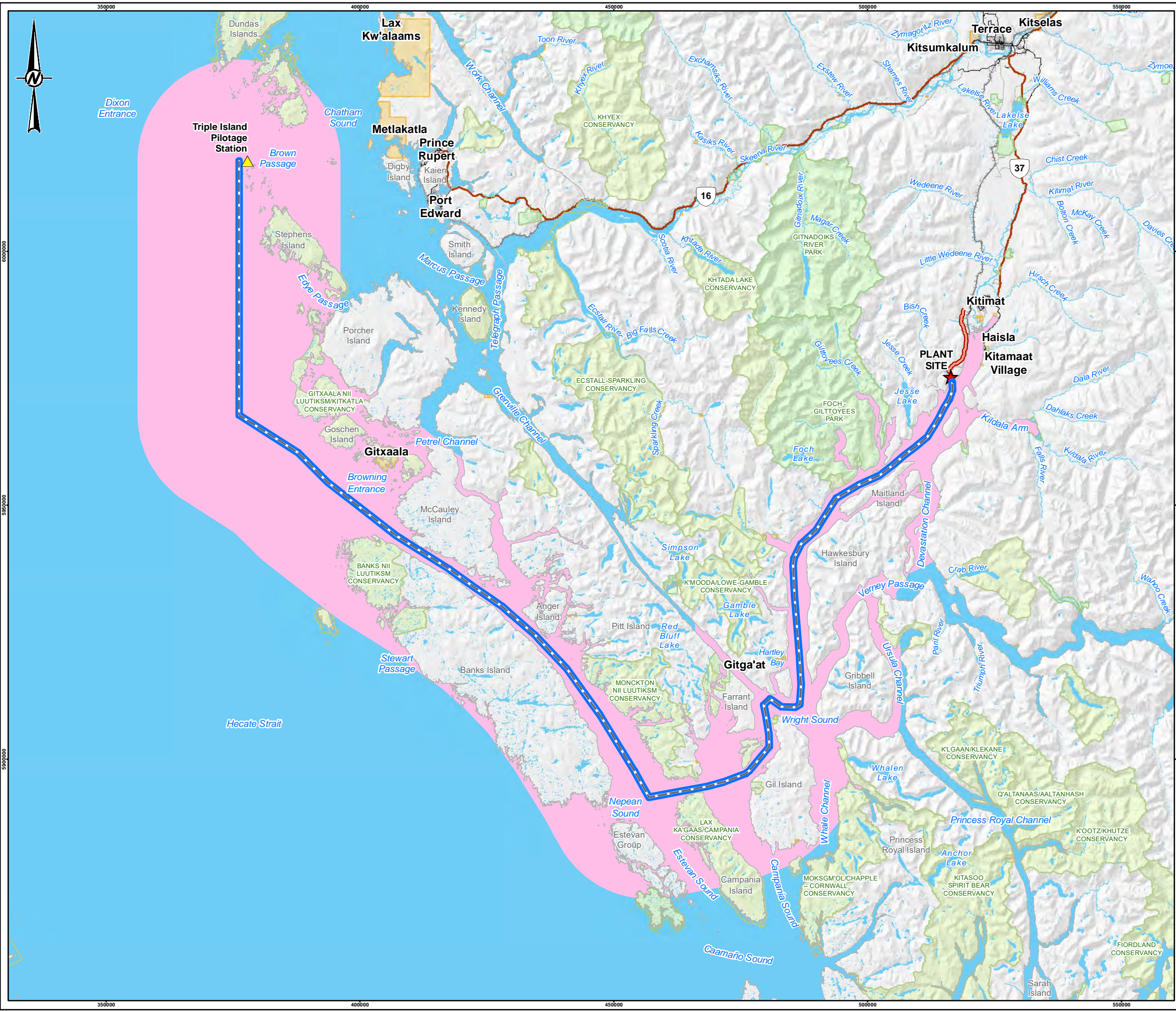
Kitimat LNG

YYYY-MM-DD	2019-10-03
DESIGNED	AC
PREPARED	CDB
REVIEWED	
APPROVED	

PROJECT NO. 19117670 CONTROL 1000 REV. A FIGURE A9

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- PROJECT DATA**
- ★ KITIMAT LNG (PLANT SITE)
 - PROPOSED SHIPPING ROUTE
 - PROPOSED PIPELINE CORRIDOR
 - LOCAL ASSESSMENT AREA
 - REGIONAL ASSESSMENT AREA
- BASE DATA**
- ▲ PILOTAGE STATION
 - HIGHWAY
 - MAJOR ROAD
 - LOCAL ROAD
 - +++ RAILWAY
 - WATERCOURSE
 - WATERBODY
 - FIRST NATION RESERVE
 - CONSERVANCY AREA
 - PARKS AND PROTECTED AREAS



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
3. CONTOURS, ROADS, INTERNATIONAL BOUNDARY, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

