

A World-Class Canadian LNG Project



The Kitimat LNG Project is a 50/50 joint venture between Chevron Canada Limited (Chevron) and Woodside Energy International (Canada) Limited (Woodside).

Chevron and Woodside are advancing the proposed Kitimat LNG Project to meet increasing global demand for cleaner, affordable, reliable energy.

Kitimat LNG has the potential to advance a new world-class industry in British Columbia and deliver significant economic and social benefits to local and Indigenous communities, British Columbia and Canada.

Kitimat LNG



All-Electric LNG Facility



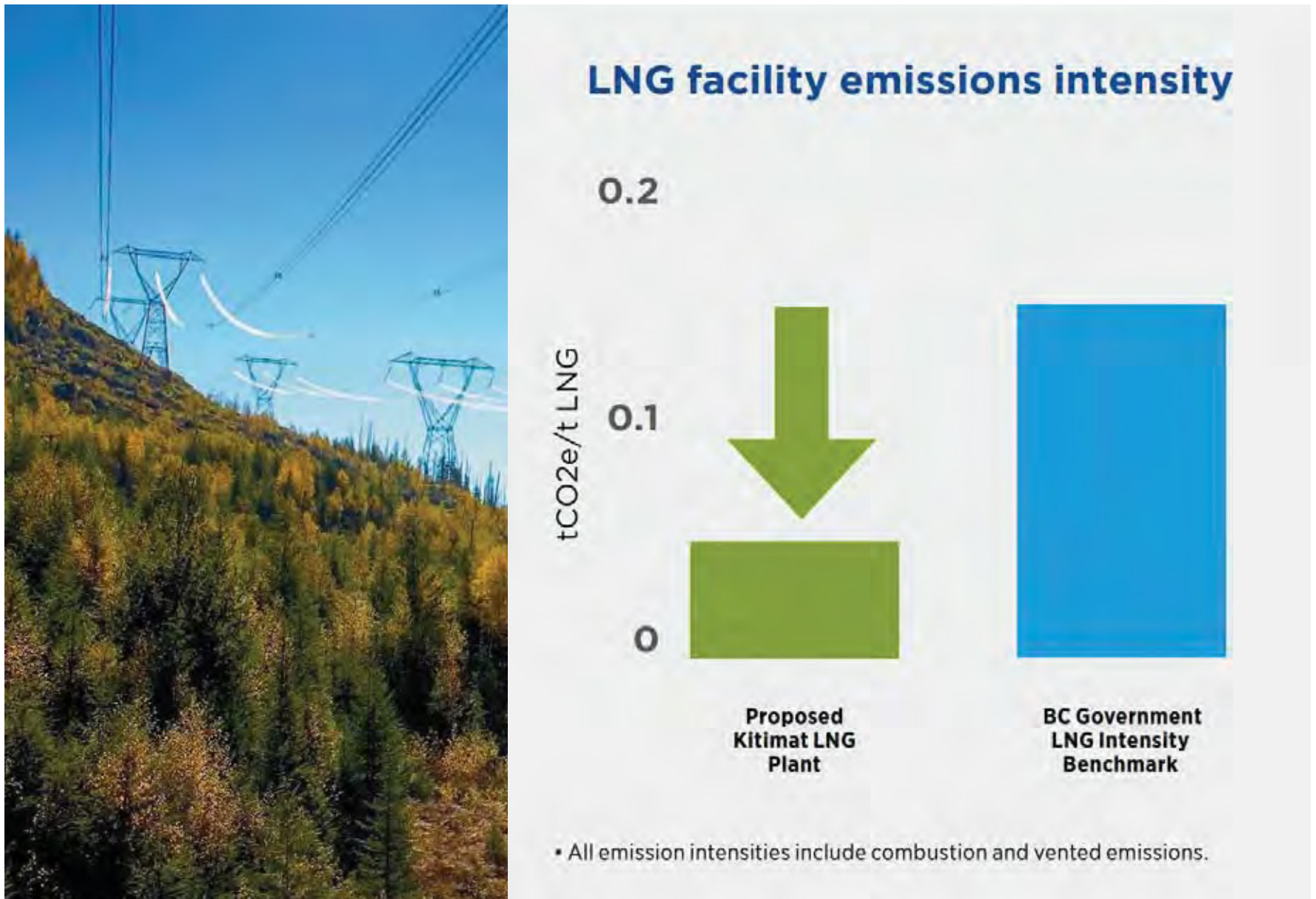
An all-electric Kitimat LNG facility design eliminates the need for natural-gas powered turbines. The plant design features an advanced compact module design enabling low-cost operations, high efficiency and high availability.