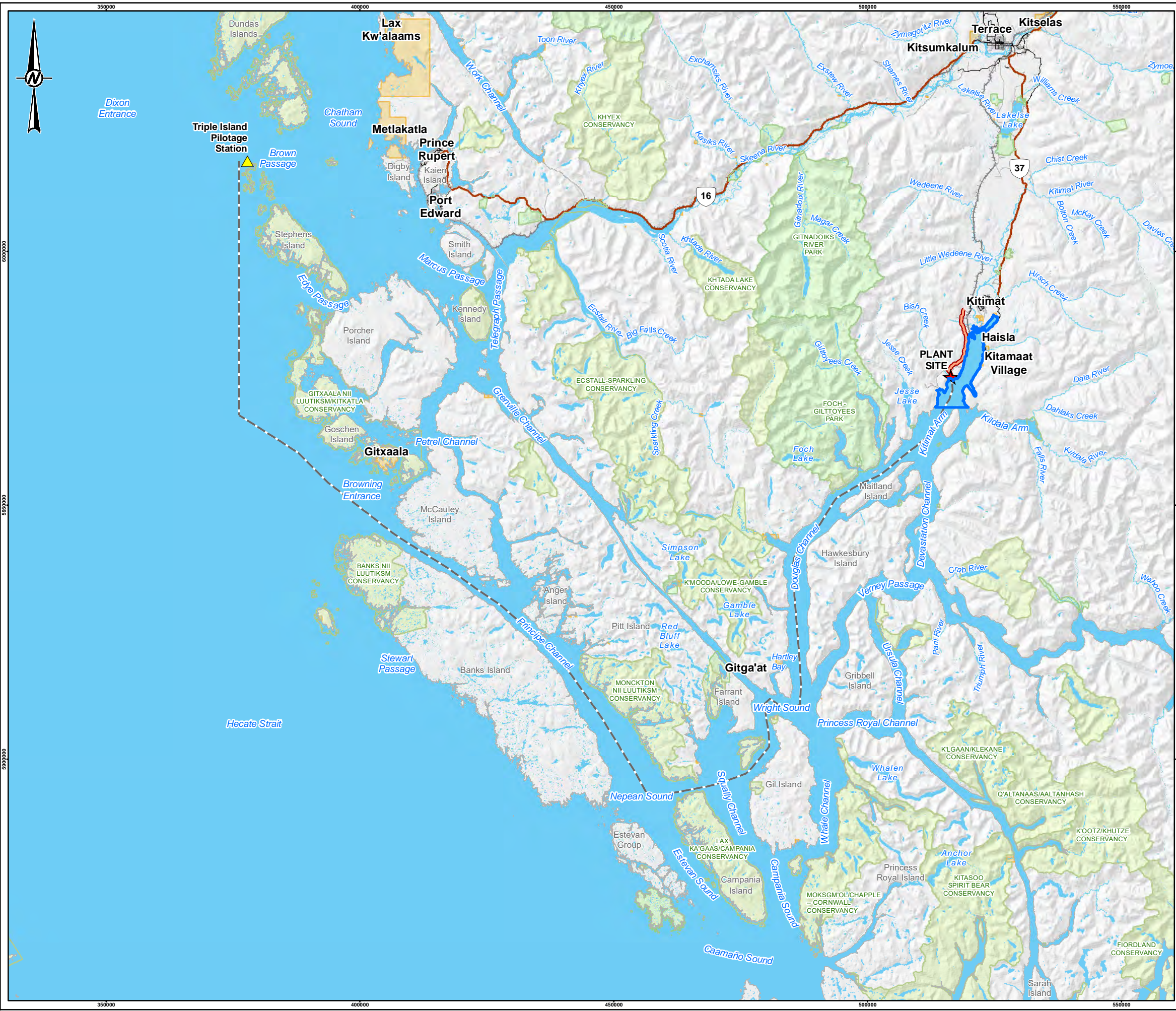
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: MARINE MAMMALS

Kitimat LNG	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A10.1

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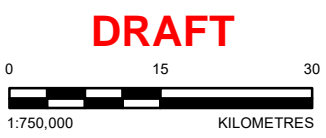
LEGEND

PROJECT DATA

- ★ KITIMAT LNG (PLANT SITE)
- - - PROPOSED SHIPPING ROUTE
- PROPOSED PIPELINE CORRIDOR
- LOCAL AND REGIONAL ASSESSMENT AREAS

BASE DATA

- ▲ PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- +++ RAILWAY
- WATERCOURSE
- WATERBODY
- FIRST NATION RESERVE
- CONSERVANCY AREA
- PARKS AND PROTECTED AREAS



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
3. CONTOURS, ROADS, INTERNATIONAL BOUNDARY, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