- Kitimat, British Columbia
- Up to three LNG train 18 million tonnes per annum (MTPA) facility (6.0 MTPA/train)
- All-electric LNG Plant powered by clean hydroelectricity provided by BC Hydro
- APCI dual mixed refrigerant LNG process technology
- Advanced compact module design

Kitimat LNG



Designed to be the World's Cleanest LNG



- An all-electric Kitimat LNG facility powered by renewable hydroelectricity will set the global standard for lowest emissions intensity of any large-scale LNG facility
- 98% of BC Hydro power is generated from hydroelectric, wind, solar and biomass sources
- Aligned with the CleanBC Strategy

Kitimat LNG



Proposed Project Changes

Proposed Changes	Approved KLNG Project	KLNG Expansion Project
Maximum Production Capacity in Million Tons Per Annum (MTPA)	10 MTPA	18 MTPA
Number of Trains	2 Trains	2 + 1 Trains
LNG Carriers per Year	60 – 120	225 – 255
LNG Loading Facility	Permanent LNG loading jetty and carrier berth	Land-Backed Wharf
On Shore Storage	420,000 m3	390,000 m3
Pipeline Diameter	30"	42"

Environment Valued Components



The following Valued Components (VCs) are proposed to be assessed:

- Atmospheric Environment
 - GHG Management
 - Air Quality
- Terrestrial Environment
 - Vegetation
- Water Resources
 - Surface Water Resources
 - Groundwater Resources
- Wildlife and Wildlife Habitat
- Freshwater Fish and Fish Habitat
- Marine Resources, including Marine Mammals
 - Marine Fish and Fish Habitat
 - Benthic Fauna

Environment

Atmospheric Environment



View of meteorological station at Bish Cove

- Assess the incremental effects of the proposed KLNG Expansion Project on Air Quality and Greenhouse Gases (GHG).
- Air quality modelling will assess any changes in air quality in the Kitimat airshed using site specific meteorological data to predict potential impacts on human health and wildlife.
- Primary substances of concern include nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), hydrogen sulphide (H_2S), particulate matter ($\text{PM}_{2.5}$ and PM_{10}) and volatile organic compounds (VOCs).
- Changes in GHG emissions have the potential to impact local and global climate change (primarily during operational phase). Primary substances of concern are methane, nitrous oxide and CO_2 .
- To mitigate potential adverse effects on air quality and GHGs, the LNG plant will use electric motor driven (E-Drive) technology for all liquefaction process and utility compressors, pumps and fans. Use of electric drives largely eliminates combustion related emissions during operation such as NO_2 , SO_2 , CO and particulate matter.

Environment

Terrestrial Environment



- Seasonal vegetation surveys were conducted within the proposed KLNG Expansion Project assessment area.
- Terrestrial Ecosystem Mapping (TEM), old growth forests, rare plants surveys, riparian forest and wetland delineation were conducted between 2017 and 2019 within new areas that will require additional vegetation clearing.
- Clearing and vegetation removal during construction could result in direct loss or change in ecological function of: wetlands, old growth forest, federally or provincially listed plant species, traditional use plant species, and/or provincially listed ecological communities.