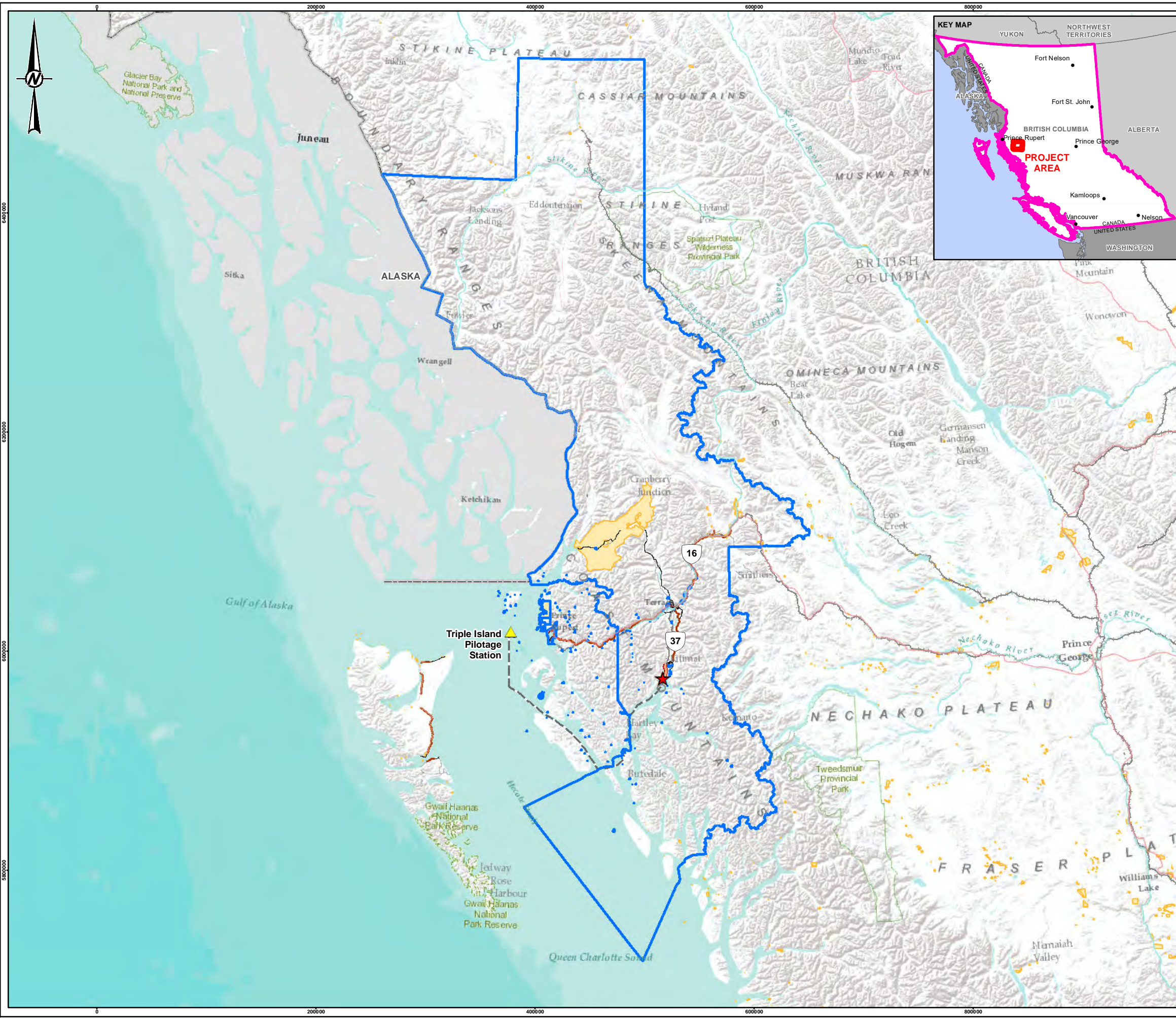
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: MARINE RESOURCES

Kitimat LNG	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO. 19117670 CONTROL 1000 REV. A FIGURE A10.2

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- PROJECT DATA**
- ★ KITIMAT LNG (PLANT SITE)
 - - - PROPOSED SHIPPING ROUTE
 - PROPOSED PIPELINE CORRIDOR
 - ▭ LOCAL ASSESSMENT AREA
 - ▭ REGIONAL ASSESSMENT AREA
- BASE DATA**
- ▲ PILOTAGE STATION
 - HIGHWAY
 - MAJOR ROAD
 - LOCAL ROAD
 - ++++ RAILWAY
 - INTERNATIONAL BOUNDARY
 - ▭ FIRST NATION RESERVE



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
3. CONTOURS, ROADS, INTERNATIONAL BOUNDARY, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

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PROJECT
KITIMAT LNG EXPANSION SITE

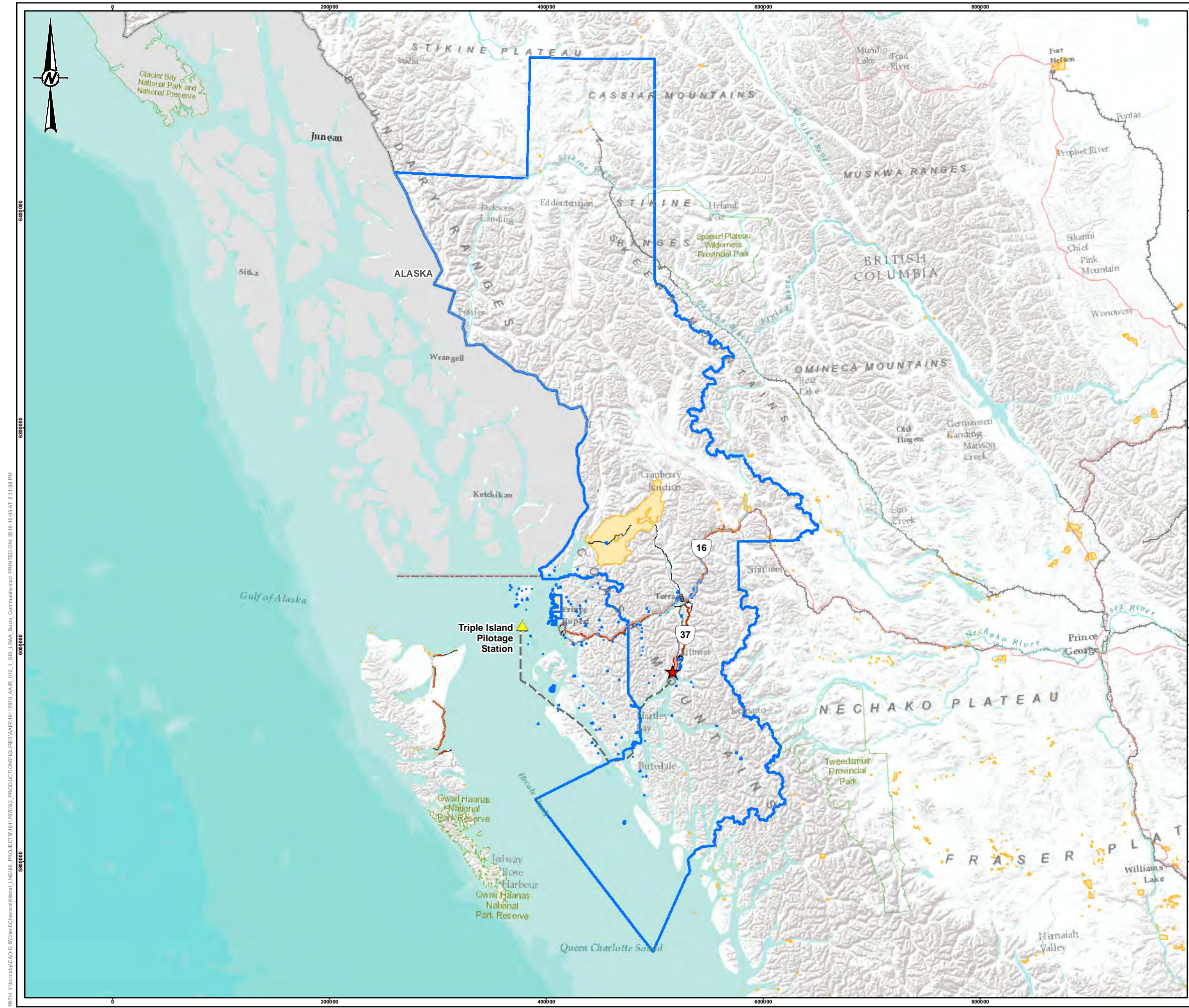
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: ECONOMY