Environment

Wildlife & Wildlife Habitat



- Wildlife surveys for northern goshawk, raptor and heron nests, bats, western screech owl, breeding birds, amphibians, and coastal tailed frogs were conducted between 2017 and 2019 to characterized existing conditions.
- Wildlife habitat suitability modelling for Grizzly Bear, Black Bear, Moose, Marten Coastal tailed frog and other focal species (including marine and migratory birds) will be undertaken.
- Potential incremental effects on wildlife habitat loss or alterations in habitat suitability and movement patterns, and disturbance due to light and noise will be assessed.

Environment

Freshwater Fish & Fish Habitat



- Field surveys were conducted in 2017 and 2019 to characterize the fish habitat and to determine the end of use in all streams and drainages within the assessment area.
- Fish sampling (backpack electrofishing) to determine the presence or absence of fish.
- Potential impacts on freshwater fish include the installation of road crossing culverts, bridges.
- Road construction will utilize best management practices for culvert and bridges to mitigate potential impacts to freshwater fish.

Environment

Marine Resources



Extensive field surveys and data collection between 2017 and 2019 has been conducted to update existing baseline information within Bish Cove and throughout the shipping corridor for the following subcomponents:

- Marine Mammals, including underwater noise
- Marine Fish and Habitat
- Marine Water Quality
- Benthic Fauna and Marine Sediment Quality

Economic Conditions

Valued Components

- Economic assessment will consider potential effects on the following subcomponents:
 - Labour Market
 - Economic Development
 - Local Government Finance
- The KLNG Expansion Project is estimating it will require 1800 – 2500 people during the peak construction period. During the operational phase it is expected to provide direct employment for approximately 300 – 450 people.
- Increased job opportunities, financial growth and training opportunities could positively influence economic well being in the local communities.
- Economic risks include goods and services shortages and price inflation in the local area, increased demand for accommodation, and higher demand on local infrastructure and services.
- KLNG is assessing the economic impacts of the expanded project by collecting current baseline data and considering cumulative effects of other projects in the area.

Social Valued Components



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

Baseline data collection involves interviews with Indigenous Groups, local governments and community groups regarding socio-community conditions in Kitimat, Terrace and the surrounding area.

Heritage Valued Components



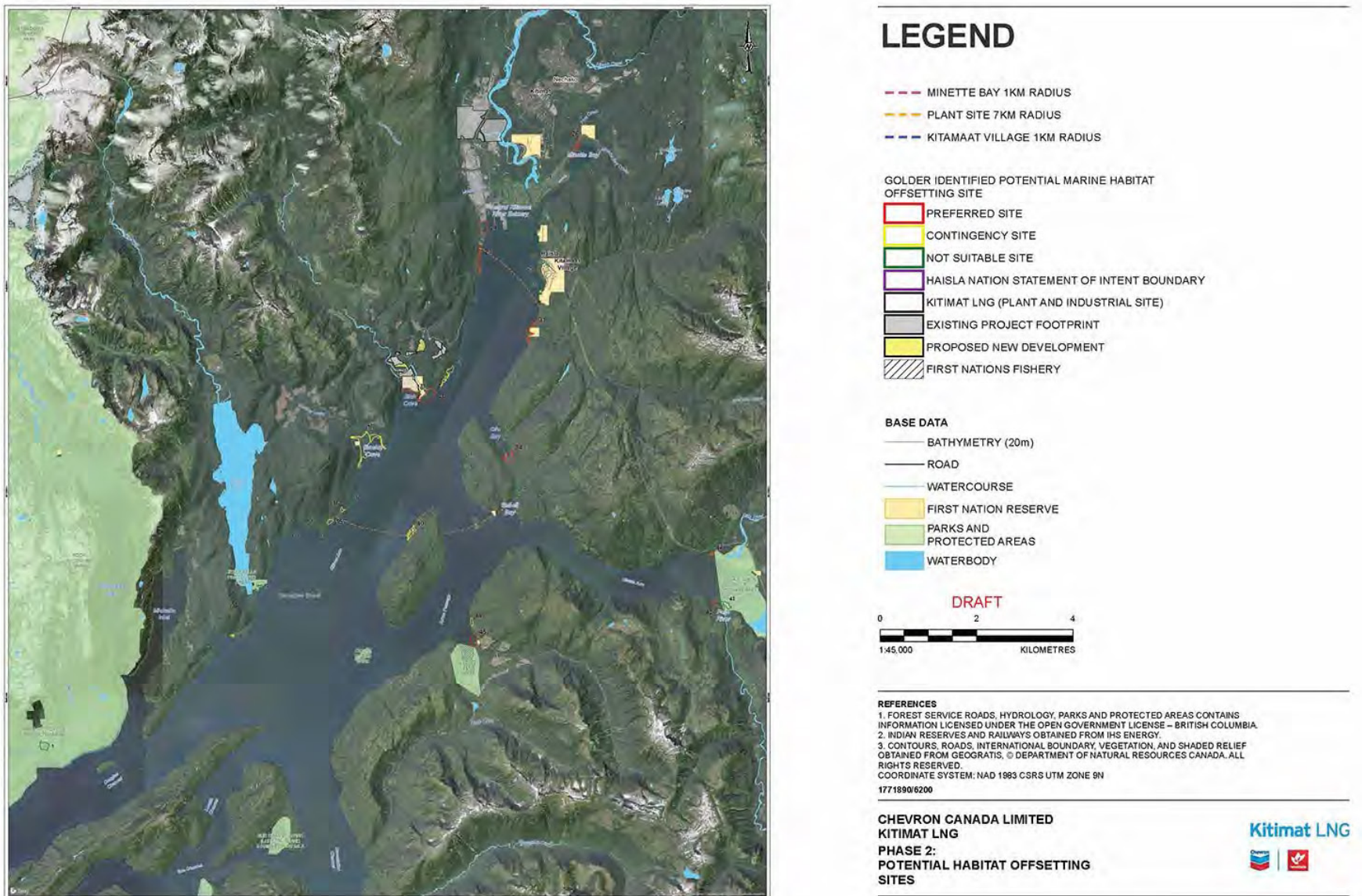
- An Archaeological Impact Assessment (AIA) was previously conducted for the approved project.
- Potential incremental effects of the proposed KLNG Expansion Project on archaeological and heritage resources will be assessed.
- An updated AIA included field surveys in 2017 and 2019 to search for visible evidence of archaeological sites, culturally modified trees.
- (CMTs), historical sites, and architectural features, and to identify landforms with potential for buried archaeological sites.
- Potential impacts include physical disturbance or increased accessibility to archaeological or historical sites could result during clearing, site preparation and construction on the expanded areas of the project.

Health Valued Components



- A human health risk assessment of the proposed KLNG Expansion Project is being conducted.
- Baseline data collection for human health included the collection of country foods (which are edible plants and berries), soil and water from a large area around Kitimat and to the north towards Terrace. Samples were submitted for laboratory analysis to determine background concentrations of potential contaminants of concern.
- 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.

Mitigation Measures



The Environmental Certificate for KLNG requires mitigation of potential adverse effects caused by the project through implementation of 235 commitments agreed upon during original Environmental Assessment Review.

- KLNG is compliant with all commitments.
- Many of the existing commitments will be effective in mitigating potential impacts of the Expansion Project.

Mitigation measures for specific key potential adverse effects of the Expansion Project include but not limited to

- Habitat offsetting in accordance with Fisheries Act Authorizations for impacts due to construction of the Land-Backed Wharf.
- Use of E-drives to reduce Greenhouse Gas emissions.

Eelgrass Transplantation Pilot Project

How It Was Done



- The Eelgrass Transplantation Pilot Project involved carefully removing 2,000 eelgrass shoots from Bish Cove and replanting them at Gobeil Bay and Minette Bay
- Divers surveyed the subtidal eelgrass in Bish Cove using underwater video, and also counted and measured the eelgrass to determine density
- Only subtidal eelgrass was harvested for transplant—this is the eelgrass closest to shore that often dries out during the summer and freezes during winter
- On shore, each harvested shoot was secured with a small anchor—a steel washer—that would help keep the shoot in place when it was replanted
- All shoots were replanted within 24 hours of harvesting
- The new eelgrass locations will be monitored for the next three years to see if the project has been successful, and lessons learned from this project will be applied to future habitat offsetting projects



Eelgrass Transplantation Pilot Project Overview



Bish Cove, the plant location for the proposed Kitimat LNG Project, contains high-value marine fish habitat in the form of eelgrass -- a flowering seagrass that grows in shallow water along the shoreline. Eelgrass provides important habitat for marine species, particularly juvenile salmon.