	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A11

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LEGEND

PROJECT DATA

- ★ KITIMAT LNG (PLANT SITE)
- PROPOSED SHIPPING ROUTE
- PROPOSED PIPELINE CORRIDOR
- LOCAL AND REGIONAL ASSESSMENT AREAS

BASE DATA

- ▲ PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- +++ RAILWAY
- INTERNATIONAL BOUNDARY
- FIRST NATION RESERVE



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
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PROJECT
KITIMAT LNG EXPANSION PROJECT

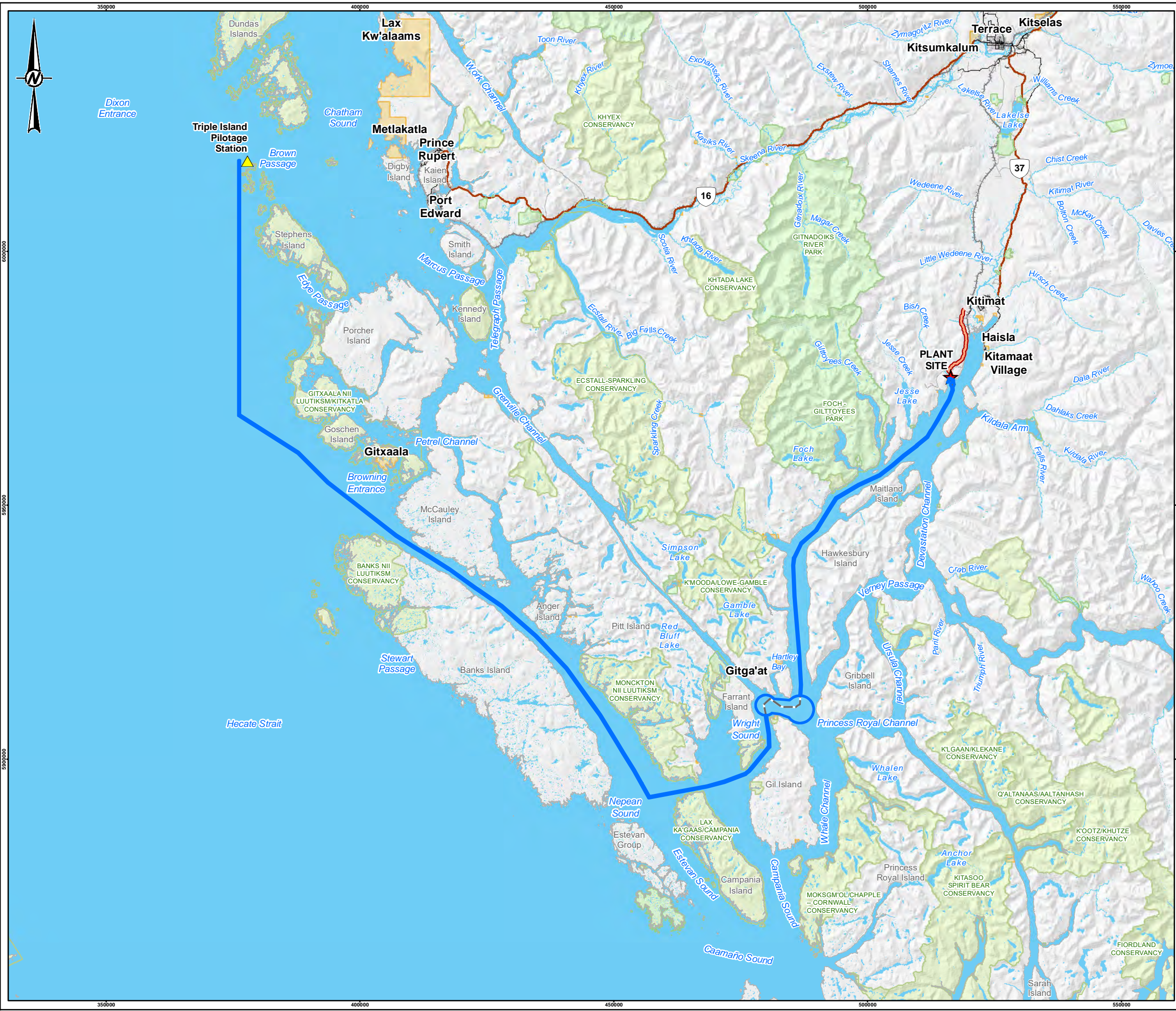
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: SOCIO-COMMUNITY