Our proposed project will result in the loss of eelgrass habitat in Bish Cove. To offset this impact, the pilot project will see if it is possible to move the eelgrass from Bish Cove to other locations in Douglas Channel.

If the project is successful, we may be able to move eelgrass before construction and create new eelgrass beds elsewhere that will provide valuable fish habitat.



Golder Associates and Haisla-Triton performed the eelgrass transplantation project on behalf of Chevron.

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LNG Shipping



- LNG carriers have been traveling the world's oceans for more than 50 years without serious incident.
- LNG carriers are double-hulled which help to prevent leakage or rupture in the event of an accident.
- LNG carriers are equipped with sophisticated leak detection technology, emergency shutdown systems, advanced radar and positioning systems, and numerous other technologies designed to ensure the safe and secure transport of LNG.
- The nature of LNG is
 - that it is non-explosive and non-toxic
 - does not mix with water and is non-polluting and non-toxic.
 - If a release of natural gas were to occur, the it would simply turn into a vapour and dissipate.

Kitimat LNG Terminal Project | Concept Layout Comparison



- 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



REFERENCE(S)

- 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.
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CLIENT

CHEVRON CANADA LIMITED

PROJECT

KITIMAT LNG EXPANSION PROJECT

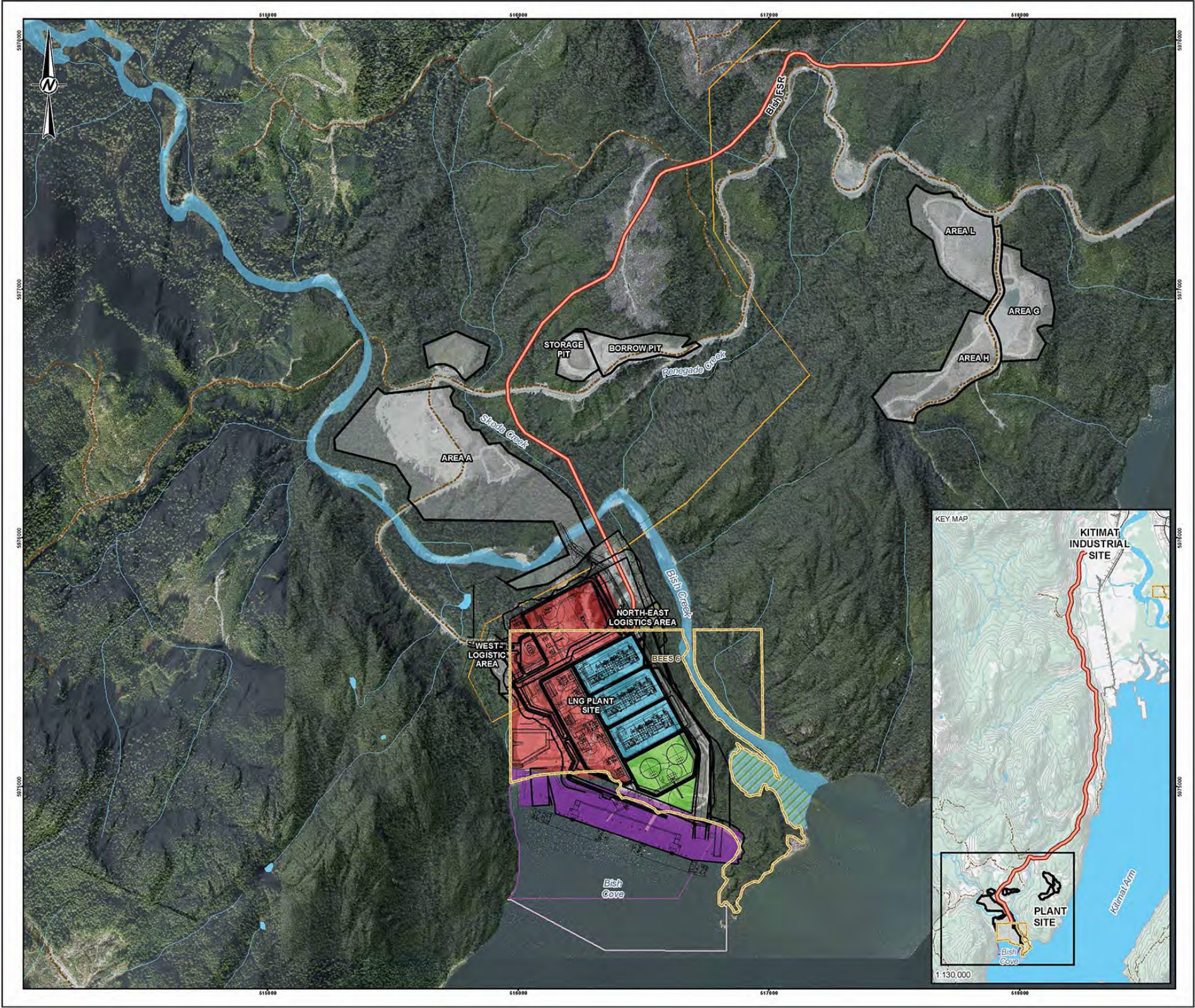
TITLE

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

CONSULTANT	YYYY-MM-DD	2019-10-09
Kitimat LNG	DESIGNED	AC
Chevron	PREPARED	CDB
Woodside	REVIEWED	
	APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A4

Kitimat LNG Terminal Project | Proposed Expansion



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
0 250 500
1:15,000 METRES

REFERENCES

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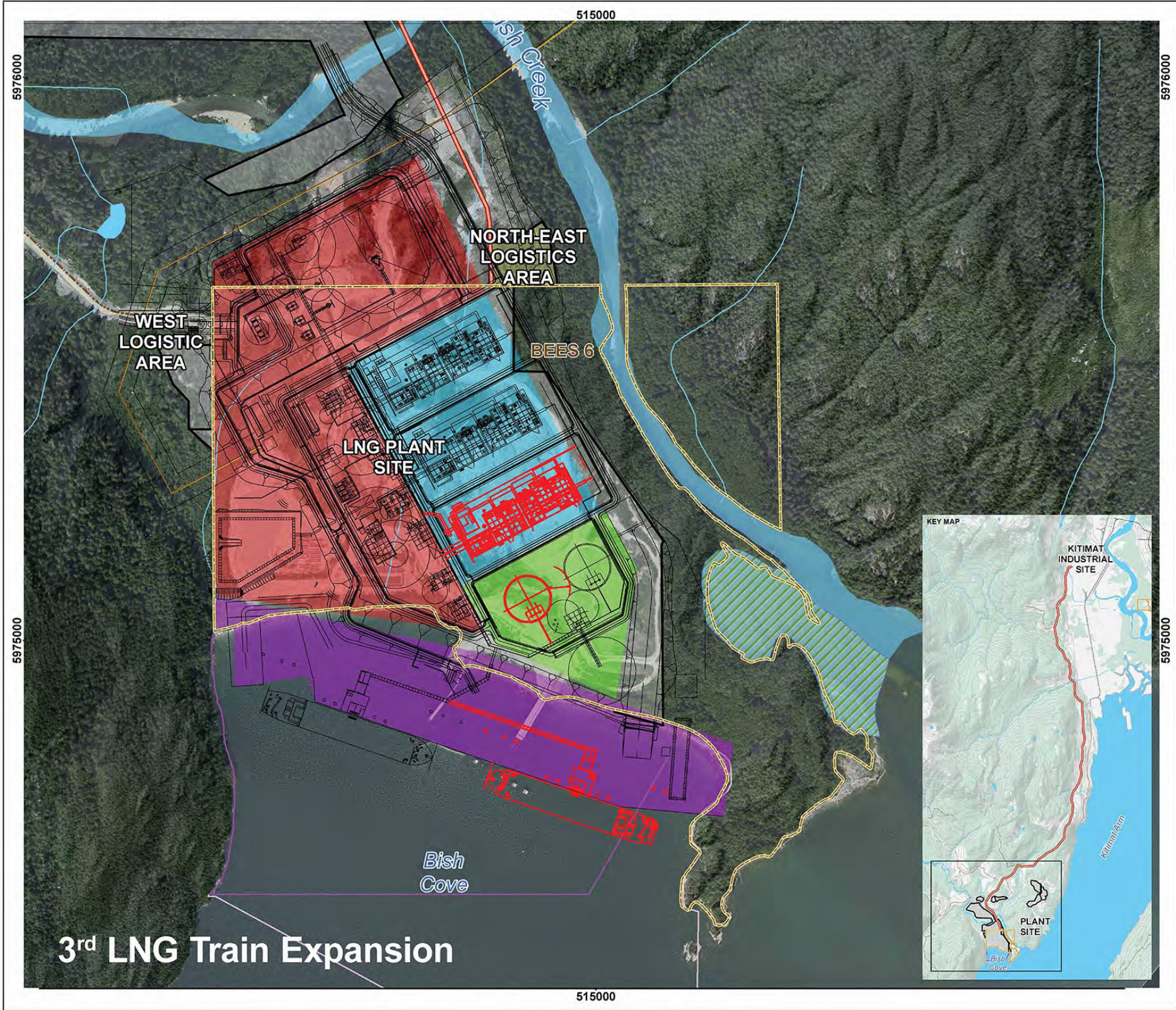
PROJECT
KITIMAT LNG EXPANSION PROJECT