	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A12.1

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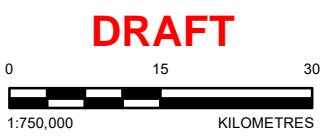
LEGEND

PROJECT DATA

- ★ KITIMAT LNG (PLANT SITE)
- PROPOSED SHIPPING ROUTE
- PROPOSED PIPELINE CORRIDOR
- ▭ LOCAL AND REGIONAL ASSESSMENT AREAS

BASE DATA

- ▲ PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- +++ RAILWAY
- WATERCOURSE
- WATERBODY
- ▭ FIRST NATION RESERVE
- ▭ CONSERVANCY AREA
- ▭ PARKS AND PROTECTED AREAS



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
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PROJECT
KITIMAT LNG EXPANSION PROJECT

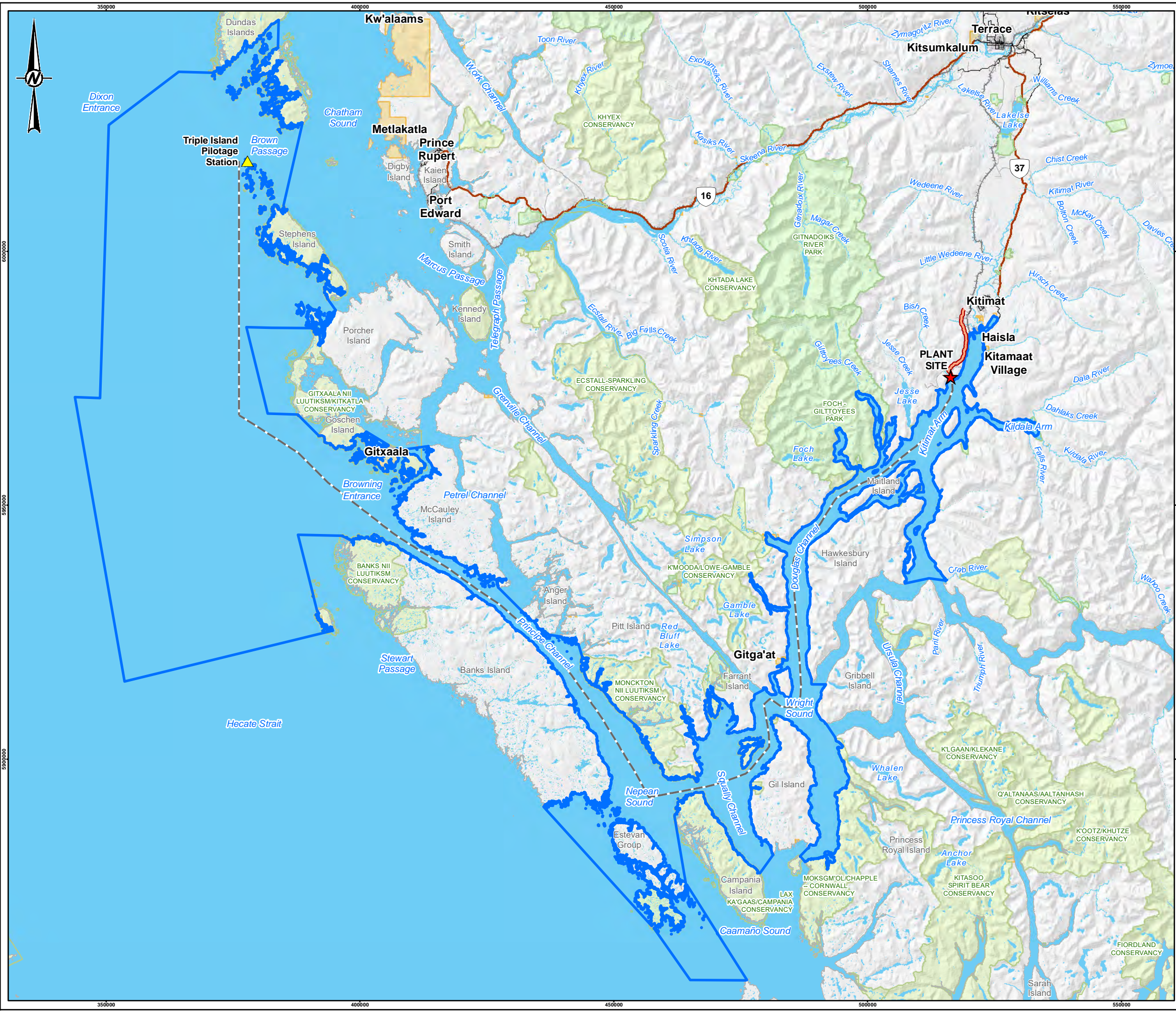
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: MARINE AND LAND RESOURCE USE - NAVIGATION

	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A12.2

PATH: Y:\bimby\CAD-GIS\client\chevron\kitimat_lng\09_PROD\FIGURES\MAR_19117670_A12_2_GIS_L004_MLBU_Navigation.mxd PRINTED ON: 2019-10-03 AT 2:37:55 PM
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 25mm



LEGEND

PROJECT DATA

- ★ KITIMAT LNG (PLANT SITE)
- - - PROPOSED SHIPPING ROUTE
- PROPOSED PIPELINE CORRIDOR
- ▭ LOCAL AND REGIONAL ASSESSMENT AREAS

BASE DATA

- ▲ PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- +++ RAILWAY
- WATERCOURSE
- ▭ WATERBODY
- ▭ FIRST NATION RESERVE
- ▭ CONSERVANCY AREA
- ▭ PARKS AND PROTECTED AREAS



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
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PROJECT
KITIMAT LNG EXPANSION PROJECT

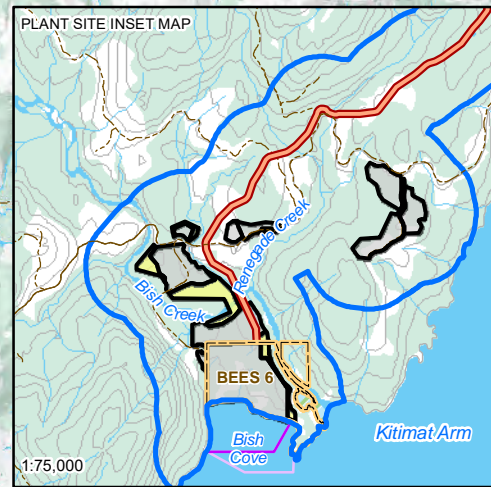
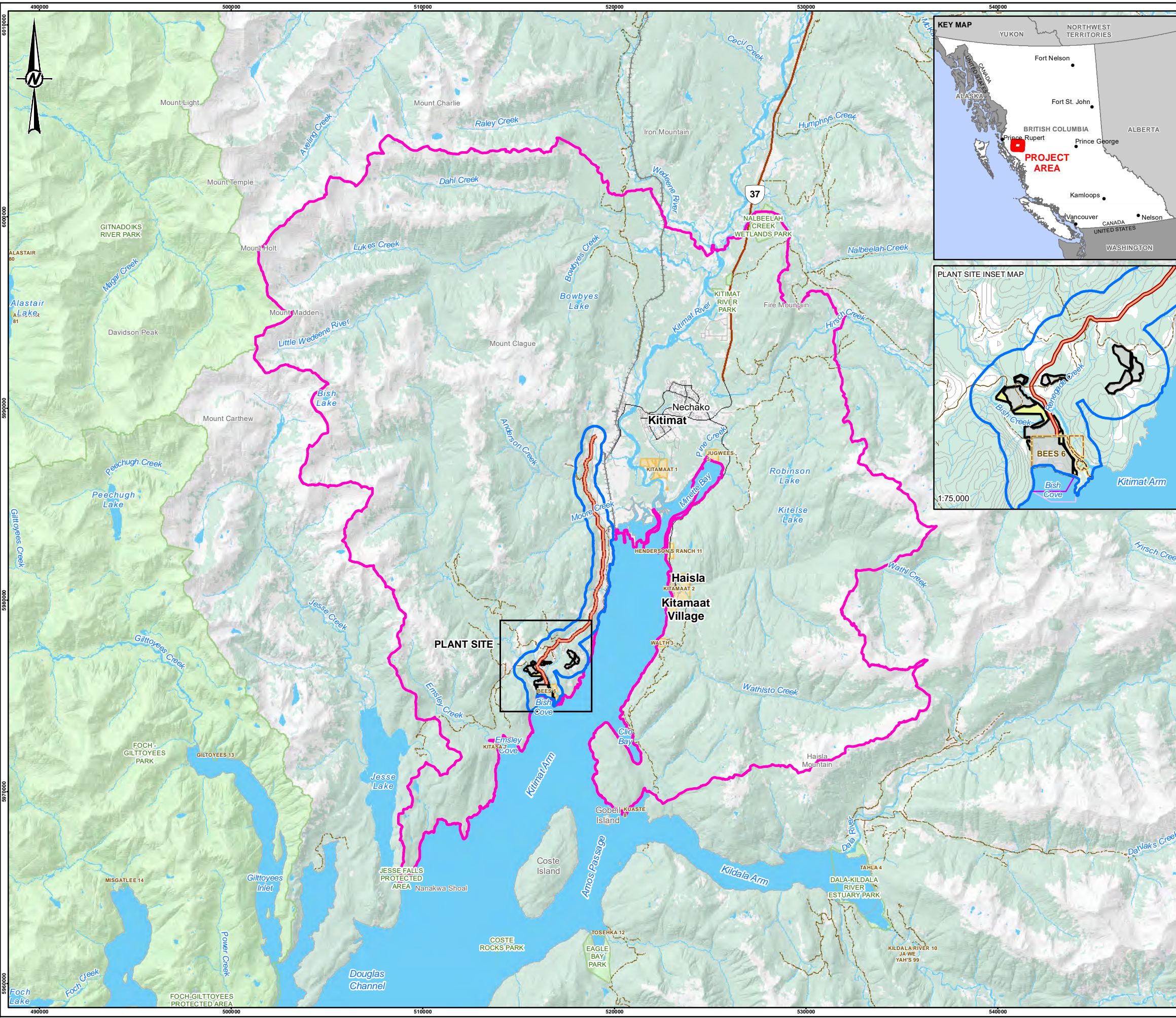
TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: MARINE AND LAND RESOURCE USE - MARINE

	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A12.3

PATH: Y:\bim\by\CAD-GIS\client\Chevron\Kitimat_LNG\09_PROJECT\191176702_PRODUCT\FIGURES\MARINE_191176702_A12_3_GIS_L004_MLBU_Marine.mxd PRINTED ON: 2019-10-03 AT: 4:15:39 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