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

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

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	1000	A	A3

Kitimat LNG Terminal Project | Proposed Expansion



LEGEND

PROJECT DATA

- FACILITY LAYOUT - PHASE 1
- FACILITY LAYOUT - PHASE 2
- PROPOSED PIPELINE CORRIDOR
- EXISTING PROJECT FOOTPRINT
- PROPOSED NEW DEVELOPMENT AREA
- EXISTING FORESHORE LEASE AREA
- PROPOSED FORESHORE LEASE AREA

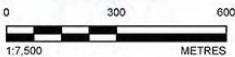
PLANT SITE AREAS

- 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






REFERENCE(S)
1. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
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PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
DETAILED PLANT SITE PLAN PHASE 2

  	YYYY-MM-DD	2019-10-07
	DESIGNED	DK
	PREPARED	RC
	REVIEWED	AC
	APPROVED	DC

PROJECT NO. 19117670 CONTROL 4300 REV. 0 FIGURE 3-4

Kitimat LNG



Kitimat LNG Terminal Project | Proposed Expansion



Foundation Project



3rd LNG Train Expansion

Kitimat LNG Terminal Project | Mitigation Measures



LEGEND

- MINETTE BAY 1KM RADIUS
- PLANT SITE 7KM RADIUS
- KITAMAAT VILLAGE 1KM RADIUS

GOLDER IDENTIFIED POTENTIAL MARINE HABITAT OFFSETTING SITE

- PREFERRED SITE
- CONTINGENCY SITE
- NOT SUITABLE SITE
- HAISLA NATION STATEMENT OF INTENT BOUNDARY
- KITIMAT LNG (PLANT AND INDUSTRIAL SITE)
- EXISTING PROJECT FOOTPRINT
- PROPOSED NEW DEVELOPMENT
- FIRST NATIONS FISHERY

BASE DATA

- BATHYMETRY (20m)
- ROAD
- WATERCOURSE
- FIRST NATION RESERVE
- PARKS AND PROTECTED AREAS
- WATERBODY



REFERENCES
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
1771890/6200

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KITIMAT LNG
PHASE 2:
POTENTIAL HABITAT OFFSETTING
SITES