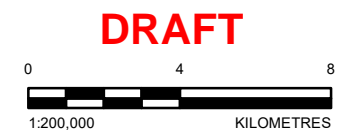
LEGEND

PROJECT DATA

- EXISTING PROJECT FOOTPRINT
- PROPOSED NEW DEVELOPMENT AREA
- EXISTING FORESHORE LEASE AREA
- PROPOSED FORESHORE LEASE AREA
- LOCAL ASSESSMENT AREA
- REGIONAL ASSESSMENT AREA

BASE DATA

- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- FOREST SERVICE ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- WETLAND
- FIRST NATION RESERVE
- PARKS AND PROTECTED AREAS
- VEGETATION



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
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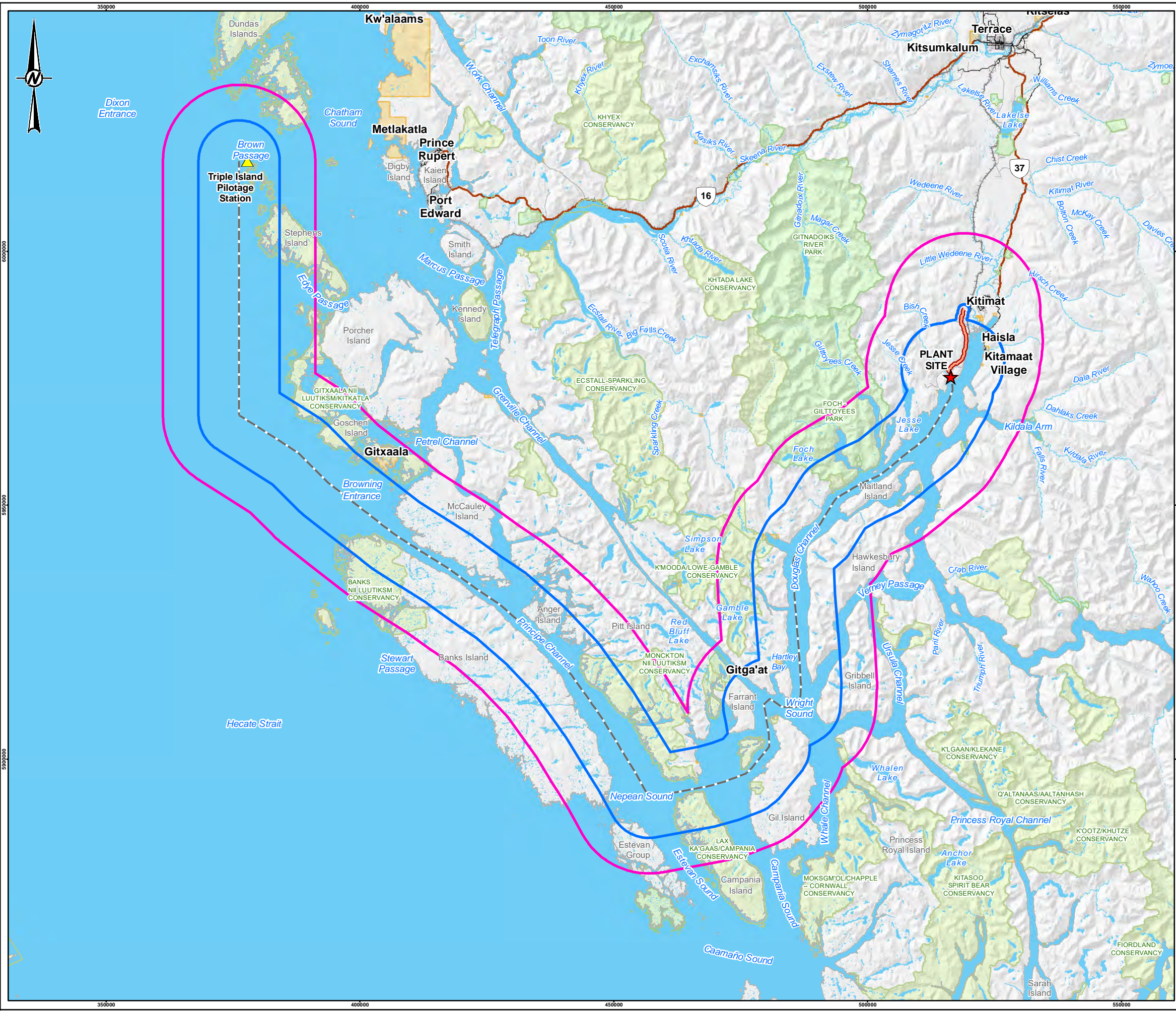
PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: MARINE AND LAND RESOURCE USE - LAND

Kitimat LNG	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A12.4

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 IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- PROJECT DATA**
- ★ KITIMAT LNG (PLANT SITE)
 - - - PROPOSED SHIPPING ROUTE
 - PROPOSED PIPELINE CORRIDOR
 - LOCAL ASSESSMENT AREA
 - REGIONAL ASSESSMENT AREA
- BASE DATA**
- ▲ PILOTAGE STATION
 - HIGHWAY
 - MAJOR ROAD
 - LOCAL ROAD
 - +++ RAILWAY
 - WATERCOURSE
 - WATERBODY
 - FIRST NATION RESERVE
 - CONSERVANCY AREA
 - PARKS AND PROTECTED AREAS



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
3. CONTOURS, ROADS, INTERNATIONAL BOUNDARY, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

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PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: VISUAL QUALITY

Kitimat LNG	YYYY-MM-DD	2019-10-03
	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A12.5

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- LEGEND**
- PROJECT DATA**
- PROPOSED PIPELINE CORRIDOR
 - EXISTING PROJECT FOOTPRINT
 - PROPOSED NEW DEVELOPMENT AREA
 - EXISTING FORESHORE LEASE AREA
 - PROPOSED FORESHORE LEASE AREA
 - LOCAL AND REGIONAL ASSESSMENT AREAS

- BASE DATA**
- MAJOR ROAD
 - LOCAL ROAD
 - FOREST SERVICE ROAD
 - + RAILWAY
 - WATERCOURSE
 - WATERBODY
 - WETLAND
 - FIRST NATION RESERVE



- REFERENCES**
1. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
 2. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE - BRITISH COLUMBIA.
 3. FIRST NATION RESERVES OBTAINED FROM IHS ENERGY.
 4. ROADS OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 5. IMAGERY PROVIDED BY CHEVRON. NAD 1983 CSRS UTM ZONE 9N

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PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: HERITAGE RESOURCES

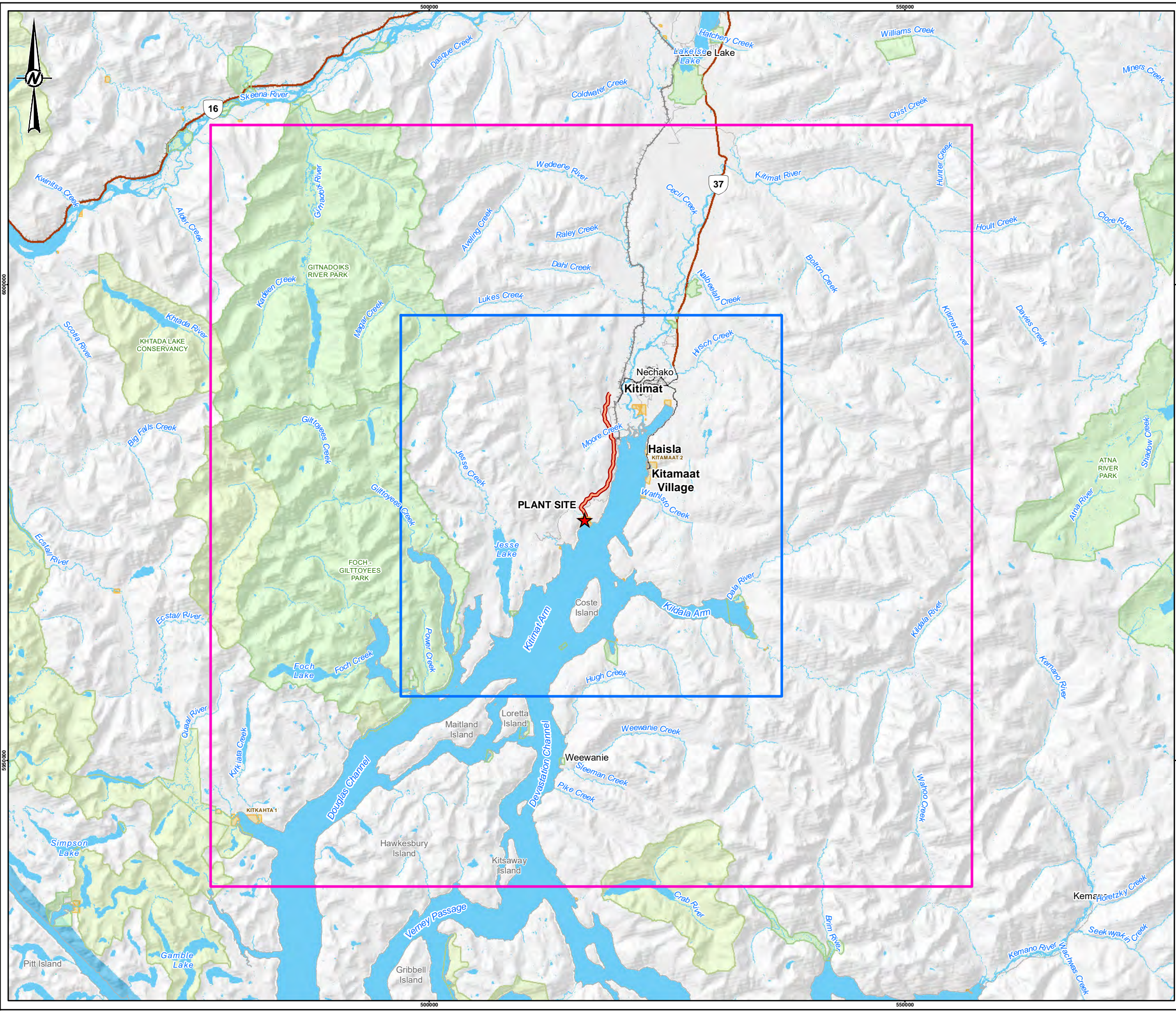
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	DESIGNED	AC
	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A13

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- LEGEND**
- PROJECT DATA**
- ★ KITIMAT LNG (PLANT SITE)
 - PROPOSED PIPELINE CORRIDOR
 - ▭ LOCAL ASSESSMENT AREA
 - ▭ REGIONAL ASSESSMENT AREA
- BASE DATA**
- HIGHWAY
 - MAJOR ROAD
 - LOCAL ROAD
 - ++++ RAILWAY
 - WATERCOURSE
 - WATERBODY
 - FIRST NATION RESERVE
 - CONSERVANCY AREA
 - PARKS AND PROTECTED AREAS



REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
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PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
LOCAL AND REGIONAL ASSESSMENT AREAS: HUMAN HEALTH

Kitimat LNG	YYYY-MM-DD	2019-10-03
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	PREPARED	CDB
	REVIEWED	
	APPROVED	

PROJECT NO. 19117670	CONTROL 1000	REV. A	FIGURE A14
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